Program outcomes (POs)- Engineering & Technology

Engineering Graduates will be able to:

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES: (PSOs)-B.Tech(ELECTRICAL ENGINEERING)

At the end of the program, the student shall be

PSO1. Able to utilize domain knowledge required for analyzing and resolving practical Electrical Engineering problems

PSO2. Equipped with theoretical and practical skills to investigate and undertake complex projects of inter-disciplinary nature with wide impact

PSO3. Imbibed with the state of the art knowledge to adapt, ever transforming technical scenario

PSO4: aware about the latest technology in electrical domain.

PSO5: exposed to industrial training giving hands on experience.

M.D UNIVERSITY

SCHEME OF STUDIES AND EXAMINATION

B.Tech II YEAR (ELECTRICAL ENGINEERING)

SEMESTER III

'F' Scheme effective from 2010-11

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
HUM-201-F OR MATH-201-F	ENGG. ECONOMICS OR MATHEMATICS – III	3 3	1 2	- -	4 5	50	100	-	150	3
HUM-203-F	FUNDAMENTALS OF MANAGEMENT (COMMON FOR ALL BRANCHES)	3	1	-	4	50	100	-	150	3
EE-201-F	ELECTRONIC DEVICES& CIRCUITS (ECE,EI,EE,EEE,IC)	3	1	-	4	50	100	-	150	3
EE-203-F	NETWORK THEORY (ECE,EI,EE,EEE,IC)	3	1	-	4	50	100	-	150	3
EE-207-F	ELECTRICAL MACHINES-I (EE, EEE)	3	1	-	4	50	100	-	150	3
EE-209-F	ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS (EE, EEE)	3	1	-	4	50	100	-	150	3
EE-223-F	NETWORK THEORY LAB. (ECE,EI,EE,EEE,IC)	-	-	2	2	25	-	25	50	3
EE-211-F	ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS LAB. (EE, EEE)	-	-	2	2	25	-	25	50	3
EE-213-F	ELECTRICAL WORKSHOP (IC,EE, EEE)	-	-	2	2	25	-	25	50	3
EE-215-F	ELECTRICAL MACHINES-I LAB. (EE, EEE)	-	-	3	3	50	-	50	100	3
	TOTAL	**18**	**6 Or 7**	**9**	**33 Or 34**	**425**	**600**	**125**	**1150**	

NOTE:

1. **Students will be allowed to use non-programmable scientific calculator. However, sharing of Calculator and other materials will not be permitted in the examination.**

HUM-201-F **ENGINEERING ECONOMICS**

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

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

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

Section-B

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.

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

Section-C

Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.
Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligoply, Monoplistic Competition (Main features of these markets)

Section-D

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

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.

COURSE OUTCOMES

Upon successful completion of this course, the student will be able to:

CO1 - explain the basic economic principles of wants, scarcity, choice, opportunity cost, etc as applied to business organizations and engineering firms;

CO2 - understand the role of demand and supply law

CO3 - carry out the cost analysis of a manufactured product;

CO4 - fully understand nature and characteristics of Indian Economy

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

MATH-201-F **MATHEMATICS-III**

(Common to CSE, ME, ECE, BME, EE, EEE, E&I, I&C, IT, CE)

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-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.

Section-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 fourmula.

Section-C

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).

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.

Section-D

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.

Course Outcomes

The students will learn:

CO1 - The tool of Fourier series and Fourier Transform for learning advanced Engineering Mathematics.

CO2 - The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

CO3 - The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.

CO4 - The basic ideas of statistics including various discrete and Continuous probability

distributions.

TEXT BOOKS :

1. Engg Mathematics By Babu Ram, Pearson India
2. Advanced Engg. Mathematics : F Kreyszig.
3. 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.

HUM-203-F **FUNDAMENTALS OF MANAGEMENT**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

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.

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.

Section-B

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**.**

Section-C

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.

Section-D

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.

Course outcomes:

Students will be able to understand

CO1 - Evolution of Management and contribution of Management thinkers.

CO2 - importance of staffing and training

CO3 - the concept of material management and inventory control

CO4 - the components of marketing and advertising

CO5 - various sources of finance and capital structure

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.

EE-201-F **ELECTRONIC DEVICES & CIRCUITS**

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

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.

SECTION-B

SEMICONDUCTORS, CONSTRUCTION AND CHARACTERISTICS OF DEVICES:

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

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. And characteristics.

SECTION-C TRANSISTORS:

Transistors: Metal-semiconductor-field-effect-transistors (MESFET), Metal-insulator-semiconductor-field-effect-transistors (MISFET), Metal oxide semiconductor field effect transistor (MOSFET): Construction, Operation and characteristics of above devices.

Bipolar junction transistors: Fundamentals of BJT operation, amplification with BJTs,

SECTION –D

SOME SPECIAL DEVICES:

Photodiodes, photo detectors, solar cell, light emitting diodes, semiconductor lasers, light emitting materials. Tunnel Diode: degenerate semiconductors, IMPATT diode; The transferred electron mechanism: The GUNN diode.P-N-P-N diode, semiconductor controlled rectifier (SCR), bilateral devices: DIAC, TRIAC, IGBT

Text Books:

1. Agarwal - Foundations of analog & Digital electronic Circuits,Elsevier
2. B. G. Streetman and S. Banerjee “Solid state electronics devices”, 5th Edition, PHI.
3. Donald Neamaen, “Electronic Circuit Analysis and Design”, 3rd Edition, TMH.

Course Outcomes: -

Students will be able to:

CO1 - Knowledge about conducting material.

CO2 - Got the knowledge of the detail working of pn junction diode.

CO3 - Understand the working of BJT and its characteristics.

CO4 - Knowledge about the different fabrication technique of diodes

Reference Books:

1. Alok Dutta, “Semiconductor Devices and circuits”, Oxford University Press.

2. Ashby - Engineering Materials : Science and design,Elsevier

EE-203-F **NETWORK THEORY**

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

Signal analysis, complex frequency, and network analysis. General characteristics and descriptions of signals, step function and associated wave forms, The unit impulse Introduction to network analysis, network elements, initial and final conditions, step and impulse response, solution of network equations,

SECTION-B

Review of Laplace transforms, poles and zeroes, initial and final value theorems, The transform circuit, Thevenin's and Norton's theorems, the system function, step and impulse responses, the convolution integral. Amplitude and phase responses. Network functions, relation between port parameters, transfer functions using two port parameters, interconnection of two ports.

SECTION-C

Hurwitz polynomials, positive real functions. Properties of real immittance functions, Synthesis of LC driving point immittances, Synthesis of RC driving point impedances, Synthesis of RC impedances or RL admittances, properties of RL impedances and RC admittances.

SECTION-D

Properties of transfer functions, zeroes of transmission, synthesis of Y_{21} and Z_{21} with 1 terminations Introduction to active network synthesis, Network Tropology and Graph Theory.

