B.Tech Syllabus

Electrical Engineering

SATYA College of Engineering & Technology

(Approved by AICTE, Ministry of HRD, Govt of India & DTE, Govt of Haryana and Affiliated to M. D. University, Rohtak)

M.D UNIVERSITY
SCHEME OF STUDIES AND
EXAMINATION
BE. II YEAR ELECTRICAL ENGINEERING SEMESTER – III 2004 -2005

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination	
		L	T	P	Total		Theory	Practic
HUM-201-E	ECONOMICS (Common for all branches)	3	1	-	4	50	100	-
MATH-201-E	MATHEMATICS - III (Common for all branches)	3	2	-	5	50	100	-
EE-201-E	ELECTRICAL ENGINEERING MATERIALS & SEMICONDUCTOR DEVICES (EL,EI,IC,EE)	3	1	-	4	50	100	-
EE-203-E	NETWORK THEORY (EL,EI, IC,EE)	3	1	-	4	50	100	-
EE-207-E	ELECTRICAL MACHINES-I	3	1	-	4	50	100	-
EE-209-E	ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS	3	1	-	4	50	100	-
EE-223-E	NETWORK LAB. (EL,EI, IC,EE)	-	-	2	2	25	-	25
EE-211-E	ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS LAB.	-	-	2	2	25	-	25
EE-231-E	ELECTRICAL WORKSHOP (EL,EI, IC,EE, CHE)	-	-	2	2	25	-	25
EE-215-E	ELECTRIC MACHINES-I LAB.	-	-	3	3	50	-	50
	TOTAL	18	7	9	34	425	600	125

HUM-201-E **ECONOMICS**

(COMMON FOR ALL BRANCHES)

L	T	P		
3	1	-	Class Work	: 50 Marks
			Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam.	: 3 Hrs.

COURSE OBJECTIVE : The purpose of this course is to :

1. Acquaint the student in the basic economic concepts and their operational significance and
2 .Stimulate him to think systematically and objectively about contemporary economic problems.

UNIT-I

Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve Economic laws and their nature. Relation between Science, Engineering, Technology and Economics.

UNIT-II

Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

UNIT-III

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

UNIT-IV

Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, opportunity cost, real cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

UNIT-V

Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligoply, Monoplistic Competition (Main features of these markets)

Supply and Law of Supply, Role of Demand & Supply in Price Determinition and effect of changes in demand and supply on prices.

UNIT-VI

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalisation of Indian economy - merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

Books Recommended :

TEXT BOOKS :

1. Principles of Economics : P.N. Chopra (Kalyani Publishers).
2. Modern Economic Theory – K.K. Dewett (S.Chand)

REFERENCE BOOKS :

1. A Text Book of Economic Theory Stonier and Hague (Longman's Landon)
2. Micro Economic Theory – M.L. Jhingan (S.Chand)
3. Micro Economic Theory - H.L. Ahuja (S.Chand)
4. Modern Micro Economics : S.K. Mishra (Pragati Publications)
5. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.)
6. Indian Economy : Rudar Dutt & K.P.M. Sundhram

NOTE: Eight questions are to be set atleast one question from each unit and the students will have to attempt five questions in all.

MATH-201-E MATHEMATICS-III

(COMMON FOR ALL BRANCHES)

L	T	P				
3	2	-	Class Work	:	50	Marks
			Exam.	:	100	Marks
			Total	:	150	Marks

Duration of exam. : 3 Hours

Part-A

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and consine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

Part-B

Functions of Complex Variable : Definition, Exponential function, Trignometric and Hyperbolic functions, Logrithmic functions. Limit and Continuity of a function, Differnetiability and Analyticity.

Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and formula.

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi circle only).

Part-C

Probability Distributions and Hypothesis Testing : Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.

Linear Programming : Linear programming problems formulation, Solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

TEXT BOOKS :

1. Advanced Engg. Mathematics : F Kreyszig.
2. Higher Engg. Mathematics : B.S. Grewal.

REFERENCE BOOKS :

1. Advance Engg. Mathematics : R.K. Jain, S.R.K.Iyenger.
2. Advanced Engg. Mathematics : Michael D. Greenberg.
3. Operation Research : H.A. Taha.
4. Probability and statistics for Engineers : Johnson. PHI.

Note: Examiner will set eight questions, taking two from Part-A, three from Part-B and three from Part-C. Students will be required to attempt five question taking atleast one from each part.

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EE-201-E ELECTRICAL ENGINEERING MATERIALS AND SEMICONDUCTOR DEVICES

L T P		CLASS WORK	: 50
3 1 0		EXAM	: 100
		TOTAL	: 150
		DURATION OF EXAM	: 3 HRS

UNIT 1 CONDUCTING MATERIALS:
Review of energy bands, description of materials, drift velocity, collision time, Mean free path, mobility, conductivity, relaxation time, factors affecting conductivity of materials, types of thermal conductivity, Wiedmann-Franz law, super conductivity, effect of magnetic field, conducting materials, applications.

UNIT 2 DIELECTRIC MATERIALS:
Behaviour of dielectric materials in static electric field, Dipole moments, Polarization, Dielectric constant, Polarizability, Susceptibility, mechanisms of polarization, behaviour in alternating field, dielectric loss, loss tangent, types of dielectric & insulating materials, electrostriction, Piezo-electricity, Applications.

UNIT 3 MAGNETIC MATERIALS:
Permeability, Magnetic susceptibility, magnetic moment, Magnetization, Dipole moment, types of magnetic materials, Magnetostriction, eddy current & hysteresis losses, applications.

UNIT 4 SEMICONDUCTORS:
Review of Si and Ge as semiconducting materials, Continuity Equation, P-N junction, Drift & Diffusion, Diffusion & Transition capacitances of P-N junction.

UNIT 5 CONSTRUCTION AND CHARACTERISTICS OF DEVICES:
Brief introduction to Planar Technology for device fabrication., metal -semiconductor junctions (ohmic and non-ohmic), breakdown mechanisms in p-n junction, zener diode, electrical and optical excitation in diodes, LED, solar cells and photo-detectors.

UNIT 6 BIPOLAR AND MOS DEVICES :
BJT, UJT, JFET, MOSFETS

UNIT 7 POWER DEVICES :
Thyristor, Diac, Triac, GTO, IGBT, VMOS

TEXT BOOKS:
1. Electrical Engineering Materials: A.J. Dekker; PHI.
2. Solid State Electronic Devices : StreetMan & Banerjee; Pearson.
3. Electronic Devices & Circuits: Millman & Halkias; MGH.

REFERENCE BOOKS:
1. Electrical Engineering Materials: S.P Seth & P.V Gupta; Dhanpat Rai.

2. Text Book of Power Electronics : H.C.Rai; Galgoitia Publication.

3 Electronic Devices & Circuit Theory : Boylestad & Nashelsky;
Pearson. 4. Semiconductor devices : Jaspreet Singh; John Wiley.

NOTE : Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

EE-203-E **NETWORK THEORY**

L T P			
3 1 0	CLASS WORK	:	50
	EXAM	:	100
	TOTAL	:	150
	DURATION OF EXAM	:	3 HRS

UNIT I TRANSIENT RESPONSE :
Transient Response of RC, RL, RLC Circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using laplace transform.

UNIT 2 NETWORK FUNCTIONS :
Terminal pairs or Ports, Network functions for one-port and two-port networks, poles and zeros of Network functions, Restrictions on pole and zero Locations for driving point functions and transfer functions, Time domain behavior from the pole-zero plot.

UNIT 3 CHARACTERISTICS AND PARAMETERS OF TWO PORT NETWORKS :
Relationship of two-port variables, short-circuit Admittance parameters, open circuit impedance, parameters, Transmission parameters, hybrid parameters, relationships between parameter sets, Inter-connection of two port networks.

UNIT 4 TOPOLOGY :
Principles of network topology , graph matrices, network analysis using graph theory.

UNIT 5 TYPES OF FILTERS AND THEIR CHARACTERISTICS :
Filter fundamentals, high-pass, low-pass, band-pass, and band-reject Filters.

UNIT 6 NETWORK SYNTHESIS :
Positive real functions, synthesis of one port and two port networks, elementary ideas of Active networks.

TEXT BOOKS:

1. Network Analysis & Synthesis : Umesh Sinha; Satya Prakash Pub.
2. Network Analysis & Synthesis : F.F.Kuo; John Wiley & Sons Inc.

REFERENCE BOOKS:

1. Introduction to modern Network Synthesis : Van Valkenburg; John Wiley
2. Network Analysis: Van Valkenburg; PHI
3. Basic circuit theory:Dasoer Kuh; McGraw Hill.
4. A Course in Electrical Circuit Analysis by Soni & Gupta; Dhanpat Rai Publication.
5. Circuit Analysis : G.K. Mithal; Khanna Publication.
6. Networks and Systems : D.Roy Choudhury; New Age International.

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

EE-207-E ELECTRICAL MACHINES - I

L	T	P		
3	1	-	Theory	:100 Marks
			Class work	: 50 Marks
			Total	:150 Marks
			Duration of Exam	**:3 Hrs.**

TRANSFORMERS: Principle, construction of core, winding & tank, operation, testing of single phase transformer, equivalent circuit, phasor diagram, parameters determination, P.U. representation of parameters, regulation, losses & efficiency, separation of iron losses.

Various types of connection of three phase transformer, their comparative features, Zig-Zag

connection. Parallel operation of single phase & three phase transformers.

Auto-transformer: Principle, construction, comparison with two winding transformers, application.

Nature of magnetizing current, plotting of magnetising current from B-H curve, Inrush current, harmonics, effect of construction on input current, connection of three phase transformer.

Phase-Conversion: Three to two phase, three to six phase and three to twelve phase conversions.

Introduction to three winding, tap-changing & phase-shifting transformers.

D.C. MACHINES: Elementary DC machine, principle & construction of D.C. generator, simplex lap and wave windings, E.M.F. equation, armature reaction, compensating winding, commutation, methods of excitation, load characteristics, parallel operation. Principle of DC Motors, torque and output power equations, load characteristics, starting, speed control, braking, testing, efficiency & applications.

TEXT BOOKS:

1. Electric Machines: I.J.Nagrath and D.P.Kothari, TMH, New Delhi.
2. Performance & Design of D.C. Machines: A.E. Clayton & N.N. Hancock; ELBS)

REF. BOOKS:

1. Electric Machinery, Fitzgerald & Kingsley, MGH.
2. Theory of alternating current machinery, A.S. Langsdorf , TMH.
3. Electrical Machines, P.S.Bhimbra, Khanna Publishers Delhi

NOTE: 4 questions are to be set from part A & 4 questions from part B. Students have to attempt five questions with at-least two from each part.

EE-209-E ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

L	T	P
3	1	0

Class Work	:50
Exam	:100
Total	:150
Duration of Exam	:3hrs

UNIT-I: UNITS STANDARDS & ERRORS: S.I. units, Absolute standards (International, Primary, Secondary & Working Standards), True Value, Errors (Gross, Systematic, Random); Static Characteristic of Instruments (Accuracy, Precision, Sensitivity, Resolution & threshold).

UNIT-II: MEASURING SYSTEM FUNDAMENTALS: Classification of Instruments (Absolute & Secondary Instruments; Indicating, Recording & Integrating instruments; Based upon Principle of operation), Generalized Instrument (Block diagram, description of blocks), three forces in Electromechanical indicating instrument (Deflecting, controlling & damping forces), Comparison between gravity & spring controls; Comparison of damping methods & their suitability, bearing supports, pivot-less supports (Simple & taut-band), Scale information, Instrument cases (Covers).

UNIT-III: MEASURING INSTRUMENTS: Construction, operating principle, Torque equation, Shape of scale, use as Ammeter or as Voltmeter (Extension of Range), Use on AC/DC or both, Advantages & disadvantages, Errors (Both on AC/DC) of PMMC types, Electrodynamic Type, Moving iron type (attraction, repulsion & combined types), Hot wire type & Induction type, Electrostatic type Instruments.