Course outcomes:

At the end of the course student will have ability to

CO1 - Articulate in working of various components of a circuit.

CO2 - Familiar with ac and dc circuits solving.

CO3 - Ready with the most important concepts transient analysis in both A.C and D.C.

CO4 - Solve Circuits using Tree, Node, Cut-set and Tie-Set Methods in network topology.

CO5 - Loop and Nodal analysis in A.C circuit with the application of Laplace as a tool.

Text Books:

1. Bird - Electric Circuit theory & technology,Elsevier
2. Franklin F. Kuo, "Network Analysis and synthesis", 2nd Edition, Wiley India Pvt Ltd.
3. D Roy Choudary, "Network and Systems" New Age International,

Reference Books:

1. M. E. Van Valkenberg, “Network Analysis”, 2nd Edition, Prentice Hall of India Ltd.

EE-207-F **ELECTRICAL MACHINES - I**

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION -A

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. Parallel operation of single phase transformers. Auto-transformer: Principle, construction, comparison with two winding transformers, application.

SECTION -B

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.

SECTION-C

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.

SECTION-D

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)
3. Electrical Machines – (Vol – II) By B L Theraja , S Chand

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

Course outcomes:-

Students will be able to:-

CO1 - Knowledge about how energy can be transmitted by transformer.

CO2 - Knowledge of three phase circuit and different connection to transfer the power .

CO3 - Detail knowledge of Dc power generation.

CO4 - Knowledge about use of Dc motor in different application.

EE-209-F **ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

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). 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).

SECTION-B

MEASURING SYSTEM FUNDAMENTALS: Classification of Instruments (Absolute & Secondary Instruments; Indicating, Recording & Integrating instruments; Based upon Principle of operation),
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.

SECTION-C

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.
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).

SECTION-D

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.
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.
2. Morris - Electronic Measurements & Instrumentation,Elsevier

Course Outcomes:

Students will be able to

CO1 - Validate the AC bridges.

CO2 - Analyze the dynamic response, applications and the limitations of few instruments.

CO3 - Learn about various measurement devices, their characteristics, their operation and their limitations.

CO4 - Understand how to measure the resistance.

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.

EE-223-F **NETWORK THEORY LAB**

L T P	Class Work marks	: 25
0 0 2	Theory marks	: 25
	Total marks	: 50

LIST OF EXPERIMENTS :

A: Simulation based

1. Introduction of circuit creation & simulation software like TINAPRO, P-Spice, Dr.-Spice/other relevant Software
2. Transient response of RC, RL circuit on any of above software.
3. To find the resonance frequency, Band width of RLC series circuit using any of above software.
4. To plot the frequency response of low pass filter and determine half-power frequency.
5. To plot the frequency response of high pass filter and determine the half-power frequency.
6. To plot the frequency response of band-pass filter and determine the band-width.

B: Hardware Based

7. To calculate and verify "Z" & "Y" parameters of a two port network.
8. To determine equivalent parameter of parallel connections of two port network and study loading effect.
9. To calculate and verify "ABCD" parameters of a two port network.
10. To synthesize a network of a given network function and verify its response.

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

Course Outcomes:

After course completion students will

CO1 - Have the basic knowledge about various circuits dealing software.

CO2 - Have the practical knowledge of various filters.

CO3 - Know about the transient response of various basic electric circuits.

CO4 - Be able to experimentally calculate various parameters of two port network.

EE-211-F **ELECTRICAL MEASURMENTS & MEASURING INSTRUMENTS LAB**

L T P	Class Work marks	: 25
0 0 2	Theory marks	: 25
	Total marks	: 50

LIST OF EXPERIMENTS :

1. To Study construction of different types of meters & study how to connect them in a circuit..
2. To calibrate a voltmeter & an ammeter using a potentiometer.
3. To study the working of a electronic energy meter (LCD/Digital display type).
4. To measure power & p.f. by 3-ammeter & 3 Voltmeter methods.
5. To study star to delta & delta to star in a Three phase system for balanced & unbalanced load.
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 study ballistic type galvanometer & calculation of ballistic constant
11. Determination of unknown inductance & Q factor by Hays Bridge.
12. To Measure resistance using Wheatstone bridge /Post office box.
13. To measure low resistance by Kelvin's double bridge.
14. To measure high resistance by loss of charge/Leakage method.

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

Course Outcome:

After the completion of the course, students will be able to:

CO1 - Know about the basics of the different types of meters.
CO2 - Calibrate ammeter and voltmeter.
CO3 - Measure power and power factor.
CO4 - Measure basic electric quantities like inductance, capacitance and resistance.

EE-213-F **ELECTRICAL WORKSHOP**

L T P		
0 0 2	Class Work marks	: 25
	Theory marks	: 25
	Total marks	: 50

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. Study circuit of a Simple power supply with regulation & filters.
6. To study Circuit of a SMPS.
7. To study circuit & working of a U.P.S.
7. To study Circuit & working of a Home Inverter.
8. To study construction of moving iron, moving coil, electrodynamic & induction type meters.
9. To design & fabricate single phase transformer.
10. To study fuses MCBs and importance of earthing.
11. To fabricate a simple PCB using sreen printing or any other technique.
12. Drilling & mounting of components on above PCB.

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 & setup by the concerned institution.

Course Outcomes: Learner will be able to…

CO1 - Draw and practice simple house wiring and testing methods
CO2 - Develop practical workshop skills in the students.
CO3 - Grasp the applications of workshop equipment, wiring accessories etc
CO4 - Physical realization of the range of discrete and integrated semiconductor devices.
CO5 - Knowledge of protective devices in electric circuits like fuse, ELCB, MCB etc.

EE-215-F **ELECTRICAL MACHINE -1 LAB**

L T P	Class Work marks	: 50
0 0 3	Theory marks	: 50
	Total marks	: 100

LIST OF EXPERIMENTS

1. conversion of 3 Phase to six phase using 3 single phase transformers..
2. To study three phase rectifiers & supply configuration . In 3 phase.
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 & setup by concerned institution as per scope of syllabus.

Course outcomes:-

Students will be able to:-

CO1 - The ability to formulate and then analyze the working of any electrical machine using mathematical model under loaded and unloaded condition.

CO2 - The ability to conduct test on different types of electrical machine.

CO3 - The ability to understand the experimental procedure of different electrical machine.

M.D UNIVERSITY

SCHEME OF STUDIES AND EXAMINATION

B.Tech II YEAR (ELECTRICAL ENGINEERING)

SEMESTER – IV

'F' Scheme effective from 2010-11

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
HUM-201-F OR MATH-201-F	ENGG. ECONOMICS OR MATHEMATICS - III	3 3	1 2	- -	4 5	50	100	-	150	3
EE-212-F	TRANSMISSION AND DISTRIBUTION (EE,EEE)	3	-	-	3	50	100	-	150	3
EE-202-F	ANALOG ELECTRONICS (ECE,EI,EE,EEE,IC)	3	1	-	4	50	100	-	150	3
EE-204-F	DIGITAL ELECTRONICS (ECE,EI,EE,EEE,IC)	3	1	-	4	50	100	-	150	3
EE-220-F	PRINCIPLES OF COMMUNICATION SYSTEMS (EE, EEE)	3	1	-	4	50	100	-	150	3
EE-208-F	ELECTRO MAGNETIC THEORY (ECE,EI,EE,EEE,IC)	3	1	-	4	50	100	-	150	3
EE-222-E	ANALOG ELECTRONICS LAB (ECE,EI,EE,EEE,IC)	-	-	2	2	25	-	25	50	3
EE-224-F	DIGITAL ELECTRONICS LAB (ECE,EI,EE,EEE,IC)	-	-	2	2	25	-	25	50	3
EE-230-F	PRINCIPLES OF COMMUNICATION SYSTEMS LAB (EE, EEE)	-	-	2	2	25	-	25	50	3
MATH-204-F	NUMERICALMETHODS LAB (ECE,EI,EE,EEE,IC)	1	1	2	4	25	-	25	50	3
GP-202-F	GENERAL PROFICIENCY (COMMON FOR ALL BRANCHES)	-	-	2	2	50	-	-	50	3
	TOTAL	**19**	**6 or 7**	**10**	**35 Or 36**	**450**	**600**	**100**	**1150**	

Note:

1. **Students will be allowed to use non-programmable scientific calculator. However, sharing of Calculator and other materials will not be permitted in the examination.**
2. **Each student has to undergo practical training of 6 weeks during summer vacation and its evaluation shall be carried out in the V semester.**

HUM-201-F **ENGINEERING ECONOMICS**

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

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

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

Section-B

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.

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

Section-C

Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run. Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligoply, Monoplistic Competition (Main features of these markets)

Section-D

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

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.

COURSE OUTCOMES

Upon successful completion of this course, the student will be able to:

CO1 - explain the basic economic principles of wants, scarcity, choice, opportunity cost, etc as applied to business organizations and engineering firms;

CO2 - understand the role of demand and supply law

CO3 - carry out the cost analysis of a manufactured product;

CO4 - fully understand nature and characteristics of Indian Economy

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

MATH-201-F **MATHEMATICS-III**

(Common to CSE, ME, ECE, BME, EE, EEE, E&I, I&C, IT, CE)

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-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.

Section-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 fourmula.

Section-C

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).

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.

Section-D

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.

Course Outcomes

The students will learn:

CO1 - The tool of Fourier series and Fourier Transform for learning advanced Engineering Mathematics.

CO2 - The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

CO3 - The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.

CO4 - The basic ideas of statistics including various discrete and Continuous probability distributions.
CO5 - The statistical methods of studying data samples, the effective mathematical tools for the solutions of Linear Programming Problem (LPP).

TEXT BOOKS :

1. Engg Mathematics By Babu Ram, Pearson India
2. Advanced Engg. Mathematics : F Kreyszig.
3. 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.

EE-212-F **TRANSMISSION AND DISTRIBUTION**

L T P		
3 0 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION A

INTRODUCTION: Structure of a power system, **i**ndoor and outdoor substations, equipment for substations, layout, auxiliary supply.
DISTRIBUTION SYSTEMS: Radial, ring mains and network distribution system, comparison of various types of ac and dc systems.

SECTION B

TRANSMISSION LINES: Calculation of line parameters, Ferranti effect, proximity effect.
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. SECTION C
MECHANICAL DESIGN: Sag and stress calculations, effect of ice and wind, dampers.
INSULATORS: Types, insulating materials, voltage distribution over insulator string, equalizer ring.

SECTION D

CABLES: Types of LV and HV cables, grading of cables, capacitance, ratings.
CORONA: Phenomenon, critical voltage, power loss, reduction in losses, radio-interference, HVDC transmission – types of links, advantages and limitations.

Course outcomes:

At the end of the course student will have ability to

CO1 - Articulate in working of various transmission line parameters like inductance and capacitance.
CO2 - Familiar with analysis for various types of transmission line analysis.
CO3 - Ready with the most important concepts of determining efficiency and voltage regulation transmission line.
CO4 - Solve Circuits using Mechanical Design of transmission line with geographical and atmospheric condition.
CO5 - Solve Circuits using insulator and cables with its grading methods in transmission line.

TEXT BOOKS:

1. Transmis sionand generation of power by bayliss, Elsevier.
2. Power System Engg: I.J.Nagrath and D.P.Kothari (TMH)
3. 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.

EE-202-F **ANALOG ELECTRONICS**

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

Semiconductor Diode: Review of P-N junction and Characteristics, P-N junction as a rectifier, Switching characteristics of Diode, 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.

SECTION-B

MOSFET: Review of device structure operation and V-I characteristics. Circuits at DC, MOSFET as Amplifier and switch, Biasing in MOS amplifier circuits, small-signal operation and models, single stage MOS amplifier, MOSFET internal capacitances and high frequency model, frequency response of CS amplifier

SECTION -C

BJT: Review of device structure operation and V-I characteristics, BJT circuits at DC, BJT as amplifier and switch, biasing in BJT amplifier circuit, small-signal operation and models, single stage BJT amplifier, BJT internal capacitances and high frequency model, frequency response of CE amplifier.

SECTION-D

Operational Amplifier: Inverting and non-inverting configurations, difference amplifier, Effect of finite open loop gain and bandwidth on circuit performance, Large signal operation of op-amp.

Feedback: The general feed back structure, properties of negative feed back, the four basic feed back topologies, the series-shunt feedback amplifier, the series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier.

Differential Amplifier: MOS differential pair, small signal operation of the MOS differential pair, BJT differential pair, other non-ideal characteristic of the Differential amplifier (DA), DA with active load

Text Book:

1. Foundations of Analog & Digital electronic Circuits, Agarwal, Elsevier
2. A. S. Sedra and K. C. Smith, **"**Microelectronic Circuits", Oxford University Press, 5th Ed.
3 Integrated Electronics: Millman & Halkias ; McGrawHill
4 Electronic circuit analysis and design (Second edition): D.A.Neamen; TMH

Course Outcomes

CO1 - Acquire basic knowledge of physical and electrical conducting properties of semiconductors.
CO2 - Develop the Ability to understand the design and working of BJT / FET amplifiers
CO3 - Able to design amplifier circuits using BJT s And FET's. and observe the amplitude and frequency responses of common amplifier circuits
CO4 - Develop the skill to build, and troubleshoot Analog circuits.