UNIT- IV: WATTMETERS & ENEGRY METERS: Construction, operating principle, Torque equation, Shape of scale, Errors, Advantages & Disadvantages of Electrodynamic & Induction type Wattmeters; & single phase induction type Energy meter, Compensation & creep in energy meter.

UNIT-V: POWER FACTOR & FREQUENCY METERS: Construction, operation, principle, Torque equation, Advantages & disadvantages of Single phase power factor meters (Electrodynamic & Moving Iron types) & Frequency meters (Electrical Resonance Type, Ferrodynamic & Electrodynamic types).

UNIT-VI: LOW & HIGH RESISTANCE MEASUREMENTS: Limitations of Wheatstone bridge; Kelvin's double bridge method, Difficulties in high resistance measurements, Measurement of high resistance by direct deflection, loss of charge method, Megohm bridge & Meggar.

UNIT-VII: A.C. BRIDGES: General balance =n, Ckt. diagram, Phasor diagram, Advantages, disadvantages, applications of Maxwell's inductance, inducance-capacitance, Hays, Anderson, Owens, De-Sauty's, Schering & Weins bridges, Shielding & earthing.

TEXT BOOK: 1. A Course in Elect. & Electronic Measurement & Instrumentation by A. K. Sawhney; Khanna Pub.

REFERENCE BOOKS: 1. Electrical Measurments by E.W. Golding

2. Electronic & Elect. Measurment & Instrumention by J.B.Gupta; Kataria & Sons.
3. Electronic Instrumentation & Measurment Technique, W.D.Cooper & A.D. Helfrick.
4. Measuring Systems by E.O. Doeblin; TMH.

NOTE: 5 out of 8 questions be attempted; at least 1 question be set from each unit.

EE-223-E **NETWORK THEORY LAB**

L	T	P			
		25	CLASS WORK	:	
0	0				
2			EXAM	:	25
			TOTAL	:	50
					3
			DURATION OF EXAM	:	HRS

LIST OF EXPERIMENTS :

1. Transient response of RC circuit.

2. Transient response of RL circuit.

3. To find the resonance frequency, Band width of RLC series circuit.

4. To calculate and verify "Z" parameters of a two port network.

5. To calculate and verify "Y" parameters of a two port network.

6. To determine equivalent parameter of parallel connections of two port network.

7. To plot the frequency response of low pass filter and determine half-power frequency.

8. To plot the frequency response of high pass filter and determine the half-power frequency.

9. To plot the frequency response of band-pass filter and determine the band-width.

10. To calculate and verify "ABCD" parameters of a two port network.

11. To synthesize a network of a given network function and verify its response.

12. Introduction of P-Spice

NOTE : Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

ELECTRICAL MEASURMENTS & MEASURING INSTRUMENTS LAB

EE-211-E

L	T	P
0	0	2

Class Work : 25
Exam : 25
Total : 50
Duration of Exam : 3hrs

LIST OF EXPERIMENTS :

1. To identify the meters from the given lot.
2. To convert & calibrate a D'Arsonnal type galvanometer into a voltmeter & an ammeter.
3. To calibrate an energy meter with the help of a standard wattmeter & a stop watch.
4. To measure power & p.f. by 3-ammeter method.
5. To measure power & p.f by 3-voltmeter method.
6. To measure power & p.f in 3-phase circuit by 2-wattmeter method.
7. To measure capacitance by De Sauty's bridge.
8. To measure inductance by maxwell's bridge.
9. To measure frequency by Wien's bridge.
10. To measure the power with the help of C.T & P.T.
11. To measure magnitude & phase angle of a voltage by rectangular type potentiometer.
12. To measure magnitude & phase angle of a voltage by polar type potentiometer.
13. To measure low resistance by Kelvin's double bridge.
14. To measure high resistence by loss of charge method.

Note: At least 7 experiments should be performed from above list. Remaining 3 experiments may either be performed from above list or designed & set by concerned institution as per scope of syllabus.

EE-231-E **ELECTRICAL WORKSHOP**

L	T	P			
		25	CLASS WORK	:	
0	0				
2			EXAM	:	25
			TOTAL	:	50
			DURATION OF EXAM	:	3 HRS

LIST OF EXPERIMENTS:

1. Introduction of tools, electrical materials, symbols and abbreviations.
2. To study stair case wiring.
3. To study house wiring i.e., batten, cleat, casing-caping and conduit wirings.
4. To study fluorescent tube light.
5. To study high pressure mercury vapour lamp (H.P.M.V).
6. To study Sodium lamp.
7. To study repairing of home appliances such as heater, electric iron, fans etc.
8. To study construction of moving iron, moving coil, electrodynamic & induction type meters.
9. To design & fabricate single phase transformer.
10. To study fuses, relays, contactors, MCBs and circuit breakers.
11. Insulation testing of electrical equipments.
12. To design, fabricate a PCB for a circuit, wire-up and test.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.

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EE-215-E Electrical Machine Lab-I

L T P	**Practical**	**:50 Marks**
- - 3	Class work	:50 Marks
	Total	:100 Marks
	Duration of Exam	:3 Hrs.

LIST OF EXPERIMENTS

1. To find turns ratio & polarity of a 1-phase transformer.
2. To perform open & short circuit tests on a 1-phase transformer.
3. To perform Sumpner's Back to back test on 1-phase transformers.
4. Parallel operation of two 1-phase transformers.
5. To convert three phase to 2-phase By Scott-connection.
6. To perform load test on DC shunt generator.
7. Speed control of DC shunt motor.
8. Swinburne’s test of DC shunt motor.
9. Hopkinson’s test of DC shunt M/Cs.
10. Ward Leonard method of speed control.

NOTE: At least 10 experiments be performed in the semester. At least seven experiments should be performed from above list. Remaining 3 experiments may either be performed from the above list or designed & set by concerned institution as per scope of syllabus.

M.D UNIVERSITY
SCHEME OF STUDIES AND
EXAMINATION
BE. II YEAR ELECTRICAL ENGINEERING SEMESTER – IV 2004 -2005

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination	
		L	T	P	Total		Theory	Practical
HUM-202-E	FUNDAMENTALS OF MANAGEMENT (EE,EL,ME,CHE,EI,IC)	3	1	-	4	50	100	-
MATH-202-E	NUMERICAL METHODS (EE,EL,EI, IC,CHE)	3	2	-	5	50	100	-
EE-202-E	ANALOG ELECTRONICS (EL,EI, IC,EE)	3	1	-	4	50	100	-
EE-204-E	DIGITAL ELECTRONICS (EL,EI, IC,EE)	3	1	-	4	50	100	-
EE-206-E	COMMUNICATION SYSTEMS (EL,EE and common with 6th Sem. – EI)	3	1	-	4	50	100	-
EE-212-E	FIELDS AND WAVES	3	1	-	4	50	100	-
EE-222-E	ANALOG ELECTRONICS LAB (EL,EI, IC,EE)	-	-	2	2	25	-	25
EE-224-E	DIGITAL ELECTRONICS LAB (EL,EI, IC,EE)	-	-	2	2	25	-	25
EE-226-E	COMMUNICATION SYSTEMS LAB (EL,EE)	-	-	2	2	25	-	25
MATH-204-E	NUMERICAL METHODS LAB (EE,EL,EI,IC,CHE)	-	-	2	2	25	-	25
GPEE-204-E	GENERAL PROFICIENCY	-	-	-	-	50	-	-
	TOTAL	18	7	8	33	450	600	100

Note : 1. Practical training of 4 weeks duration during summer vacations and its evaluation in 5th Semester.

2. Students will be allowed to use Non-Programmable Scientific Calculator. However, Sharing of calculator will not be permitted.

HUM-202-E FUNDAMENTALS OF MANAGEMENT

L	T	P		
3	1	-	Class Work	: 50 Marks
			Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam.	: 3 Hrs.

10. UNIT-I

Meaning of management, Definitions of Management, Characteristics of management, Management Vs. Administration.

Management-Art, Science and Profession. Importance of Management. Development of Management thoughts. Principles of Management. The Management Functions, Inter-relationship of Managerial functions.

UNIT-II

Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning,

Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.

UNIT-III

Production Management : Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods.

UNIT-IV

Marketing Management - Definition of marketing, Marketing concept, objectives & Functions of marketing. Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.

UNIT-V

Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.

BOOKS RECOMMENDED :

TEXT BOOKS :

1. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S. Bhalla. (Kalyani Publishers)
2. Organisation and Management - R.D. Aggarwal (Tata Mc Graw Hill)

REFERENCE BOOKS :

1. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)
2. Management – Harold, Koontz and Cyrilo Donell (Mc.Graw Hill).
3. Marketing Management – S.A. Sherlikar (Himalaya Publishing House, Bombay).
4. Financial Management - I.M. Pandey (Vikas Publishing House, New Delhi)
5. Management - James A.F. Stoner & R.Edward Freeman, PHI.

NOTE: Eight questions are to be set atleast one question from each unit and the students will have to attempt five questions in all.

MATH-202-E NUMERICAL METHODS

(COMMON FOR EE,EL,CHE,EI,IC & ELECTIVE FOR CSE,IT IN 8th SEM.)

L	T	P				
3	1	-	Sessional	:	50	Marks
			Exam.	:	100	Marks
			Total	:	150	Marks

Duration of exam. : 3 Hours

Part-A

Interpolation and curve fitting : Interpolation problem, Lagrangian polynomials, Divided differences, Interpolating with a cubic spline, Bezier curves and B-spline curves, Least square approximations.

Non-Linear Equations : Bisection method, Linear Interpolation methods, Newton's method, Muller's method, fixed-point method.

Simultaneous Linear Equations : Elimination method, Gauss and Gauss-Jordan method, Jacobi's method, Gauss-Seidal method, Relaxation method.

Numerical Differentiation and Integration : Derivatives from differences tables, Higher order derivatives, Extrapolation techniques, Newton-cotes integration formula, Trapezoidal rule, Simpson's rules, Boole's rule and Weddle's rule, Romberg's Integration.

Part-B

Numerical Solution of Ordinary Differential Equations : Taylor series method, Euler and modified Euler method, Runge-Kutta methods, Milne's method, Adams-Moulton method, Power method for Eigen values by iteration.

Numerial Solution of Partial Differential Equations : Finite difference approximations of partial derivatives, solution of Laplace equation (Standard 5-point formula only), one-dimensional heat equation (Schmidt method, Crank-Nicolson method, Dufort and Frankel method) and wave equation.

TEXT BOOKS :

1. Applied Numerical Analysis : Curtis F. Gerald and Patrick G. Wheatley-Pearson, Education Ltd.
2. Numerical Method : E. Balagurusamy T.M.H.

REFERENCE BOOKS :

1. Numerical Methods for Scientific and Engg. Computations : M.K. Jain, S.R.K. Iyenger and R.K. Jain-Wiley Eastern Ltd.
2. Introductory Methods of Numerical Analysis S.S. Sastry, P.H.I.
3. Numerical Methods in Engg. & Science : B.S. Grewal.

Note: Examiner will set eight questions, taking four from Part-A and four from Part-B. Students will be required to attempt five questions taking atleast two from each part.

EE-202-E **ANALOG ELECTRONICS**

L	T	P			
3	1	0	CLASS WORK	:	50
			EXAM	:	100
			TOTAL	:	150
			DURATION OF EXAM	:	3 HRS

UNIT 1 SEMICONDUCTOR DIODE :

P-N junction and its V-I Characteristics, P-N junction as a rectifier, Switching characteristics of Diode.

UNIT 2 DIODE CIRCUITS :

Diode as a circuit element, the load-line concept, half-wave and full wave rectifiers, clipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

UNIT 3 TRANSISTOR AT LOW FREQUENCIES:

Bipolar junction transistor : operation, characteristics, Ebers-moll model of transistor, hybrid model, h - parameters (CE, CB, CC configurations), analysis of a transistor amplifier circuits using h-parameters, emitter follower, Miller's Theorem , frequency response of R-C coupled amplifier.