Reference Books:

1. Spencer and Ghausi, Introduction to Electronic Circuit Design, Pearson Education, 2003
2. A. Dutta, Semiconductor Devices and Circuits, Oxford University Press, ND 2008

EE-204-F **DIGITAL ELECTRONICS**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

Digital system and binary numbers: Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes.
Gate-level minimization: The K-map method up to five variable, don't care conditions, POS simplification, NAND and NOR implementation, Quine Mc-Clusky method (Tabular method)

SECTION-B

Combinational Logic: Combinational circuits, analysis procedure, design procedure, binary adder-subtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers ,demultiplexers

SECTION -C

Synchronous Sequential logic: Sequential circuits, storage elements: latches, flip flops, analysis of clocked sequential circuits, state reduction and assignments, design procedure.
Registers and counters: Shift registers, ripple counter, synchronous counter, other counters

SECTION- D

Memory and programmable logic: RAM, ROM, PLA, PAL. Design at the register transfer level: ASMs, design example, design with multiplexers. Asynchronous sequential logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race Free State assignment, hazards

Course Outcomes:

Students will be able to

CO1 - Understand working of logic families and logic gates.

CO2 - Design and implement Combinational and Sequential logic circuits.

CO3 - Understand the process of Analog to Digital conversion and Digital to Analog conversion.

CO4 - Be able to use PLDs to implement the given logical problem.

Text Book:

1. .M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education
2. Pedroni - Digital Electronics & Design, Elsevier
3. R.P. Jain , "Modern digital electronics" , 3rd edition , 12th reprint TMH Publication, 2007.
4. Digital Design and computer organization: Nasib Singh Gill & J. B. Dixit, university press(Laxmi Publication)

REFERENCE BOOKS :

1. Grout - Digital Design using FPGA'S & CPLD's, Elsevier
2. F. Vahid: Digital Design*:* Wiley Student Edition, 2006
3. J. F. Wakerly, *Digital Design Principles and Practices*, Fourth Edition, Prentice-Hall, 2005.

4. R. L. Tokheim, *Digital electronics, Principles and applications*, 6th Edition, Tata McGraw Hill Edition, 2003

EE-220-F **PRINCIPLE OF COMMUNICATION SYSTEMS**

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

INTRODUCTION TO COMMUNICATION SYSTEMS:
Types of signals and their representation,The essentials of a Communication system, modes and media's of Communication, Classification of signals and systems , Fourier Analysis of signals. Analog Communication & Digital Communication. Channels,Multiplexing & Demultiplexing.

SECTION-B

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).
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.

SECTION C

PULSE ANALOG MODULATION : Sampling theory, sampling and hold circuits. Time division (TDM) and frequency division (FDM) multiplexing, pulse amplitude modulation (PAM), pulse time modulation. PULSE DIGITAL MODULATION : Coding & Decoding techniques, 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)

SECTION D

DIGITAL MODULATION TECHNIQUES:ASK, FSK, BPSK, QPSK, M-ary
PSK. PC-PC data Communication
INTRODUCTION TO NOISE: External noise, Internal noise, S/N ratio, noise figure.

Course Outcomes:

CO1 - Use of different modulation and demodulation techniques used in analog communication

CO2 - Identify and solve basic communication problems

CO3 - Analyze transmitter and receiver circuits

CO4 - Compare and contrast design issues, advantages, disadvantages and limitations of analog communication systems

TEXT BOOKS :

1. Signals and Systems(2nd Edition), Nagrath, Sharan and Ranjan, TMH
2. Communication systems (4th edn.) : Simon Haykins; John wiley & sons.

3. Communication systems: Singh & Sapre; TMH.

REFERENCE BOOKS :

1. Signals and Systems,(SCHAUM's) Hsu and Ranjan, TMH
2. Electronic Communication systems : Kennedy; TMH.
3. Communication system : Taub & Schilling; TMH.

EE-208-F **ELECTROMAGNETIC FIELD THEORY**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

Coordinate systems and transformation: Cartesian coordinates, circular cylindrical coordinates, spherical coordinates Vector calculus: Differential length, area and volume, line surface and volume integrals, del operator, gradient of a scalar, divergence of a vector and divergence theorem, curl of a vector and Stoke's theorem, Laplacian of a scalar

SECTION-B

Electrostatics: Electrostatic fields, Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses's Law – Maxwell's equation, Electric dipole and flux lines, energy density in electrostatic fields. Electric field in material space: Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, dielectric constants, continuity equation and relaxation time, boundary condition. Electrostatic boundary value problems: Poission's and Laplace's equations, general procedures for soling Poission's or Laplace's equations, resistance and capacitance, method of images.

SECTION-C

Magnetostatics: Magneto-static fields, Biot-Savart's Law, Ampere's circuit law, Maxwell's equation, application of ampere's law, magnetic flux density- Maxwell's equation, Maxwell's equation for static fields, magnetic scalar and vector potential.

Magnetic forces, materials and de vices: Forces due to magnetic field, magnetic torque and moment, a magnetic dipole, magnetization in materials, magnetic boundary conditions, inductors and inductances, magnetic energy

SECTION-D

Waves and applications: Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, displacement current, Maxwell's equation in final form.

Electromagnetic wave propagation: Wave propagation in lossy dielectrics, plane waves in lossless dielectrics, plane wave in free space, plain waves in good conductors, power and the pointing vector, reflection of a plain wave in a normal incidence. Transmission lines: Transmission line parameters, Transmission line equations, input impedance, standing wave ratio and power,

Course Outcomes: -

Students will be able to:

CO1 - Knowledge about the vector calculus in different co-ordinate.
CO2 - Knowledge about the electrostatic and solution of Laplace and poissons equation.
CO3 - Knowledge about the magnetic forces and magnetism in different condition and behaviour different magnetic material.
CO4 - Knowledge about the different parameter of transmission line at different loading condition.

Text Book:

1. M. N. O. Sadiku, “Elements of Electromagnetic”, 4th Ed, Oxford University Press.

Reference Books:

1. W. H. Hayt and J. A. Buck, “Electromagnetic field theory”, 7th edition TMH
2. Electromagnetic Field theory by Balmein and Jordan

EE-222-F **ANALOG ELECTRONICS LAB**

L	T	P
0	0	2

Class Work marks	: 25
Theory marks	: 25
Total marks	: 50

1. **Study of lab equipments and components:** CRO, Multimeter, Function Generator, Power supply-Active, Passive Components & Bread Board.
2. **P-N Junction Diode**: Characteristics of PN Junction diode-Static and dynamic resistance measurement from graph.
3. **Applications of PN junction diode**: Half & Full wave rectifier- Measurement of Vrms, Vdc, and ripple factor-use of filter- ripple reduction (RC Filter)-Clipper & Clamper
4. **Properties of junctions** Zener diode characteristics. Heavy doping alters the reverse characteristics. Graphical measurement of forward and reverse resistance.
5. **Application of Zener diode:** Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.
6. **Characteristic of BJT**: BJT in CB and CE configuration- Graphical measurement of h parameters from input and output characteristics. Measurement of A_v, A_I, R_o and R_i of CE amplifier with potential divider biasing.
7. **Characteristic of FET**: FET in common source configuration. Graphical measurement of its parameters gm, rd & m from input and output characteristics.
8. **Characteristic** of silicon-controlled rectifier.
9. **To plot** V-I Characteristics of DIAC .
10. **To draw** V-I characteristics of TRIAC for different values of Gate Currents.
11. Study of frequency response of active filters LP, HP & BP.