UNIT 4 TRANSISTOR BIASING :

Operating point, bias stability, collector to base bias, self-bias, emitter bias, bias compensation, thermistor & sensistor compensation.

UNIT 5 TRANSISTOR AT HIGH FREQUENCIES:

Hybrid P model, CE short circuit current gain, frequency response, alpha, cutoff frequency, gain bandwidth product, emitter follower at high frequencies.

UNIT 6 FIELD EFFECT TRANSISTORS :

Junction field effect transistor, pinch off voltage, volt-ampere characteristics, small signal model, MOSFET Enhancement & Depletion mode, V-MOSFET.Common source amplifier, source follower, biasing of FET, applications of FET as a voltage variable resistor (V V R).

UNIT 7 REGULATED POWER SUPPLIES :

Series and shunt voltage regulators, power supply parameters, three terminal IC regulators, SMPS.

TEXT BOOK :

1 .Integrated Electronics: Millman & Halkias ; McGrawHill
2. Electronic circuit analysis and design (Second edition): D.A.Neamen; TMH

REFERENCE BOOKS:

1. Electronics Principles: Malvino ; McGrawHill
2. Electronics Circuits: Donald L. Schilling & Charles Belove ; McGrawHill
3. Electronics Devices & Circuits: Boylestad & Nashelsky ; Pearson.

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

EE-204-E **DIGITAL ELECTRONICS**

L	T	P			
3	1	0	CLASS WORK	:	50
			EXAM	:	100
			TOTAL	:	150
			DURATION OF EXAM	:	3 HRS

UNIT 1 FUNDAMENTALS OF DIGITAL TECHNIQUES :
Digital signal, logic gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, Boolean algebra. Review of Number systems. Binary codes: BCD, Excess-3, Gray, EBCDIC, ASCII, Error detection and correction codes.

UNIT 2 COMBINATIONAL DESIGN USING GATES:
Design using gates, Karnaugh map and Quine Mcluskey methods of simplification.

UNIT 3 COMBINATIONAL DESIGN USING MSI DEVICES
Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders / Subtractors, BCD arithmetic circuits, Encoders, Decoders / Drivers for display devices.

UNIT 4 SEQUENTIAL CIRCUITS:
Flip Flops : S-R, J-K, T, D, master-slave, edge triggered, shift registers, sequence generators, Counters, Asynchronous and Synchronous Ring counters and Johnson Counter, Design of Synchronous and Asynchronous sequential circuits.

UNIT 5 DIGITAL LOGIC FAMILIES:
Switching mode operation of p- n junction, bipolar and MOS. devices. Bipolar logic families:RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic, Interfacing of CMOS and TTL families.

UNIT 6 A/D AND D/A CONVERTERS:
Sample and hold circuit, weighted resistor and R -2 R ladder D/A Converters, specifications for D/A converters. A/D converters : Quantization, parallel -comparator, successive approximation, counting type, dual-slope ADC, specifications of ADCs.

UNIT 7 PROGRAMMABLE LOGIC DEVICES:
ROM, PLA, PAL, FPGA and CPLDs.

TEXT BOOK :
1. Modern Digital Electronics(Edition III) : R. P. Jain; TMH

REFERENCE BOOKS :
1. Digital Integrated Electronics : Taub & Schilling; MGH
2. Digital Principles and Applications : Malvino & Leach; McGraw Hill.
3. Digital Design : Morris Mano; PHI.

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NOTE : Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

EE-206-E **COMMUNICATION SYSTEMS**

(EE,EL,EI)

L T P		CLASS WORK	: 50
3 1 0		EXAM	: 100
		TOTAL	: 150
		DURATION OF EXAM	: 3 HRS

UNIT 1. INTRODUCTION TO COMMUNICATION SYSTEMS :
The essentials of a Communication system, modes and media's of Communication, Classification of signals and systems , Fourier Analysis of signals.

UNIT 2. AMPLITUDE MODULATION :
Amplitude modulation, Generation of AM waves, Demodulation of AM waves, DSBSC, Generation of DSBSC waves, Coherent detection of DSBSC waves, single side band modulation, generation of SSB waves, demodulation of SSB waves, vestigial sideband modulation (VSB).

UNIT 3. ANGLE MODULATION :
Basic definitions: Phase modulation (PM) & frequency modulation(FM), narrow band frequency modulation, wideband frequency modulation, generation of FM waves, Demodulation of FM waves.

UNIT 4. PULSE ANALOG MODULATION :
Sampling theory, time division (TDM) and frequency division (FDM) multiplexing, pulse amplitude modulation (PAM), pulse time modulation.

UNIT 5. PULSE DIGITAL MODULATION :
Elements of pulse code modulation, noise in PCM systems, Measure of information, channel capacity, channel capacity of a PCM system, differential pulse code modulation (DPCM). Delta modulation (DM)

UNIT 6. DIGITAL MODULATION TECHNIQUES:
ASK, FSK, BPSK, QPSK, M-ary PSK.

UNIT 7. INTRODUCTION TO NOISE:
External noise, Internal noise, S/N ratio, noise figure.

TEXT BOOKS :
1. Communication systems (4th edn.) : Simon Haykins; John wiley & sons.
2. Communication systems: Singh & Sapre; TMH.

REFERENCE BOOKS :
1. Electronic Communication systems : Kennedy; TMH.
2. Communication Electronics : Frenzel; TMH.
3. Communication system : Taub & Schilling; TMH.
4. Communication systems : Bruce Carlson.

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

EE-212-E **FIELDS AND WAVES**

L T P				
3 1 0	CLASS WORK	:		50
	EXAM	:	100	
	TOTAL	:	150	
	DURATION OF EXAM	:	3 HRS	

UNIT-1: STATIC ELECTRIC FIELDS: Coulomb's Law, Gauss's Law, potential function, field due to a
continuous distribution of charge, equi-potential surfaces, Gauss's Theorem, Poison's equation, Laplace's equation, method of electrical images, capacitance, electro-static energy, boundary conditions, the electro-static uniqueness theorem for field of a charge distribution, Dirac-Delta representation for a point charge and an infinitesimal dipole.

UNIT-2: STEADY MAGNETIC FIELDS: Faraday Induction law, Ampere's Work law in the differential vector form, Ampere's law for a current element, magnetic field due to volume distribution of current and the Dirac-delta function, Ampere's Force Law, magnetic vector potential, vector potential (Alternative derivation), far field of a current distribution, equation of continuity.

UNIT-3: TIME VARYING FIELDS: Equation of continuity for time varying fields, inconsistency of Ampere's law, Maxwell's field equations and their interpretation, solution for free space conditions, electromagnetic waves in a homogeneous medium, propagation of uniform plane-wave, relation between E & H in a uniform plane-wave, wave equations for conducting medium, Maxwell's equations using phasor notation, wave propagation in a conducting medium, conductors, dielectrics, wave propagation in good conductor and good dielectric, depth of penetration, polarization, linear, circular and elliptical,

UNIT-4: REFLECTION AND REFRACTION OF E M WAVES: Reflection and refraction of plane waves at the surface of a perfect conductor & perfect dielectric (both normal incidence as well as oblique incidence), Brewester's angle and total internal reflection, reflection at the surfaces of a conductive medium, surface impedance, transmission-line analogy, poynting theorem, interpretation of E x H, power loss in a plane conductor.

UNIT-5: TRASMISSION LINE THEORY: Transmission line as a distributed circuit, transmission line equation, travelling ,standing waves , characteristic impedance, input impedance of terminated line, reflection coefficient, VSWR, Smith's chart and its applications.

TEXT BOOKS:
1. Electro-magnetic Waves and Radiating System: Jordan & Balmain, PHI.

REFRENCE BOOKS:
1. Engineering Electromagnetics: Hayt; TMH
2. Electro-Magnetics : Krauss J.DF; Mc Graw Hill.

NOTE: 8 questions are to be set, atleast one from each unit. Students have to attempt any 5 questions.

EE-222-E **ANALOG ELECTRONICS-LAB**

L	T	P			
			CLASS WORK	:	25
0	0	2	EXAM	:	25
			TOTAL	:	50
			DURATION OF EXAM	:	3 HRS

11. LIST OF EXPERIMENTS:

1. Study of Half wave & full wave rectifiers.
2. Study of power supply filters.
3. Study of Diode as clipper & clamper.
4. Study of Zener diode as a voltage regulator.
5. Study of CE amplifier for voltage, current & Power gains and input, output impedances..
6. Study of CC amplifier as a buffer.
7. To study the frequency response of RC coupled amplifier.
8. Study of 3-terminal IC regulator.
9. Study of transistor as a constant current source in CE configuration.
10. Study of FET common source amplifier.
11. Study of FET common Drain amplifier.
12. Graphical determination of small signal hybrid parameters of bipolar junction transistor.
13. Study & design of a d.c. voltage doubler.

NOTE : At least ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EE-224-E **DIGITAL ELECTRONICS LAB**

L	T	P			
			CLASS WORK	:	25
0	0	2	EXAM	:	25
			TOTAL	:	50
			DURATION OF EXAM	:	3 HRS

LIST OF EXPERIMENTS:

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.

2. Design & realize a given function using K-maps and verify its performance.

3. To verify the operation of multiplexer & Demultiplexer.

4. To verify the operation of comparator.

5. To verify the truth tables of S-R, J-K, T & D type flip flops.

6. To verify the operation of bi-directional shift register.

7. To design & verify the operation of 3-n bit synchronous counter.

8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.

9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.

10. To design & realize a sequence generator for a given sequence using J-K flip-flops.

11. Study of CMOS NAND & NOR gates and interfacing between TTL and CMOS gates.

12. Design a 4-bit shift-register and verify its operation . Verify the operation of a ring counter and a Johnson counter.

NOTE : At least ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EE-226-E **COMMUNICATION SYSTEMS LAB**

L	T	P			
		25	CLASS WORK	:	
0	0				
2			EXAM	:	25
			TOTAL	:	50
					3
			DURATION OF EXAM	:	HRS

LIST OF EXPERIMENTS:

1. Study of Amplitude Modulation and determination of Modulation index.
2. Study of Frequency Modulation and determination of Modulation index.
3. Study of Phase Modulation.
4. Study of Pulse Amplitude Modulation.
5. Study of Pulse Width Modulation.
6. Study of Pulse Frequency Modulation.
7. Study of Pulse Code Modulation.
8. Study of frequency Shift Keying.
9. Study of ASK and QASK.
10. Study of PSK and QPSK.
11. Project related to the scope of the course.

NOTE: Atleast ten experiments are to be performed , atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

MATH-204-E NUMERICAL METHODS LAB.

(COMMON FOR EE,EL,CHE,EI)

L	T	P				
-	-	2	Class Work	:	25	Marks
			Exam.	:	25	Marks
			Total	:	50	Marks

Duration of exam. : 2 Hours

WRITE DOWN AND EXECUTE THE FOLLOWING PROGRAMS USING C/C++/MATLAB

1. To find the roots of non-linear equation using Bisection method.
2. To find the roots of non-linear equation using Newton's method.
3. Curve fitting by least - square approximations.
4. To solve the system of linear equations using Gauss-Elimination method.
5. To solve the system of linear equations using Gauss-Seidal iteration method.
6. To solve the system of linear equations using Gauss-Jorden method.
7. To Integrate numerically using Trapezoidal rule.
8. To Integrate numerically using Simpson's rules.
9. To find the largest eigen value of a matrix by power-method.
10. To find numerical solution of ordinary differential equations by Euler's method.
11. To find numerical solution of ordinary differential equations by Runge-Kutta method.
12. To find numerical solution of ordinary differential equations by Milne's method.
13. To find the numerical solution of Laplace equation.
14. To find numerical solution of wave equation.
15. To find numerical solution of heat equation.