Course Outcomes:

CO1 - At the end of the course the students can able to Measure voltage, frequency and phase of any waveform using CRO.
CO2 - Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.
CO3 - Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers etc.

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 & setup by concerned institution as per scope of syllabus.

EE-224-F **DIGITAL ELECTRONICS LAB**

L T P		
0 0 2	Class Work marks	: 25
	Theory marks	: 25
	Total marks	: 50

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of V_{cc} and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.
5. Implementation of 4x1 multiplexer using logic gates.
6. Implementation of 4-bit parallel adder using 7483 IC.
7. Design, and verify the 4-bit synchronous counter.
8. Design, and verify the 4-bit asynchronous counter.
9. Static and Dynamic Characteristic of NAND and Schmitt-NAND gate(both TTL and MOS)
10 Study of Arithmetic Logic Unit.
10. Mini Project.

Course Outcomes:

Students will be able to

CO1 - Learn the basics of gates.

CO2 - Construct basic combinational circuits and verify their functionalities.

CO3 - Apply the design procedures to design basic sequential circuits.

CO4 - Learn about counters and Shift registers.

CO5 - To understand the basic digital circuits and to verify their operation.

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 & setup by concerned institution as per scope of syllabus.

EE-226-F **PRINCIPLES OF COMMUNICATION SYSTEMS LAB**

L T P	Class Work marks	: 25
0 0 2	Theory marks	: 25
	Total marks	: 50

LIST OF EXPERIMENTS: (Any ten experiments)

1. Generation of DSB-SC AM signal using balanced modulator.
2. Generation of SSB AM signal
3. To study envelop detector for demodulation of AM signal and observe diagonal peak clipping effect.
4. Frequency modulation using voltage controlled oscillator.
5. To generate a FM Signal using Varactor & reactance modulation.
6. Detection of FM Signal using PLL & foster seelay method..
7. To Study Super heterodyne AM receiver and measurement of receiver parameters viz. sensitivity, selectivity & fidelity.
8. To study the circuit of PAM/PWM/PPM modulator & Demodulator
9. Study of Frequency Division Multiplexing/Demultiplexing with sinusoidal & audio inputs.
10. Generation & study of Analog TDM at least 4 channels.
11. Study of 4 channel Time Division Multiplexing system.
12. Study of pulse code modulation and demodulation with parity & Hamming code.
13. Study pulse data coding & Decoding techniques for various formats.
14. Study of ASK, FSK modulator and demodulator.
15. Study of PSK & QPSK modulator and demodulator.
16. Study of Differential Pulse code modulation & demodulation.

Course Outcomes: At the end of the course the student will be able to:

CO1 - Analysis and design of various modulation and demodulation techniques.

CO2 - Acquaint with formulate the frequency modulation and angle modulation signals.

CO3 - Measures the bandwidth of various modulation techniques and observes the output waveforms.

CO4 - Emphasize on sampling modeling, techniques, signal constellations.

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 & setup by concerned institution as per scope of syllabus.

MATH-204 –F **NUMERICAL METHODS OF COMPUTATIONAL PROGRAMMING LAB**

L T P	Class Work marks	: 25
1 1 2	Theory marks	: 25
	Total marks	: 50

THIS LAB IS DESIGNED IN manner where every lab will have first hour as lecture on Numerical methods and followed by 2 hours of programming Lab.

THEORY TO BE TAUGHT

Interpolation and curve fitting : Interpolation problem, Lagrangian polynomials, Divided differences, 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 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.

Numerical Solution of Partial Differential Equations : Finite difference approximations of partial derivatives, solution of Laplace equation

TEXT BOOKS :

1. Phillips - Theory & Applications & Numerical analysis, Elsevier
2. Applied Numerical Analysis : Curtis F. Gerald and Patrick G. Wheatley-Pearson, Education Ltd.
3. Numerical Methods By Babu Ram, Pearson
4. Numerical Method : E. Balagurusamy T.M.H.

REFERENCE BOOKS :

1. Numerical Methods in Engg. & Science : B.S. Grewal.

LAB SESSION (ANY TEN PROGRAMM TO BE DEVELOPED)

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

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 any one methods Euler's/ Runge-Kutta method.
11. To find the numerical solution of Laplace equation.
12. Department specific problem given by lecturer.

Learning Outcomes Students would be able to

CO1 - Evaluate numerical differentiation and numerical integration using iterative methods.

CO2 - To find the solution of transcendental and linear equation using several numerical methods

CO3 - Solve ordinary and partial differential equations of first order using several numerical Technique

GP-202 F **GENERAL PROFICIENCY**

L. T. P	Marks for Class Work ;50
- - 2	Total Marks: 50

Quiz & Aptitude Comprehension

Communication for Specifics Lets Speak

Composition Sills – Instead of the given content we should teach the students formal letter writing based on the trends in practice in corporate culture.

Training on etiquettes & manners should be carried further and should be observed during the general classes, if required, even the faculty should imparted some training on the same.

Course Outcomes

CO1 - Student will be try to perform well not only for academic performance.

CO2 – Student will be able to participate in activities like games and other extracurricular activities

CO3 – Student will be able to write technical paper, presentation and participate in competitions.

M.D. UNIVERSITY, ROHTAK

Scheme of studies & Examination

Bachelor of Technology (Electrical Engg.)

SEMESTER V

'F ' Scheme Effective from 2011–2012

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
EE-311-F	Electrical Machines-II (EE, EEE)	3	1	-	4	50	100	-	150	3
EE-303-F	Electronic Measurement And Instrumentation (EE,EEE,ECE,IC)	3	1	-	4	50	100	-	150	3
EE-305-F	Analog Electronics Circuits (EE,EEE,ECE,IC)	3	1	-	4	50	100	-	150	3
EE-315-F	Power Systems-I (EE, EEE)	3	1	-	4	50	100	-	150	3
EE-317-F	Power Electronics (EE, EEE, Common with VI sem IC)	3	1	-	4	50	100	-	150	3
EE-309-F	Microprocessors And Interfacing (EE,EEE,ECE)	3	1	-	4	50	100	-	150	3
EE-323-F	Electronic Measurement & Instrumentation Lab (EE,EEE,ECE,IC)	-	-	2	2	25	-	25	50	3
EE-321-F	Power Electronics Lab. (EE, EEE Common with VI sem , IC)	-	-	2	2	25	-	25	50	3
EE-319-F	Microprocessor & Interfacing Lab. (EE,EEE)	-	-	2	2	25	-	25	50	3
EE-327-F	Electrical Machines-II LAB. (EE, EEE)	-	-	3	3	25	-	25	50	3
EE-333-F	Practical Training-I	-	-	2	2		-	-		-
	TOTAL	**18**	**6**	**11**	**35**	**400**	**600**	**100**	**1100**	

Note:

2. **Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.**
3. **Assessment of Practical Training-I, undergone at the end of IV semester, will be based on seminar, viva-voce, report and certificate of practical training obtained by the student from the industry. 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.**

EE-311-F ELECTRICAL MACHINES - II

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

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.

Section-B

Single phase Induction Motors: Double revolving field theory, cross field theory, different types of single phase induction motors, circuit model of single phase induction motor.

Section-C

Synchronous Generator: 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.

Section-D

Synchronous Motor: Principles of synchronous motor, power angle curve, V-curve, starting, damper winding, synchronous condenser, applications.

Course outcomes:

By the end of the course students will be able to:

CO1 - Have knowledge of various parts of a electrical machine..

CO2 - Able to conduct open circuit/ short circuit test on induction and synchronous motor.

CO3 - Ability to conduct experiments on Ac Machines to find the characteristics.

CO4 - Able to calculate torque and speed of given Machine.

CO5 - Ability to perform test on synchronous Machine to find Direct and quadrature axis reactance.

TEXT BOOKS:

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

REF. BOOKS:

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

EE-303-F ELECTRONIC MEASUREMENT AND INSTRUMENTATION

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

OSCILLOSCOPE:

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

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.

Section-B

ELECTRONIC INSTRUMENTS:

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

FREQUENCY & TIME MEASUREMENT:

Study of decade counting Assembly(DCA), frequency measurements, period measurements, universal counter, introduction to digital meters.

Section-C

DISPLAY DEVICES:

Nixie tubes, LED˝s LCD˝s, discharge devices.

TRANSDUCERS:

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

Section-D

INTRODUCTION TO SIGNAL CONDITIONING:

DC signal conditioning system, AC signal conditioning system, data acquisition and conversion system

Course Outcomes:

Learner will be able to:

CO1 - Understand operation of different instruments.

CO2 - Use oscilloscope to determine frequency and phase of a sinusoidal signal

CO3 - Understand the principles of various types of transducers and sensors.

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.

EE-305-F **ANALOG ELECTRONIC CIRCUITS**

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

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 .

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.

Section-B

OSCILLATORS:

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

Section-C

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.

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) .

Section-D

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.

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.

Course Outcomes

CO1 - Observe the effect of negative feedback on different parameters of an Amplifier and different types of negative feedback topologies.
CO2 - Observe the effect of positive feedback and able to design and working of different Oscillators using BJTS.
CO3 - Define significance of Op Amps and their importance.
CO4 - Ability to use OP Amp as Summer, Subtractor, Multiplier and Divider
CO5 - Able to use OP Amp to generate sine waveform, Square wave form, Triangular wave forms.

TEXT BOOK:

4. Agarwal - Foundations & Analog & digital electronics,Elsevier
5. Integrated Electronics: Milman Halkias, TMH.
6. Microelectronic Circuits : Sedra & Smith.

REFERENCE BOOKS:

5. Operational Amplifiers:Gaikwad
6. Electronic Circuit Analysis and Design (Second edition) : D.A.Neamen; TMH

EE-315-F **POWER SYSTEMS-I**

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

REPRESENTATION OF POWER SYSTEM COMPONENTS: Introduction, Single-phase representation of balance three-phase network, The one-line diagram and the impedance or reactance diagram, Per unit (PU) system, Complex power, The steady state model of synchronous machine, Power transformer, Transmission of electric power, System protection, Representation of loads.

Section-B

LOAD FLOW STUDIES: Introduction, Network model formulation, Formation of YBUS by singular transformation, Load flow problem, Gauss-siedel method, Newton-Raphson method, Decoupled load flow studies, Comparison of load flow methods, Control of voltage profile.

Section-C

OPTIMAL SYSTEM OPERATION: Introduction, Optimal operation of generators on a bus bar, Optimal unit commitment (UC), Reliability considerations, Optimal generation scheduling, Optimal load flow solution, Optimal scheduling of hydrothermal system.

Section-D

AUTOMATIC GENERATION AND VOLTAGE CONTROL: Introduction, Load frequency control (single area case), Load frequency control and economic dispatch control, Two- area load frequency control, Optimal (two-area) load frequency control, Automatic voltage control.

Course Outcomes:

CO1 - At the end of this course, students will demonstrate the ability to understand the concepts of power systems.

CO2 - Understand the various power system components.

CO3 - Students will demonstrate the ability to Use numerical methods to analyze a power system in steady state.

CO4 - Understand stability constraints in a synchronous grid.

CO5 - Understand methods to control the voltage, frequency and power flow.

TEXT BOOK:

Power System Engineering – DP Kothari, I J Nagrath, Tata McGraw Hill
Electrical Power system by C L Wadhwa
Power system Engineering by P. Kundur
Tleis - Power systems analysis using Fault tolerance systems,Elsevier
A Course in Electrical Power: Gupta, Soni & Bhatnagar (Dhanpat Rai & Sons).

REF. BOOKS:

3. Elements of power system analysis: W.D.Stevenson (MGH)
4. Electric Power: S.L.Uppal (Khanna Pub.)
5. Electrical power: J.B.Gupta (S.K.Kataria & Sons).
6. Power System Engineering: B. R. Gupta.
7. Electric Power System: B.M.Weedy, John Wiley & Sons.

8. Transmission & Distribution of Electrical Engineering: H.Cotton.
9. Transmission & Distribution of Electrical Engineering: Westing House & Oxford Univ. Press, New Delhi.

EE-317-F **POWER ELECTRONICS**

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

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.

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.

Section-B

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.

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.

Section-C

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.

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.

Section-D

CYCLOCONVERTERS :

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

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.

Course Outcomes

CO1 - Articulate the basics of power electronic devices

CO2 - Express the design and control of rectifiers, inverters.

CO3 - Design of power electronic converters in power control applications

CO4 - Ability to express characteristics of SCR, BJT, MOSFET and IGBT.

CO5 - Ability design AC voltage controller and Cyclo Converter.

TEXT BOOK:

6. Power Electronics: P.S Bhimra
7. Power Electronics : MH Rashid; PHI
8. Bose - Power electronics,Elsevier

REFERENCE BOOKS :

Rashid - Handbook of power electronics,Elsevier
2. Power Electronics : PC Sen; TMH
3. Power Electronics : HC Rai; Galgotia
4. Thyristorised Power Controllers : GK Dubey, PHI
5. Power Electronics and Introduction to Drives : A.K.Gupta and L.P.Singh;Dhanpat Rai

EE-309-F **MICROPROCESSORS AND INTERFACING**

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section A

THE 8085 PROCESSOR :

Introduction to microprocessor, 8085 microprocessor : Architecture, instruction set, interrupt structure, and Assembly language programming.