BOOKS SUGGESTED :

1. Applied Numerical Analysis by Curtis F. Gerald and Patrick G. Wheatley- Pearson, Education Ltd.
2. Numerical Methods : E. Balagurusamy T.M.H.

Note: Ten experiments are to be performed out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed by the concerned institution as per the scope of the syllabus.

M.D. UNIVERSITY, ROHTAK
Scheme of studies & Examination
Bachelor of Engineering (Electrical Engg.)
Scheme of studies / Examination SEMESTER V
EFFECTIVE FROM 2005-06 SESSION

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination	
		L	T	P	Total		Theory	Practical
EE-311-E	ELECTRICAL MACHINES-II	3	1	-	4	50	100	-
EE-303-E	ELECTRONIC MEASUREMENT AND INSTRUMENTATION (EL,EI, IC,EE)	3	1	-	4	50	100	-
EE-305-E	ANALONG ELECTRONICS CIRCUITS (EL, EE, EI, IC)	3	1	-	4	50	100	-
EE-315-E	POWER SYSTEMS-I	3	1	-	4	50	100	-
EE-317-E	POWER ELECTRONICS (Common with VI-sem EI, IC)	3	1	-	4	50	100	-
EE-313-E	MICROPROCESSOR (8085), INTERFACING & APPLICATIONS (EE ONLY)	3	1	-	4	50	100	-
EE-323-E	ELECTRONIC MEASUREMENT & INSTRUMENTATION LAB (EL, EI, IC, EE)	-	-	2	2	25	-	25
EE-321-E	POWER ELECTRONICS LAB. (Common with VI sem EI, IC)	-	-	2	2	25	-	25
EE-319-E	MICROPROCESSOR (8085), INTERFACING & APPLICATIONS LAB. (EE ONLY)	-	-	2	2	25	-	25
EE-327-E	ELECTRICAL MACHINES-II LAB.	-	-	3	3	25	-	25
EE-333-E	PRACTICAL TRAINING-I	-	-	2	2		-	-
	TOTAL	18	6	11	35	400	600	100

Note: 1. Assessment of Practical Training-I will be based on seminar, viva-voce, report and certificate of practical Training at the end of IV Semester. According to performance Letter Grades A, B, C, F are to be awarded. A student who is awarded 'F' grade is required to repeat Practical Training.

2. Students will be allowed to use Non-Programmable Scientific Calculator. However sharingof the calculator is not permitted.

EE-311-E ELECTRICAL MACHINES - II

L	T	P
3	1	-

Theory : 100 Marks
Class work : 50 Marks
Total : 150 Marks
Duration of Exam : 3 Hours

12. INDUCTION MACHINES

Poly-phase Induction Machine: Constructional features, production of rotating field, induction motor action, torque production, testing, development of equivalent circuit, performance characteristics, circle diagram, starting methods, methods of speed control - stator voltage control, stator resistance control, frequency control, rotor resistance control, slip power recovery control. double cage and deep bar motors. grid excited and self excited induction generators.
Single phase Motors: Double revolving field theory, cross field theory, different types of single phase induction motors, circuit model of single phase induction motor.

SYNCHRONOUS MACHINES

Principle, construction of cylindrical rotor and salient pole machines, winding, EMF equation, Armature reaction, testing, model of the machine, regulation -- synchronous reactance method, Rothert's mmf method, Potier triangle method. Output power equation, power angle curve, two reactance theory, slip test, transient and sub-transient reactances, synchronization, parallel operation. Principles of synchronous motor, power angle curve, V-curve, starting, damper winding, synchronous condenser, applications.

TEXT BOOKS:

1. Electric Machines**:** I.J.Nagrath and D.P. Kothari, TMH, New Delhi.
2. Electric Machinery, Fitzgerald and Kingsley, MGH.
3. Electrical Machines, P.S. Bhimbra, Khanna Publishers Delhi

REF. BOOKS:

1. Theory of alternating current machinery: A.S. Langsdorf (TMH)
2. Generalized theory of Electrical Machines: P.S. Bhimbra(Khanna Pub.)

NOTE: 8 questions are to be set; 4 from each part. Students are to attempt 5 questions with at least 2 from each

EE-303-E ELECTRONIC MEASUREMENT AND INSTRUMENTATION

L	T	P			
3	1	0	CLASS WORK :		50
			EXAM :	100	
			TOTAL :		150
			DURATION OF EXAM :		3 HRS

UNIT 1. OSCILLOSCOPE:
Block diagram, study of various stages in brief, high frequency CRO considerations. Sampling and storage oscilloscope.

UNIT 2. ELECTRONIC INSTRUMENTS:
Instruments for measurement of voltage, current & other circuit parameters, Q-meters, R.F. power measurements, introduction to digital meters.

UNIT 3. GENERATION & ANALYSIS OF WAVEFORMS:
Block diagram of pulse generators, signal generators, function generators wave analysers, distortion analysers, spectrum analyser, Harmonic analyser, introduction to power analyser.

UNIT 4. FREQUENCY & TIME MEASUREMENT:
Study of decade counting Assembly(DCA), frequency measurements, period measurements, universal counter, introduction to digital meters.

UNIT 5. DISPLAY DEVICES:
Nixie tubes, LED's LCD's, discharge devices.

UNIT 6 TRANSDUCERS:
Classification, Transducers of types: RLC photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, liquid level & temperature.

UNIT 7 INTRODUCTION TO SIGNAL CONDITIONING:
DC signal conditioning system, AC signal conditioning system, data acquisition and conversion system

TEXT BOOK:

1. A course in Electrical & Electronics Measurements & Instrumentation : A.K.Sawhney; Dhanpat Rai & Sons.

REFERENCE BOOKS.

1. Electronics Instrumentation & Measurement Techniques : Cooper; PHI.

NOTE: Eight questions are to be set – at least one from each unit. Students have to attempt five questions in all.

EE-305-E **ANALOG ELECTRONIC CIRCUITS**

L	T	P			
3	1	0	CLASS WORK :		50
			EXAM :	100	
			TOTAL :	150	
			DURATION OF EXAM :	3	HRS

UNIT1. SINGLE AND MULTISTAGE AMPLIFIERS:
Classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, pass-band of cascaded stages, RC-coupled amplifier, low frequency response of RC coupled stage, effect of an emitter bypass capacitor on low Frequency response, multistage CE amplifier .

UNIT2. FEEDBACK AMPLIFIERS :
Feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers, input resistance, output resistance, voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

UNIT3. OSCILLATORS:
Sinusoidal oscillators, Barkhausen criteria, R-C phase shift oscillator, generalform of oscillator circuit, wien-bridge oscillator, crystal oscillator.

UNIT4. POWER AMPLIFIERS:
Class A, B, and C operations; Class A large signal amplifiers, higher order harmonic distortion, efficiency, transformer coupled power amplifier, class B amplifier : efficiency & distortion; class A and class B push-pull amplifiers; class C power amplifier.

UNIT5. OPERATIONAL AMPLIFIERS :
Ideal and practical operational amplifiers, inverting and non-inverting amplifier, differential amplifier, emitter coupled differential amplifier, transfer characteristics of a differential amplifier, offset error : voltage and current, common mode rejection ratio (CMRR) .

UNIT6. LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS :
Scale changer, phase shifter, adder, voltage to current converter, current to voltage converter, DC voltage follower, Bridge amplifier, AC coupled amplifier, AC voltage follower, Integrator, differentiator.

UNIT7. NON-LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS :
Comparators, sample & hold circuits, Logarithmic amplifier, anti-log amplifier, logarithmic multiplier, waveform generators , Miller & Bootstrap sweep generators, regenerative comparator (Schmitt Trigger), multivibrators, ADC.

TEXT BOOK:
1. Integrated Electronics: Milman Halkias, TMH.
2. Microelectronic Circuits : Sedra & Smith.

REFERENCE BOOKS:
1. Operational Amplifiers:Gaikwad

2. Electronic Circuit Analysis and Design (Second edition) : D.A.Neamen; TMH

NOTE: Eight questions are to be set – at least one from each unit. Students have to attempt five questions.

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EE-315-E POWER SYSTEMS-I

L	T	P		
3	1	-	Theory	:100 Marks
			Class work	:50 Marks
			Total	:150 Marks
			Duration of Exam	:3 Hrs.

1. INTRODUCTION: Structure of a power system, **i**ndoor and outdoor substations, equipment for substations, layout, auxiliary supply.
2. DISTRIBUTION SYSTEMS: Radial, ring mains and network distribution system, comparison of various types of ac and dc systems.
3. TRANSMISSION LINES: Calculation of line parameters, Ferranti effect, proximity effect.
4. PERFORMANCE OF LINES: models of short, medium and long transmission lines, performance of transmission lines, circle diagram, capacity of synchronous condenser, tuned lines, voltage control.
5. MECHANICAL DESIGN: Sag and stress calculations, effect of ice and wind, dampers.
6. INSULATORS: Types, insulating materials, voltage distribution over insulator string, equalizer ring.
7. CABLES: Types of LV and HV cables, grading of cables, capacitance, ratings.
8. CORONA: Phenomenon, critical voltage, power loss, reduction in losses, radio-interference, HVDC transmission – types of links, advantages and limitations.

TEXT BOOKS: 1. Power System Engg: I.J.Nagrath and D.P.Kothari (TMH)
2. A Course in Electrical Power: Gupta, Soni & Bhatnagar (Dhanpat Rai & Sons).

REF. BOOKS:

1. Elements of power system analysis: W.D.Stevenson (MGH)
2. Electric Power: S.L.Uppal (Khanna Pub.)
3. Electrical power: J.B.Gupta (S.K.Kataria & Sons).
4. Power System Engineering: B. R. Gupta.
5. Electric Power System: B.M.Weedy, John Wiley & Sons.
6. Transmission & Distribution of Electrical Engineering: H.Cotton.
7. Transmission & Distribution of Electrical Engineering: Westing House & Oxford Univ. Press, New Delhi.

NOTE: 8 questions are to be set –one from each unit. Students have to attempt any 5 questions.

EE-317-E **POWER ELECTRONICS**

L	T	P			
3	1	0	CLASS WORK	:	50
			EXAM	:	100
			TOTAL	:	150
			DURATION OF EXAM	:	3 HRS

UNIT1. INTRODUCTION :
Role of power electronics, review of construction and characteristics of power diode, Shottky diode, power transistor, power MOSFET, SCR, DIAC, Triac, GTO, IGBT & SIT.

UNIT2. SCR:
Ratings and protections, series and parallel connections, R, RC and UJT firing circuit and other firing circuits based on ICs and microprocessors; pulse transformer and opto-coupler, commutation techniques.

UNIT3. AC REGULATORS:
Types of regulator, equation of load current, calculation of extinction angle, output voltage equation, harmonics in load voltage and synchronous tap changer, three phase regulator.

UNIT4. CONVERTERS :
One, two, three, six and twelve pulse converters, fully and half controlled converters, load voltage waveforms, output voltage equation, continuous and discontinuous modes of operation, input power factor of converter, reactive power demand, effect of source inductance, introduction to four quadrant / dual converter, power factor improvement techniques, forced commutated converter, MOSFET and transistor based converters.

UNIT5. INVERTERS :
Basic circuit, 120 degree mode and 180 degree mode conduction schemes, modified McMurray half bridge and full bridge inverters, McMurray -Bedford half bridge and bridge inverters, brief description of parallel and series inverters, current source inverter (CSI), transistor and MOSFET based inverters.

UNIT6. CHOPPERS :
Basic scheme, output voltage control techniques, one, two, and four quadrant choppers, step up chopper, voltage commutated chopper, current commutated chopper, MOSFET and transistor based choppers.

UNIT7. CYCLOCONVERTERS :
Basic principle of frequency conversion, types of cycloconverter, non-circulating and circulating types of cycloconverters.

UNIT8. DRIVES:
Introduction to electric drives: DC drives – converter and chopper fed dc drives, ac drives - stator voltage control, V/f control, rotor resistance control, static Scherbius system and static Kramer systems.

TEXT BOOK:

1. Power Electronics : MH Rashid; PHI

REFERENCE BOOKS :

1. Power Electronics : PC Sen; TMH
2. Power Electronics : HC Rai; Galgotia
3. Thyristorised Power Controllers : GK Dubey, PHI
4. Power Electronics and Introduction to Drives : A.K.Gupta and L.P.Singh;Dhanpat Rai
5. Power Electronics: P.S Bhimra.

NOTE : Eight questions are to be set –one from each unit. Students have to attempt any five questions.

EE-313-E MICROPROCESSOR (8085), INTERFACING & APPLICATIONS

L T P — Theory : 100 marks
3 1 - — Class Work : 50 marks
Total : 150 marks
Duration of Exam. : 3 Hrs.

1. Introduction: Overview; History of microprocessors.
2. The 8085 Processor: Architecture, Addressing modes, instruction set, Timing diagrams & simple examples, including loops & nested loops, interrupts.
3. The 8255 PPI chip: Architecture, control words, modes & simple examples.
4. Introduction to other chips: Introduction to DMA process & its controller chip 8257, & a few other chip such as programmable interrupt controller, programmable interval timer.
5. Interfacing & application of 8085 Microprocessor: Interfacing issues, Interfacing ADC & DAC, Interfacing memory, Microprocessor-based voltage, current, frequency, power measurement schemes.

TEXT BOOKS:

1. Ramesh S. Gaonkar, “Microprocessor Architecture, Programming & Applications with 8085/8086 A”, Wiley Eastern Ltd.

REF. BOOKS:

1. B.Ram, “Fundamentals of Microprocessors & Microcomputers”, Dhanpat Rai & Sons, Delhi.
2. Michael Andrews, “Programming Microprocessor Interfaces for control & instrumentation”, Prentice Hall Inc., Engle Wood Clifs, New Jersey.
3. S.I. Ahson, “Microprocessors with Application in Process Control”, TMH, New Delhi.

Note: 8 question are to be set, at least one question from each unit. Students have to attempt any 5 questions.

EE-323-E ELECTRONIC MEASUREMENT AND INSTRUMENTATION-LAB

L	T	P				
			CLASS WORK	:	25	
0	0	2	EXAM	:	25	
			TOTAL	:	50	
			DURATION OF EXAM	:	3	HRS

LIST OF EXPERIMENTS:

1. Measurement of displacement using LVDT.
2. Measurement of distance using LDR.
3. Measurement of temperature using R.T.D.
4. Measurement of temperature using Thermocouple.
5. Measurement of pressure using Strain Guage.
6. Measurement of pressure using Piezo-Electric Pick up.
7. Measurement of distance using Capacitive Pick up.
8. Measurement of distance using Inductive Pick up.
9. Measurement of speed of DC Motor using Magnetic Pick up.
10. Measurement of speed of DC Motor using Photo Electric Pick up.

NOTE : 1. At least ten experiments have to be performed in the semester.
2. At least seven experiments should be performed from above list.
Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-303-C.

EE-321-E **POWER ELECTRONICS-LAB**

L T P			
50			
3 1 0	CLASS WORK	:	
	EXAM	:	100
	TOTAL	:	150
			3
	DURATION OF EXAM	:	HRS

LIST OF EXPERIMENTS:

1. Study of characteristics of diode, thyristor and triac.
2. Study of characteristics of transistor and MOSFET.
3. Study of R and R-C firing circuits.
4. Study of UJT firing circuit.
5. Study of complementary voltage commutation using a lamp flasher.
6. Study of complementary voltage commutation using ring counter.
7. Study of thyristorised d-c circuit breaker.
8. Study of a.c. phase control.
9. Study of full wave converter.
10. Study of dc chopper.
11. Study of series inverter.
12. Study of bridge inverter.
13. Study of single phase cycloconverter.

NOTE : At least ten experiments have to be performed in the semester. At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-308-C.

MICROPROCESSOR (8085), INTERFACING & APPLICATIONS

EE-319-E LAB.

L T P
- - 2

Practical : 25 marks
Class Work : 25 marks
Total : 50 marks
Duration of Exam. : 3 Hrs.

1. Study architecture of 8085 & familiarization with its hardware, commands & operation of Microprocessor kit.
2. Write a well-documented program for:
   a. addition of two 8-bit numbers (provision for carry)
   b. addition of two 8-bit numbers.
3. Write a well-documented program for:
   a. subtraction of two 8-bit numbers (display of borrow)
   b. subtraction of two 16-bit numbers (display of borrow)
4. Write a well documented program for:
   Multiplication of two 8-bit numbers by repeated addition method. Check for minimum number of addition and also test for typical data.
5. Write a well-documented program for:
   Multiplication of two 8-bit numbers by bit rotation method.
6. Write a well-documented program for: Division of two 8-bit numbers by repeated subtraction method. Test for typical data.
7. Write a well-documented program for Dividing two 8-bit numbers by bit rotation method. Test for typical data.
8. Write a well-documented program for:
   a. Finding a largest number from an array.
   b. Finding a smallest number from an array.
9. Write a well-documented program for arranging an array of numbers in descending order.
10. Write a well-documented program for arranging an array of numbers in ascending order.
11. Write a well-documented program for finding square of a number using Look-up table.
12. Identification of input & output pins of port 8255, for various control words.
13. To measure an electrical quantity using microprocessor & 8255.
14. Write a program to interface a 2-digit number using seven-segment LEDs. Use 8085 microprocessor and 8255 PPI chip.
15. Write a program to control the operation of stepper motor using 8085 microprocessor & 8255 PPI chip.

Note: At least 10 experiments are to be performed with at least 7 from above list, remaining 3 may either be performed from the above list or designed and set by concerned institution as per the scope of syllabus.

13. EE-327-E ELECTRICAL MACHINES-II LAB

L	T	P
-	-	3

Practical : 25 Marks
Class work : 25 Marks
Total : 50 Marks
Duration of Exam : 3 Hours

List of Experiments:

1. **To perform the open circuit test and block rotor test on 3 phase induction motor and draw the circle diagram.**
2. **Speed control of induction motor by rotor resistance control.**
3. **To conduct the load test to determine the performance characteristics of the I.M..**
4. **To compute the torque v/s speed characteristics for various stator voltages.**
5. **To perform the open circuit test and block rotor test on single-phase induction motor and determine equivalent circuit parameters.**
6. **To perform load test on a universal motor and determine the performance with dc/ac supply voltage.**
7. **Voltage Vs load Characteristics of 3 phase synchronous generator. And draw input vs. Output power.**
8. **To perform O.C. test on synchronous generator. And determine the full load regulation of a three phase synchronous generator by synchronous impedance method**
9. **Determination of direct axis and quadrature axis reactances of synchronous machines.**
10. **To plot V- Curve of synchronous motor.**
11. **To study the parallel operation of synchronous generators.**
12. **Determination of sequence impedances of synchronous machine for various stator voltages.**

NOTE: At least 10 experiments are to be performed, with at least 7 from above list, remaining three may either be performed from above list or designed & set by concerned institution as per scope of syllabus.

EE-333-E **PRACTICAL TRAINING – I**

L T P
- - 2

At the end of fourth semester each student would undergo six weeks practical training in an industry/Professional organization/research laboratory with the prior approval of the Director Principal/Principal of the concerned college and submit a written typed report along with a certificate from the organization. The record will be evaluated by a board of examiners to be appointed by the Director- Principal/Principal of the concerned college during V Sem. who will award one of the following grades:

Excellent : A

Good : B

Satisfactory : C

Non – Satisfactory : F

A student who has been awarded 'F' grade will be required to repeat practical training even after eighth semester.

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M.D. UNIVERSITY, ROHTAK
scheme of studies & Examination
Bachelor of Engineering (Electrical Engg.)

Scheme of studies / Examination SEMESTER VI

EFFECTIVE FROM 2005-06 SESSION

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination	
		L	T	P	Total		Theory	Practic
EE-312-E	POWER SYSTEMS –II	3	1	-	4	50	100	-
EE-314-E	Conventional & CAD of Electric Machines	3	1	-	4	50	10 0	-
EE-316-E	ADVANCED MICROPROCESSOR AND MICRO-CONTROLLER	3	1	-	4	50	100	-
EE-304-E	CONTROL SYSTEMS ENGG. (EL,EE)	3	1	-	4	50	100	-
EE-318-E	ELECTRIC POWER GENERATION	3	1	-	4	50	100	-
EE-310-E	DIGITAL SYSTEM DESIGN (EL,EI, IC,EE,CSE)	3	1	-	4	50	100	-
EE-324-E	CONTROL SYSTEM ENGG. LAB (EL,EE)	-	-	2	2	25	-	25
EE-320-E	ADVANCED MICROPROCESSOR AND MICRO-CONTROLLER LAB	-	-	2	2	25	-	25
EE-326-E	Conventional & CAD of Electric Machines Lab	-	-	2	2	25	-	25
EE-328-E	POWER SYSTEMS LAB	-	-	2	2	25	-	25
GPEE-304-E	GENERAL PROFICIENCY	-	-	-	-	50	-	-
	TOTAL	18	6	8	32	450	600	100

Note: 1. Practical training of 6- weeks duration during summer vacations and its evaluation in the VIIth Semester.

2. Students will be allowed to use Non-Programmable Scientific Calculator. However, Sharing of calculator will not be permitted.

EE-312-E POWER SYTEMS - II

L	T	P			
3	1	-	Theory	:100	Marks
			Class work	:50	Marks
			Total	:150	Marks
			Duration of Exam	:3 Hours	

1. SYMMETRICAL FAULT ANALYSIS: Transients on a transmission line, short circuit of synchronous machine at no load and on full load.
2. SYMMETRICAL COMPONENTS: Symmetrical component transformation, phase shift in star-delta transformation, sequence impedances.
3. UNSYMMETRICAL FAULT ANALYSIS: Single line to ground fault, line to line fault, double line to ground fault, open conductor fault.
4. CIRCUIT BREAKERS: Theory of arc interruption, circuit breaker, circuit breaker ratings, restriking voltage transients, current chopping, duties of switch gear, automatic switch, air circuit breaker, bulk oil, minimum oil, air blast, SF6 CB, vacuum and DC circuit breakers.
5. PROTECTIVE RELAYS: Nature and causes of faults, consequences, zone of protection, essential qualities, primary and backup protections, relay classification, principal types of electromagnetic relays, i.e. attracted armature, induction disc, induction cup types.
6. RELAY APPLICATION AND CHARACTERISTICS: Over -current, instantaneous over current, IDMT, directional and differential relays, distance relays, plain impedance, mho, reactance, offset mho type, transmission line & feeder protection, introduction, over current, distance, pilot wire and carrier current protection, neutral grounding.
7. APPARATUS PROTECTION: Transformer, generator, motor and bus zone protection.
8. STATIC & DIGITAL RELAYS: Classification of static relays, amplitude and phase comparators, block-spike and block-average comparators , rectifier type relays. Introduction to digital relay: basic principles. Application of microprocessors and computers - recent Trends. Travelling wave relay, relaying schemes based on microwave and optical fiber link.

TEXT BOOKS:

1. Power System protection and switchgear –B.Ram, D.N.Vishvakarma : TMH.
2. Switchgear and protection - S.S.Rao : Khanna Pub.

REF. BOOKS:

1. Protective Relays -Their Theory and Practice Vol.I & II: W.Van Warrington.
2. Advanced power system analysis and dynamics: L.P.Singh, Wiley Eastern N.Delhi.
3. Digital Protection : Protective relay from Electro Mechanical to Microprocessor-L.P.Singh,Wiley Eastern.
4. Power System Protection and Switchgear -B.Ravinder Nath and M.Chander, Wiley Eastern,N.Delhi.
5. A course in Electrical Power - Soni, Gupta and Bhatnagar - Dhanpat Rai & Sons.
6. Power System Engg: I.J. Nagrath and D.P. Kothari(TMH).
7. Power System Engineering: V. K. Mehta.