Section B

THE 8086 MICROPROCESSOR ARCHITECTURE :

Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals

Section C

INSTRUCTION SET OF 8086 :

Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

Section D

INTERFACING DEVICE :

8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, Direct Memory Access and 8237 DMA controller.

Course Outcomes:

Learner will be able to…

CO1 - Write programs to run on 8086 microprocessor based systems.
CO2 - Design system using memory chips and peripheral chips for 16 bit 8086 microprocessor.
CO3 - Understand and devise techniques for faster execution of instructions, improve speed of
operations and enhance performance of microprocessors.
CO4 - Distinguish between RISC and CISC processors.
CO5 - Understand multi core processor and its advantages.

TEXT BOOKS :

1. Microprocessor Architecture, Programming & Applications with 8085 : Ramesh S Gaonkar; Wiley

Eastern Ltd.
2. The Intel Microprocessors 8086- Pentium processor : Brey; PHI

REFERENCE BOOKS:

1. Microprocessors and interfacing : Hall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing,Hardware & Applications :Triebel & Singh; PHI
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design : Yu-Chang Liu & Glenn A Gibson; PHI.
4. Advanced Microprocessors and Interfacing : Badri Ram; TMH

EE-323-F ELECTRONIC MEASUREMENT AND INSTRUMENTATION-LAB

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

LIST OF EXPERIMENTS:

1) Study blocks wise construction of a analog oscilloscope & Function generator.
2) Study blocks wise construction of a Multime0ter & frequency counter.
3) Study Measurement of different components & parameters like Q of a coil etc using LCRQ meter.
4) Study of distortion factor meter and determination of the % distortion of the given oscillator
5) Determine output characteristics of a LVDT and Measure displacement using LVDT
6) Study characteristics of temperature transducer like Thermocouple, Thermistor & RTD with implementation of a small project using signal conditioning circuits like instrumentation amplifier.
7) Measurement of Strain using Strain Guage.
8) To study differential pressure transducer & signal conditioning of output signal.
9). Measurement of level using capacitive transducer..
10) Study of Distance measurement using ultrasonic transducer.

COURSE OUTCOMES :

CO1 - Upon successful completion of this course, the student will be able to: (Knowledge based)

CO2 - Identify electronics/ electrical instruments, their use, peculiar errors associated with the instruments and how to minimise such errors.

CO3 - Explain the industrial and laboratory applications of such instruments service and maintain such instruments in case of damage or misuse

CO4 - Understand the basic design techniques of electronic equipment (skills)

CO5 - The students will o use various laboratory instruments like cathode ray oscilloscope, function generators, dismantle and recouple serviceable parts of some other selected instruments without damaging them. O be well grounded in their knowledge about various types of transducers, their applications and how they can be used for design purposes.

Note: Any Eight Experiments should performed from above list and two experiments can be suitably chosen on the contemporary topics

EE-321-F **POWER ELECTRONICS-LAB**

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

LIST OF EXPERIMENTS:

1. Static Characteristics of Power diode & Shottky diode and to study reverse recovery of Power Diode & Shottky diode.
2. Characteristics of IGBT & GTO
3. To study R, RC and UJT firing Circuit with Pulse transformer
4. To study of Firing Circuit based on ICs NE555, 7408 & 3140
5. To Study of Pulse transformer & optocoupler technique
6. To Study of SCR Communication Technique Class A-E.
7. Speed control of small motor using Single Phase Half wave & Full wave fully controlled Converter
8. Speed control of small motor using Single Phase Dual Converter (Continuous and discontinuous Control)
9. Study of Mc Murray - Bed ford Half & Full Bridge Inverter
10. To study Parallel Inverter to drive small AC Induction motor
11. Speed control of a small DC motor using MOSFET based Chopper with output voltage control technique
12. Speed control of small AC induction motor using Single Phase non circulating type bridge by frequency conversion.

Course Outcomes:

At the end of the course the students will be able to

CO1 – Practically study R, RC and UJT firing circuit with pulse transformer.

CO2 – will be able to study SCR communication techniques.

CO3 – will be able to study speed control of a small DC and AC motor.

EE-319-F MICROPROCESSOR & INTERFACING LAB.

L T P — Practical : 25 marks

- - 2 — Class Work : 25 marks

Total : 50 marks

Duration of Exam. : 3 Hrs.

List of Experiment

ANY TEN EXPERIMENTS SHOULD BE PERFORMED:

4. Write a program using 8085 for Hexadecimal addition & subtraction of two numbers.
5. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers
6. Write a program to perform multiplication and division of two 8 bit numbers using 8085
7. Write a program using 8086 for division of a defined double word (stored in a data segment) by another double Word division and verify.
3. Write a program using 8086 for finding the square root of a given number and verify.
4. Write a program using 8086 to copy 12 bytes of data from source to destination & verify.
5. Write a program to find maximum and minimum from series using 8086.
6. Write a program to initiate 8251 and to check the transmission and reception of character.
7. Write a program to interface ADC & DAC with 8085 & demonstrate generation of square wave.
8. Write a program to control the operation of stepper motor using 8085/8086 and 8255 PPI.
5. Write a program to interface 8X8 LED Matrix Display using 8085/8086 microprocessors and 8255 PPI.

B: Write a program to control the traffic light system using 8085/8086 and 8255 PPI.

C: Write a program to control simulated elevator 8085/8086 microprocessors and 8255 PPI.

Course Outcomes :

Students will be able to:

CO1 - Able to write program on 8085 and 8086 microprocessor based systems.

CO2 - Understand multi core processor and its advantage.

CO3 - Able to design system using memory chips and peripheral chips for microprocessor.

EE-327-F **ELECTRICAL MACHINES-II LAB**

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

List of Experiments:

1. Study of the No Load and Block Rotor Test in a Three Phase Slip Ring Induction Motor & draw its circle diagram
2. To Study the Starting of Slip Ring Induction Motor by Rotor Resistance Starter.
3. To Study and Measure Direct and Quadrature Axis Reactance of a 3 phase alternator by Slip Test
4. To Study and Measure Positive, Negative and Zero Sequence Impedance of a Alternator
5. To Study and Measure Synchronous Impedance and Short circuit ratio of Synchronous Generator .
6. Study of Power (Load) sharing between two Three Phase alternators in parallel operation condition
7. Synchronization of two Three Phase Alternators, by
   a) Synchroscope Method
   b) Three dark lamp Method
   c) Two bright one dark lamp Method
8. To plot V- Curve of synchronous motor.
9. To study and verify Load characteristics of Long Shunt & short shunt Commutatively Compound Generator using 3 phase induction motor as prime mover.
10. To perform O.C. test on synchronous generator. And determine the full load regulation of a three phase synchronous generator by synchronous impedance method

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.