Note: 8 questions are to be set –one from each unit. Students have to attempt five questions in all.

EE-314-E CONVENTIONAL AND CAD OF ELECTRIC MACHINES

L	T	P			
4	-	-	Theory	:	100 marks
			Class Work	:	50 marks
			Total	:	150 marks
			Duration of exam.	:	3 hours

1. GENERAL: General features and limitations of electrical machine design. Types of enclosures, heat dissipation, temperature rise heating and cooling cycles and ratings of machine machines. Cooling media used.

2. BASIC DESIGN PRINCIPLES: Output equation and output coefficient, Specific electric and magnetic loading. Effect of size and ventilation.

3. MAGNETIC CIRCUITS: MMF calculation for airgun and iron parts of electrical machines, gap contraction coefficient. Real and apparent flux densities. Estimation of magnet current of transformers and rotating machines, no load current of transformers and induction motors. Leakage flux and reactance calculations for transformers and rotating machines, Design of field magnet.

4. DETAILED DESIGN: Design of transformer, D.C. machines induction motor and synchronous machine and their performance calculations.

5. COMPUTER AIDED DESIGN: Computerization of design Procedures. Development of Computer program and performance prediction. Optimization techniques and their applications to design Problems.

TEXT BOOKS:

1. A course in Electrical Machine Design by A.K. Sawhney,

Khanna Pub. REFERENCE BOOKS:

1. Theory, performance and Design of alternating current machines by MG Say, ELBS, 15th Ed. 1986.
2. Theory, Performance and Design of Direct Current machines by A.E. Clayton, 3rd Ed. 1967.
3. Optimization Techniques, S.S. Rao

NOTE: 8 questions are to be set –at least one from each unit. Students have to attempt any 5 Questions.

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EE-316-E ADVANCED MICROPROCESSOR & MICROCONTROLLER

			:5
L T P	CLASS	WORK	0
3 1 0	EXAM	:100	
	TOTAL	:150	
		:3	
	DURATION OF EXAM	HRS	

1. THE 8086 ARCHITECTURE: Pin diagram of 8086 and description of various signals. Architecture block diagram of 8086 & description of sub-blocks such as EU & BIU & of various registers ; Description of address computations & memory segmentation; Program relocation; Addressing models; Instruction formats.
2. INSTRUCTION SET OF 8086: Instruction execution timing, Assembler instruction format; Data transfer instructions, Arithmetic instructions, Branch instructions, Looping instructions, NOP & HLT instructions, Flag manipulation instructions, Logical instructions, Shift & Rotate instructions, Directives & operators, simple example such as copying a block of data, finding maximum from an array of numbers, using look up table technique etc.

3. MICROCONTROLLERS: comparison between Microcontrollers & Microprocessors. Block diagram of 8051, Pin diagram & details, I/O structure, Memory organization. Special function registers. External memory, 8032/8052 Enhancements, Reset operation.
   Instruction Set: Addressing modes, arithmetic, Logical. Data transfer. Boolean variable, program branching instructions.
   Timer Operation: Timer Mode register, Timer Control register. Timer modes & Overflow flag., clocking sources, Start, Stopping & controlling the timers. Programs for generating various frequecy. Square waves.
   Serial Port Operation: Serial port control register, Modes & operation. Serial port band rate. Multoprocessor communication. Initialization & programming of serial port.
   Interrupt: Organization, processing interrupts, program design using interrupts. Serial port interrupts, External interrupts.

TEXT BOOKS:

1. **The 8051 Microcontroller; 1. Scott Mackenizie, Prentice Hall, Eagle wood Cliff**
2. Yu-Chang Liu & Glenn A Gibson Microcomputer systems: the 8086/8088 Family: architecture,Programming & Design.

REFERENCE BOOKS:

1. Brey, "Intel Microprocessors, 8086,8088,80186,80286/Pentium
2. Triekel & Singh,"The 8088 & 8086 Microprocessors -Programming, interfacing,
3. Bhupinder singh Chabra, "The Intel 8086/8088 Microprocessors architecture programming, design & interfacing," Dhanpat Rai & Sons.
4. Kenneth J. Ayala, "8051 Microcontroller Architecture, programming & Applications", 2nd edition 1996, Penram International Publishers, India.
5. Website: W W W at mel. Com.

EE-304-E **CONTROL SYSTEM ENGINEERING**

L	T	P			
3	1	0	CLASS WORK	:	50
			EXAM	:	100
			TOTAL	:	150
			DURATION OF EXAM	:	3 HRS

UNIT1. INTRODUCTORY CONCEPTS :
System/Plant model, types of models, illustrative examples of plants and their inputs and outputs, controller, servomechanism, regulating system, linear time-invariant (LTI) system, time-varying system, causal system, open loop control system, closed loop control system, illustrative examples of open-loop and feedback control systems, continuous time and sampled data control systems. Effects of feedback on sensitivity (to parameter variations), stability, external disturbance (noise), overall gain etc. Introductory remarks about non-linear control systems.

UNIT2. MATHEMATICAL MODELLING :
Concept of transfer function, relationship between transfer function and impulse response, order of a system, block diagram algebra, signal flow graphs : Mason’s gain formula & its application, characteristic equation, derivation of transfer functions of electrical and electromechanical systems. Transfer functions of cascaded and non-loading cascaded elements. Introduction to state variable analysis and design.

UNIT3. TIME DOMAIN ANALYSIS :
Typical test signals, time response of first order systems to various standard inputs, time response of 2nd order system to step input, relationship between location of roots of characteristics equation, w and wn, time domain specifications of a general and an under-damped 2nd order system, steady state error and error constants, dominant closed loop poles, concept of stability, pole zero configuration and stability, necessary and sufficient conditions for stability, Hurwitz stability criterion, Routh stability criterion and relative stability.

UNIT4. ROOT LOCUS TECHNIQUE :
Root locus concept, development of root loci for various systems, stability considerations.

UNIT5. FREQUENCY DOMAIN ANALYSIS :
Relationship between frequency response and time-response for 2nd order system, polar, Nyquist, Bode plots, stability, Gain-margin and Phase Margin, relative stability, frequency response specifications.

UNIT6. COMPENSATION :
Necessity of compensation, compensation networks, application of lag and lead compensation, basic modes of feedback control, proportional, integral and derivative controllers, illustrative examples.

UNIT7. CONTROL COMPONENTS : Synchros, AC and DC techo-generators, servomotors, stepper motors, & their applications, magnetic amplifier.

TEXT BOOK

1. Control System Engineering : I.J.Nagrath & M.Gopal; New Age

REFERENCE BOOKS :

1. Automatic Control Systems : B.C.Kuo, PHI.
2. Modern Control Engg : K.Ogata; PHI.
3. Control Systems - Principles & Design : Madan Gopal; Tata Mc Graw Hill.
4. Modern Control Engineering.R.C.Dorl & Bishop; Addison-Wesley

NOTE: Eight questions are to be set - at least one from each unit. Students have to attempt five questions.

ELECTRICAL POWER GENERATION

L	T	P		
3	1	-	Theory	: 100
			Class work	: 50
			Total	: 150
			Duration of Exam.	: 3 Hrs.

EE-318-E

INTRODUCTION: Energy sources, their availability, Recent trends in Power
1. Generation, Interconnected Generation of Power Plants.
2. POWER GENERATION PLANNING: Load forecasting, load curves, load duration curve, Base load and Peak load Power Plants, connected Load, maximum demand, demand factor, Group diversity factor, load factor, significance of load factor, plant factor, capacity factor, selection of unit size, No. of Units, reserves, cost of power generation, Depreciation, tariff.
3. CONVENTIONAL ENERGY SOURCES: Selection of site, capacity calculations, classification, Schematic diagram and working of Thermal Power Stations, Hydro Electric Plant, Nuclear Power Plant and Diesel Power Stations.
4. NON-CONVENTIONAL ENERGY SOURCES: Wind, Solar, Tidal, Ocean, and Geothermal sources of Energy, fuel cell, Magneto Hydro Dynamic (MHD) system.
5. ELECTRIC ENERGY CONSERVATION & MANAGEMENT: Energy management, Energy Audit, Energy Efficient Motors, Co-generation.

TEXT BOOKS:
1. Electric Power Generation, B.R.Gupta
2. Power Generation, Operation and Control, Wood and Wollenberg, John Wiley & Sons,1984.

REF. BOOKS:
1. A Course in Electric Power System, Soni, Gupta, Bhatnagar, Dhanpat Rai & Sons
2. Power System Engineering, Nagrath & Kothari, Tata Mc-Graw Hill, New Delhi
3. Power Plant Engg: G.D. Rai
4. Electric Power: S.L. Uppal (Khanna Publishing)

NOTE: 8 questions are to be set at least one from each unit. Students have to attempt any five questions.

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EE-310-E **DIGITAL SYSTEM DESIGN**

L T P		CLASS WORK	:
50			
3 1 0		EXAM :	100
		TOTAL	: 150
			3
		DURATION OF EXAM	: HRS

UNIT 1. INTRODUCTION :
Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL, data objects, classes and data types, Operators, Overloading, logical operators.Types of delays Entity and Architecture declaration. Introduction to behavioural, dataflow and structural models.

UNIT 2. VHDL STATEMENTS :
Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements.
Subprograms: Application of Functions and Procedures, Structural Modelling, component declaration, structural layout and generics.

UNIT 3. COMBINATIONAL CIRCUIT DESIGN:
VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders, code converters, comparators, implementation of Boolean functions etc.

UNIT 4. SEQUENTIAL CIRCUITS DESIGN :
VHDL Models and Simulation of Sequential Circuits
Shift Registers, Counters etc.

UNIT 5. DESIGN OF MICROCOMPUTER :
Basic components of a computer, specifications, architecture of a simple microcomputer system,
implementation of a simple microcomputer system using VHDL

UNIT 6. DESIGN WITH CPLDs AND FPGAs :
Progr ammable logic devices : ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA.
Design implementation using CPLDs and FPGAs

REFERENCE BOOKS:
1. IEEE Standard VHDL Language Reference Manual (1993).
2. Digital Design and Modelling with VHDL and Synthesis : KC Chang; IEEE Computer Society Press.
3. "A VHDL Primmer" : Bhasker; Prentice Hall 1995.
4. "Digital System Design using VHDL" : Charles. H.Roth ; PWS (1998).
5. "VHDL-Analysis & Modelling of Digital Systems" : Navabi Z; McGraw Hill.
6. VHDL-IV Edition :Perry; TMH (2002)
7. "Introduction to Digital Systems" : Ercegovac. Lang & Moreno; John Wiley (1999).
8. Fundamentals of Digital Logic with VHDL Design : Brown and Vranesic; TMH (2000)
9. Modern Digital Electronics- III Edition: R.P Jain; TMH (2003).

NOTE : Eight questions are to be set - at least one question from each unit. Students will be required to attempt five questions in all.

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EE-324-E **CONTROL SYSTEM LAB**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM	:	3 HRS

LIST OF EXPERIMENTS :

1. To study A.C. servo motor and to plot its torque speed characteristics.

2. To study D.C. servo motor and to plot its torque speed characteristics.

3. To study the magnetic amplifier and to plot its load current v/s control current characteristics for :
   (a) series connected mode
   (c) parallel connected mode.

4. To plot the load current v/s control current characteristics for self exited mode of the magnetic amplifier.

5. To study the synchro & to:
   (a) Use the synchro pair (synchro transmitter & control transformer) as an error detector.

   (b)Plot stator voltage v/s rotor angle for synchro transmitter i.e. to use the synchro transmitter as position transducer.

6. To use the synchro pair (synchro transmitter & synchro motor) as a torque trans mitter.

7. (a) To demonstrate simple motor driven closed loop position control system.
   (b) To study and demonstrate simple closed loop speed control system.

8. To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots .

9. To study a stepper motor & to execute microprocessor or computer-based control of the same by changing number of steps, direction of rotation & speed.

10. To implement a PID controller for level control of a pilot plant.

11. To implement a PID controller for temperature control of a pilot plant.

12. To study the MATLAB package for simulation of control system design.

NOTE : At least ten experiments have to be performed in the semester, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-304-C.

EE-320-E ADVANCED MICROPROCESSOR & MICROCONTROLLER LAB

L	T	P		
-	-	2	Practical	: 25 Marks
			Class work	: 25 Marks
			Total	: 50 Marks
			Duration of Exam: 3 Hours	

14. LIST OF EXPERIMENTS:

1. Study of 8086 microprocessor kit, its operation & commands.
2. Write a well-documented program for copying 12 bytes from source to destination, on 8086 microprocessor kit.
3. Write a program for 8086 for division of a defined double word (stored in a data segment) by another double word and verify.
4. Write a well-documented program for finding the square root of a given number, on 8086, microprocessor kit.
5. Write a program using 8086 for finding the square of a given number and verify.
6. Write a program using 8086 and verify for:
   a. Finding the largest number from an array.
   b. Finding the smallest number from an array.
7. Write a program using 8086 for arranging an array of numbers in descending order and verify.
8. Write a program using 8086 for arranging an array of numbers in ascending order and verify.
9. Write a program for 8086 for finding square of a number using look-up table and verify.
10. Write a program to interface a two digit number using seven-segment LEDs. Use 8086 microprocessor and 8255 PPI.
11. Write a program to control the operation of stepper motor using 8086 microprocessor and 8255 PPI.

NOTE: At least 10 experiments are to be performed with atleast 7 from above list, remaining 3 may either be performed from the above list or designed & set by concerned institution as per the scope of syllabus.

EE-326-E CONVENTIONAL AND CAD OF ELECTRIC MACHINES -LAB

L	T	P		
2			Class Work	: 25 marks
			Exam	: 25 marks
			Total	: 50 marks
			Duration of exam.	: 3 hours

This will pertain the syllabus of theory Paper CONVENTIONAL AND CAD OF ELECTRIC MACHINES.

15. EE-328-E POWER SYSTEMS LAB

L	T	P			
				Practical	: 25 marks
				Class work	: 25 marks
-	-	2	Total	: 50 marks	
				Duration of exam.	: 3 hours

1. To draw the operating characteristcs of IDMT relay.
2. To draw the operating characteristcs of differential relay.
3. To study Bucholtz relay.
4. Testing of transformer oil.
5. To find ABCD parameters of a model of transmission line.
6. To observe the Ferranti effect in a model of transmission line.
7. To study the plain impedance relay and plot its tripping characteristics.
8. To study the MHO relay and plot its tripping characteristics
9. To study the power control by phase shifting transformer.
10. To plot annual/monthly/daily load demand of nearby area.
11. To draw single line diagram of distribution system of HVPNL of near by area of the college concerned.
12. To design 11 KV substation.

NOTE : At least 10 experiments have to be performed, with at least 7 from above list, remaining 3 may either be performed from above list or designed & set by the concerned institution as per latest developments/ advancements in Electrical Engg.

M.D. UNIVERSITY, ROHTAK
Scheme of studies & Examination
Bachelor of Engineering (Electrical Engg.)
16. Scheme of studies / Examination SEMESTER VII
EFFECTIVE FROM 2006-07 SESSION

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination	
		L	T	P	Total		Theory	Practical
EE-401-E	DATA COMMUNICATION (EL,EE)	3	1	-	4	50	100	-
EE-409-E	ELECTRIC DRIVES	3	1	-	4	50	100	-
EE-411-E	POWER SYSTEM OPERATION AND CONTROL	3	1	-	4	50	100	-
EE-407-E	DIGITAL SIGNAL PROCESSING (EL,EI, IC,EE & Elective –I in CSE and Common with 6th semester- IT)	3	1	-	4	50	100	-
	ELECTIVE – I	4	-	-	4	50	100	-
EE-421-E	DATA COMMUNICATION LAB (EL, EE)	-	-	2	2	25	-	25
EE-413-E	ELECTRIC DRIVES LAB.			2	2	25	-	25
EE-427-E	DIGITAL SIGNAL PROCESSING LAB (EL,EI, IC,EE & Common with 6th Sem.- IT)	-	-	2	2	25	-	25
EE-415-E EE-417-E	PROJECT OR INDUSTRIAL PROJECT	-	-	4	4	50	-	-
EE-419-E	PRACTICAL TRAINING – II	-	-	2	2	-	-	-
	TOTAL	16	4	12	32	375	500	75

NOTE : 1. Project load will be treated as 2 hours for project co-ordinator and 1 hour for each participating teacher.

2. Project Course will commence in seventh semester where the students will identify the project problems, complete the design/ procure the materials /start the fabrication/complete the survey etc. depending upon the nature of the problem. The project will be completed in VIIIth sem..and its examination will be held in VIII semester.
3. Students will be allowed to use the scientific calculator only, however sharing of calculator will not be permitted.
4. Assessment of Practical Training-II, which will be based on seminar, Viva-Voce, report and certificate for the practical training taken at the end of VIth semester. According to performance Letter Grades A, B, C, F are to be awarded. A student who is awarded 'F' grade is required to repeat Practical Training.

Electrical Engineering

Elective-I of 7th Semester

1.	PHY-451-E	Non-Conventional Energy & Conversion Technology
2.	CSE-307-E	Web Development
3.	Maths-453-E	Statistical Modeling
4.	HUM-451-E	Language Skills for Engineers
5.	HUM-457-E	Organisational Behaviour & Human Resource Management
6.	EE-403-E	Multimedia Systems
7.	Math-451-E	Combinatorics and Graph Theory
8.	EE-455-E	Electrical Machine Design
9.	IC-451-E	Intelligent Instrumentation
10.	EE-453-E	High Voltage Engineering
11.	CH-451-E	Environmental Sciences & Engg.
12.	IT-471-E	Management Information System
13.	CSE-303-E	Computer Graphics
14.	HUM-455-E	Entrepreneurship

EE-401-E **DATA COMMUNICATION**

L	T	P			
3	1	0			

CLASS WORK : 50

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

UNIT 1 DIGITAL COMMUNICATION :

Introduction, digital communication, Shannon limit for information capacity, digital radio, digital amplitude modulation, frequency shift keying (FSK), phase shift keying (PSK), quadrature amplitude modulation (QAM), band width efficiency, carrier recovery, differential phase shift keying,(DPSK), clock recovery, probability of error & bit error rate, trellis encoding.

UNIT 2 DATA COMMUNICATIONS:
Introduction, history of data communication, standard organization for data communication, data communication circuits, data communication codes, error control, synchronization, data communications hardware, serial interfaces: RS-232, RS-449 & RS-530, CCITT X.21, parallel interfaces: centronics parallel interfaces. the telephone network: DDD network, private- line service, the telephone circuit, data modems: synchronous modems, asynchronous modems, modem synchronization.

UNIT 3 DATA COMMUNICATIONS PROTOCOLS AND NETWORK CONFIGURATIONS : Introduction, open system interconnection (OSI), data transmission mode, asynchronous protocols, synchronous protocols, public data network, integrated services digital network (ISDN), local area networks, token pass ring, Ethernet.

UNIT 4 MULTIPLEXING :
Introduction, time division multiplexing, T1 digital carrier system, CCITT time division multiplexed carrier systems, CODECS, COMBO chips, line encoding, T-CARRIERS, frame synchronization, bit interleaving VS word interleaving, frequency division multiplexing, AT&T's FDM hierarchy, composite base band signal, formation of a master group.

UNIT 5 INTERNET AND TCP/IP:
Introduction, history, use of Internet, accessing the Internet, Internet addresses, security on the internet, authentication, firewalls, intranet and extranet, TCP/IP reference model, domain name service, world wide web.

TEXT BOOK:

1. Electronic Communications Systems (4th Ed.) : Wayne Tomasi;
Pearson 2. Data Communication and Networking (2nd -edition): Forauzan;

NOTE Eight questions are to be set at-least one from each unit. Students have to attempt any five questions

EE-409-E **ELECTRIC DRIVES**

L T P		
3 1 -	Theory	: 100 marks
	Class work	: 50
	Total	: 150
	Duration of exam.	: 3 hours

1. ELECTRICAL DRIVES: Introduction, Classification, advantages, Characteristics of Electric Motors, choice of electrical drive machines, status of ac and dc drives.
2. CONTROL OF ELECTRICAL DRIVES: Modes of operation, closed loop control of drives, sensing of current and speed, Microprocessor based control of electric drives
3. DYNAMICS OF ELECTRICAL DRIVES: Fundamental torque equations, multi-quadrant operation, equivalent values of drive parameters, load torque components, types of loads.
4. SELECTION OF MOTOR POWER RATING: Heating and cooling, determination of motor rating, continuous, short time and intermittent duty rating, load equalization and determination of moment of inertia of the flywheel.
5. DC MOTOR DRIVES: Starting, Acceleration control, braking, transient analysis, Converter fed dc drive & chopper fed dc drive.
6. INDUCTION MOTOR DRIVES: Starting, Acceleration control, braking, transient analysis, Static control techniques- stator frequency control, stator voltage control, rotor resistance control. Static Scherbius system & static Kramer system, vector control.
7. PMBLDC & PMSAC DRIVES: Permanent Magnet Brushless D C drive, Permanent Magnet Sine-fed drives, Switched Reluctance Machine Drives.

TEXT BOOKS:.

1. Fundamentals of Electrical Drives:- by G.K.Dubey, Narosa Publishing House, New Delhi, 1995
2. Electric drives: Concepts and applications, V.Subrahmaniyam, TMH, New Delhi.

REFERENCE BOOKS:

1. Power Semiconductor controlled drives; by G.K.Dubey, Prentice Hall.
2. Kusko, A., Solid State DC Motor Drives, MIT Press, Cambridge, Mass.USA,1969
3. Pillai S.K., A First course in elecric drives, Wiley Eastern, New Delhi.
4. Chillikan, M., Electric Drives, Mir Publishers, Moscow, 1970.
5. Bose B.K., Power Electronics & AC Drives, Prentice Hall, New Delhi,1991.

NOTE: 8 questions are to be set –atleast one from each unit. Students have to attempt any 5 questions.

EE-411-E **POWER SYSTEM OPERATION AND CONTROL**

L	T	P		
3	1	-		

Theory :100 marks
Class work :50 marks
Total marks :150 marks
Duration of Exam : 3 Hours

1. AUTOMATIC GENERATION CONTROL: Load frequency control (single area case), load frequency control and economic dispatch, optimal load frequency control, Load Management.
2. ECONOMIC LOAD DESPATCH: Introduction, Optimal Operation of Generators of Bus bar, Unit Commitment, Reliability Considerations, Optimal Generation Schedule Hydro thermal optimal scheduling.
3. POWER SYSTEM STABILITY: Steady state, transient & dynamic stabilities, equal area criteria, effect of fault clearing time on transient stability, dynamics of synchronous machine, factors affecting transient stability.
4. AUTOMATIC VOLTAGE CONTROL & EXCITATION SYSTEMS: AVRs, role of AVR on transient stability of system, type 0 & 1 excitation system, power system stabilizers.
5. VOLTAGE STABILITY: Basic concept, Voltage collapse, Modelling & prevention.

TEXT BOOKS: 1. Power System Engineering, : I.J. Nagrath & D.P. Kothari :TMH
2 . Power System Stability Volume-I : E.W. Kimbark, John Wiley & Sons.

REF. BOOKS:

1. Voltage stability by Taylor
2. Power System Control and Stability: P.Kundur : Mc Graw Hill
3. Electric Energy System Theory: O.I.Elgerd : TMH
4. Computer Aided Power System Analysis : S.I. Ahson,D.P.Kothari & A.K. Mahalanabis, TMH.
5. Power System Analysis & Design : B.R.Gupta, Wheelers Publication,
6. EHV-AC/DC Transmission System ; S.Rao : Khanna Pub.
7. PGO & C: Wood & Wallenberg, John Wiley & Sons.

NOTE: 8 questions are to be set – atleast one from each unit. Students have to attempt any five questions.

EE-407-E **DIGITAL SIGNAL PROCESSING**

L	T	P			
3	1	0	CLASS WORK	:	50
			EXAM	:	100
			TOTAL	:	150
			DURATION OF EXAM	:	3 HRS

UNIT1. DISCRETE-TIME SIGNALS:
Signal classifications, frequency domain representation, time domain representation, representation of sequences by Fourier transform, properties of Fourier transform, discrete time random signals, energy and power theorems.

UNIT2. DISCRETE-TIME SYSTEMS : Classification, properties, time invariant system, finite impulse Response (FIR) system, infinite impulse response (IIR) system.

UNIT3. SAMPLING OF TIME SIGNALS:
Sampling theorem, application, frequency domain representation of sampling, reconstruction of band limited signal from its samples. discrete time processing of continuous time signals, changing the sampling rate using discrete time processing.

UNIT4. Z-TRANSFORM :
Introduction, properties of the region of convergence, properties of the Z-transform, inversion of the Z-transform, applications of Z-transform.

UNIT5. BASICS OF DIGITAL FILTERS : Fundamentals of digital filtering, various types of digital filters, design techniques of digital filters : window technique for FIR, bi- linear transformation and backward difference methods for IIR filter design, analysis of finite word length effects in DSP, DSP algorithm implementation consideration. Applications of DSP.

UNIT6. MULTIRATE DIGITAL SIGNAL PROCESSING:
Introduction to multirate digital signal processing, sampling rate conversion, filter structures, multistage decimator and interpolators, digital filter banks.

TEXT BOOKS :
1. Digital Signal Processing : Proakis and Manolakis; PHI
2. Digital Signal Processing: Salivahanan, Vallavaraj and Gnanapriya;TMH

REFERENCE BOOKS:
1. Digital Signal Processing: Alon V. Oppenhelm;PHI
2. Digital Signal processing(II-Edition): Mitra, TMH

NOTE: Eight questions are to be set - at least one from each unit. Students have to attempt five questions.

EE-421-E **DATA COMMUNICATION LAB**

L	T	P				
		25	CLASS WORK	:		
0	0					
2			EXAM	:	25	
			TOTAL	:	50	
					3	
			DURATION OF EXAM	:	HRS	

LIST OF EXPERIMENTS:

1) To study different types of transmission media
2) To study Quadrature Phase Shift Keying Modulation.
3) To study Quadrature Amplitude Modulation.
4) To Study !6 Quadrature Amplitude Multiplexing.
5) To Study Serial Interface RS-232 and its applications.
6) To study the Parallel Interface Centronics and its applications.
7) To configure the modem of a computer.
8) To make inter-connections in cables for data communication in LAN.
9) To install LAN using Tree topology.
10) To install LAN using STAR topology.
11) To install LAN using Bus topology.
12) To install LAN using Token-Ring topology
13) To install WIN NT
14) To cofigure a HUB/Switch.

NOTE : 1. At least ten experiments have to be performed in the semester; At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus .

EE-413-E ELECTRIC DRIVES LAB

L	T	P		
-	-	2	Practical	: 25 marks
			Class work :	25 marks
			Total	: 50 marks

Duration of exam. : 3 hours

1. Speed control of dc motor using dc chopper.
2. Speed control of dc motor using single- phase converter.
3. Speed control of dc motor using 3- phase converter.
4. Speed control of dc motor using single- phase dual converter.
5. Inverter fed single-phase induction motor drive.
6. CSI fed induction motor drive.
7. Speed control of single- phase induction motor using ac regulator.
8. Regenerative braking of dc motor using single- phase converter.
9. Speed control of single-phase induction motor using cycloconverter.
10. Static rotor resistance control method.

NOTE : 1. At least 10 experiments have to be performed with atleast 7 from above list, remaining 3 may either be performed from above list or designed & set by concerned institution as per scope of syllabus.

EE-427-E **DIGITAL SIGNAL PROCESSING LAB**

L	T	P			
		25	CLASS WORK	:	
0	0				
2			EXAM	:	25
			TOTAL	:	50
			DURATION OF EXAM	:	3 HRS

LIST OF EXPERIMENTS:

Perform the experiments using MATLAB:

1. To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
2. To develop program for discrete convolution.
3. To develop program for discrete correlation.
4. To understand stability test.
5. To understand sampling theorem.
6. To design analog filter(low-pass, high pass, band-pass, band-stop).
7. To design digital IIR filters(low-pass, high pass, band-pass, band-stop).
8. To design FIR filters using windows technique.
9. To design a program to compare direct realization values of IIR digital filter
10. To develop a program for computing parallel realization values of IIR digital filter.
11. To develop a program for computing cascade realization values of IIR digital filter
12. To develop a program for computing inverse Z-transform of a rational transfer function.]

NOTE: At least ten experiments have to be performed in the semester; out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES & EXAMINATION

B.E IV YEAR ELECTRICAL ENGINEERING SEMESTER – VIII

Effective From the Session 2006-07

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination	
		L	T	P	Total		Theory	Practic
EE-406-E	ADVANCED CONTROL SYSTEM	3	1	-	4	50	100	-
EE-408-E	COMPUTER APPLICATIONS TO POWER SYSTEM ANALYSIS	3	1	-	4	50	100	-
	ELECTIVE – II	4	-	-	4	50	100	-
	ELECTIVE- III	4	-	-	4	50	100	-
EE-410-E	COMPUTER APPLICATIONS TO POWER SYSTEM ANALYSIS LAB.	-	-	2	2	25	-	25
EE-415-E EE-417-E	PROJECT OR INDUSTRIAL PROJECT	-	-	6	6	100	-	100
EE-412-E	SEMINAR	-	-	4	4	50	-	-
GFEE-404-E	GENERAL FITNESS FOR THE PROFESSION	-	-	-	-	50	-	100
	TOTAL	14	2	12	28	425	400	225

NOTES: 1. Project load will be treated as2 hours for project coordinator and 1 hour for each participating teacher.

2. Students will be allowed to use the scientific calculator only, however sharing of calculator will not be permitted.

Electrical Engineering

Elective-I of 8th Semester

1. MATH-452-E Statistical Quality Control
2. HUM-452-E Business Communication
3. IC-404-E Fuzzy Control Systems
4. CSE-202-E Data Base Management System
5. EE-466-E Utiliation of Electrical Power & Traction
6. PHY-452-E Laser Technology

17. Electrical Engineering

18. Elective-IIIof 8th Semester

1. HUM-456-E Marketing Management
2. EE-458-E ANN Based Control
3. EE-462-E Genetic Algorithms & Applications
4. EE-456-E Power System Stability & FACTS
5. EE-452-E Installation, testing & Maintenance of Electrical Apparatus
6. HUM-454-E Indian English Writing
7. MATHS-454-E Advanced Mathematics

EE-406-E ADVANCED CONTROL SYSTEMS

L T P	Theory	:	100 marks
3 1 -	Class work	:	50 marks
	Total	:	150 marks
	Duration of exam.	:	3 hours

UNIT 1. STATE VARIABLE TECHNIQUES: State variable representation of systems by various methods. Solution of state equations-state transition matrix. Transfer function from state variable model. Controllability & observability of state variable model.

UNIT 2. SECOND ORDER SYSTEMS & STATE PLANE: Phase portrait of linear second systems. Method of isoclines, phase portrait of second order system with non-linearities, limit cycle, singular points.

UNIT 3. DESCRIBING FUNCTION ANALYSIS: Definition, limitations, use of describing function for stability analysis , describing function of ideal relay, relay with hysteresis & dead zone, saturation/coulomb friction & backlash,

UNIT 4. LINEAR APPROXIMATION OF NONLINEAR SYSTEMS: Taylor series, Liapunov's 2^{nd} method.

UNIT 5. SAMPLED DATA SYSTEMS: Sampling process, impulse modulation, mathematical analysis of sampling process, application of Laplace transform, Shannon's theorem, 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, the Schur-Cohn stability criterion, Jury's test of stability of extension of Routh-Hurwitz criterion to discrete time systems.

TEXT BOOKS:

1. Digital Control & State Variable Methods : M.Gopal ; TMH.

REFERENCE BOOKS :

1. Modern Control Theory : M.Gopal ; Wiley International.
2. Discrete time control system : K.Ogate ; PHI
3. Digital Control Systems : B.C.Kuo
4. Applied non-linear control : J.E.Slotine & W.P.Li; Prentice Hall, USA,
5. Nonlinear Control Systems: Isidari ; Springer-Verlag.

NOTE : 8 questions are to be set –one from each unit. Students have to attempt five questions.

EE-408-E COMPUTER APPLICATION TO POWER SYSTEM

L T P		
3 1 -	Theory	:100 marks
	Class work	:50 marks
	Total	:150 marks
	Duration of exam.	:3 hours

PART-A: LOAD FLOW STUDIES: Introduction, Bus Admittance Matrix, Formation of Y Bus, Tree graph, Cotree, Primitive network, Bus Incidence matrix, Formulation of Y Bus using singular transformation, Load flow equations Approximate Load flow study, Cious-Seidel method for Load flow Study, Algorithm and flow, Chart for Computer application to Load flow studies, using G-I method, Newton-Rophson method for Load flow studies, Algerthm and flow chart for Computer Application to Load flow studies using N.R. Method. Decenpted Load flow Studies, Fast Decenpted Load flow. Comparison between G-S & N.R. Methods. Load flow Study of Distribution System.

PART-B: DIGITAL TECHNIQUES IN FAULT CALCULATIONS: Review of symmetrical components, Sequence networks for synchronous machines, transforms and transmission Lines. Bus Impedene matrix, Altorithn for formulation of Bus. All types of modifications Short circuit Studies : Single line to ground fault, Line to Line fault, Double line to Ground fault and symmetrical fault. Consideration of Prefault currents.

PART-C: COMPUTER CONTROL & AUTOMATION: Introduction to energy control centres, various states of a power system, SCADA Systems and RTU. Introduction to the MATLAB Power System block Set. Introduction of the features of EMTP.

TEXT BOOKS:

1. Power System Engg.: B.R.Gupta.
2. Computer methods in power system: G. W. Stagg and A. H. El-Abiad, M.G.H.

REFERENCE BOOKS:

1. Advance power system analysis and dynamics: L.P. Singh, Wiley Eastern ltd.
2. Electrical Energy system theory: An introduction by O.I.Elgerd, TMH.
3. Elements of power system analysis: W. D. Stevenson, M.G.H.
4. Power System Engineering, : I.J.Nagrath & D.P.Kothari(TMH).
5. Power System Analysis : Hadi Saadat, TMH, New Delhi.

NOTE: 8 questions are to be set –atleast 3 questions from Part -A & Part-B each and 2 questions from Part-C. Students have to attempt any five questions.

EE-410-E COMPUTER APPLICATIONS TO POWER SYSTEMS LAB

L T P
- - 2

Practical :25 marks
Class work :25 marks
Total :50 marks
Duration of exam. : 3 hours

1. Draw the flow chart and develop the computer program for the formation of the Y Bus of a generalized network.
2. Draw the flow chart and develop the computer program for the formation of the Z Bus of a generalized network.
3. To plot the swing curve and observe the stability.
4. To perform load flow study using Gaus Shiedel method.
5. Perform short circuit study for any type of fault.
6. To observe transmission losses and efficiency with variations in power for the given example.
7. Design of distribution system
8. To study the features of EMTP
9. To study the MATLAB Power System block set features.

NOTE: At least 10 experiments have to be performed with at least 7 from above list, remaining 3 may either be performed from above list or designed & set by concerned institution as per the scope of syllabus.