Course outcomes:-

Students will be able to:-

CO1 - To have basic knowledge of various parts of electrical machine.

CO2 - Able to conduct experiments on ac machines.

CO3 - Able to calculate torque and speed of given machine.

EE-333-F **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.

M.D UNIVERSITY,ROHTAK
SCHEME OF STUDIES AND EXAMINATION
B.Tech. III YEAR (ELECTRICAL ENGINEERING)
SEMESTER - VI
Modified 'F' Scheme effective from 2011-12

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
EE-312-F	Power Systems –II (EE, EEE)	3	1	-	4	50	100	-	150	3
EE-314-F	Computer Added Electric Machines Design (EE, EEE)	3	1	-	4	50	10 0	-	150	3
EE-308-F	Micro-Controller And Embeded System(EE,ECE)	3	1	-	4	50	100	-	150	3
EE-304-F	Control systems engg. (EE, EEE,ECE)	3	1	-	4	50	100	-	150	3
EE-318-F	Electric Power Generation (EE, EEE)	3	1	-	4	50	100	-	150	3
EE-310-F	Digital System Design (IC,EE,ECE,)	3	1	-	4	50	100	-	150	3
EE-324-F	Control system engg. Lab (EE, EEE,ECE)	-	-	2	2	25	-	25	50	3
EE-320-F	Micro-Controller And Embeded System LAB (EE,ECE)	-	-	2	2	25	-	25	50	3
EE-326-F	Computer Added Electric Machines Design Lab (EE, EEE)	-	-	2	2	25	-	25	50	3
EE-328-F	Power Systems Lab (EE, EEE)	-	-	2	2	25	-	25	50	3
GPEE-302-F	GENERAL PROFICIENCY	-	-	-	-	50	-	-	50	3
	TOTAL	**18**	**6**	**8**	**32**	**450**	**600**	**100**	**1150**	

Note:

1. **Each student has to undergo practical training of 6 weeks during summer vacation and its evaluation shall be carried out in the VII semester.**
2. **Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.**

EE-312-F **POWER SYTEMS - II**

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

SYMMETRICAL FAULT ANALYSIS: Transients on a transmission line, short circuit of synchronous machine at no load and on full load.

SYMMETRICAL COMPONENTS: Symmetrical component transformation, phase shift in star-delta transformation, sequence impedances.

UNSYMMETRICAL FAULT ANALYSIS: Single line to ground fault, line to line fault, double line to ground fault, open conductor fault.

Section-B

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.

APPARATUS PROTECTION: Transformer, generator, motor and bus zone protection.

Section-C

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.

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.

Section-D

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.

Course outcomes:

By the end of the course students will be able to:

CO1 - Understand the different components of a protection system.

CO2 - Evaluate fault current due to different types of fault in a network.

CO3 - Understand the protection schemes for different power system components.

CO4 - Understand the basic principles of digital protection.

CO5 - Understand system protection schemes, and the use of wide-area measurements.•

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.

EE-314-F **COMPUTER ADDED ELECTRIC MACHINES DESIGN**

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

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.

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

Section-B

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.

Section-C

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

Section-D

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

Course outcomes:

By the end of the course students will be able to:

CO1 - Familiarize with design of electrical and magnetic circuit for all static and rotating machines.

CO2 - Analyze the range of specific electric and magnetic loadings.

CO3 - Students get familiarize with different models of machines with different performance and can be proceed for fabrication of suitable model.

CO4 - Student would be able to proceed for calculated design parameters with validation to design software.

CO5 - Design of field magnet and d.c. machines with different specifications.

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

EE-316-F MICROCONTROLLER & EMBEDDED SYSTEM

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

INTRODUCTION OF MICROCONTROLLER: Different types of microcontrollers: Embedded microcontrollers, External memory microcontrollers; Processor Architectures: Harvard V/S Princeton , CISC V/S RISC; microcontrollers memory types; microcontrollers features : clocking, i/o pins, interrupts, timers, peripherals.

Section-B

MICROCONTROLLER ARCHITECTURE: Introduction to PIC microcontrollers, Architecture and pipelining, program memory considerations, Addressing modes, CPU registers, Instruction set, simple operations.

Section-C

Microcontrollers - Microcontroller 8051- Architecture, Pin Diagram, I/O Ports, Internal RAM and Registers, Interrupts, Addressing Modes, Memory Organization and External Addressing, Instruction Set, Assembly Language Programming, Real Time Applications of Microcontroller- Interfacing with LCD, ADC, DAC, Stepper Motor, Key Board and Sensors.

Section-D

Embedded Systems-Introduction, Classification, Processors, Hardware Units, Software Embedded into System, Applications and Products of Embedded Systems, Structural Units in Processor, Memory Devices, I/O Devices, Buses, Interfacing of Processor Memory and I/O Devices, Case Study of an Embedded System for a Smart Card.

Course Outcomes: -

Students will be able to:

CO1 - To understand the architecture and working of Micro-controller.
CO2 - To understand the interfacing with different devices.
CO3 - To understand the Embedded system and feature of Embedded system.
CO4 - To understand the programming language .

Text Book

1. B. B. Brey: The Intel Microprocessors, Architecture, Programming and Interfacing, Pearson Education.
2. Design with PIC Microcontrollers by John B. Peatman , Pearson.
3. Raj Kamal: Embedded Systems- Architecture, Programming and Design, TMH, New Delhi.
4. V. Udayashankara and M. S. Mallikarjunaswamy: 8051 Microcontroller, TMH, New Delhi.

References:

1. **Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education.**
2. **A. V. Deshmukh: Microcontroller (Theory and Application), TMH.**
3. **D. V. Hall: Microprocessors and Interfacing, TMH**
4. **Programming and Customizing the 8051 Microcontroller : Predko ; TMH.**
5. **Programming Embedded Systems in C and C++ : Michael Barr; SHROFF PUB. & DISTR**

EE-304-F **CONTROL SYSTEM ENGINEERING**

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

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.

Section-B

MATHEMATICAL MODELLING : Concept of transfer function, relationship between transfer function and impulse response, order of a system, blockdiagram 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.

Section-C

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.

Root locus concept, development of root loci for various systems, stability considerations..

Section-D

FREQUENCY DOMAIN ANALYSIS , COMPENSATION & CONTROL COMPONENT :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.

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

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

Course Outcomes:

Students will be able to

CO1 - Understand the modeling of linear-time-invariant systems using transfer function and state-space representations.

CO2 - Understand the concept of stability and its assessment for linear-time invariant systems.

CO3 - Understand the time and frequency response of the system.

TEXT BOOK :
1. . Control Systems :Anuj Jain & Naveen mehra vayu education
2.Control Systems - Principles & Design : Madan Gopal; Tata Mc Graw Hill.
3. 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.

EE-318-F **ELECTRICAL POWER GENERATION**

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

INTRODUCTION: Energy sources, their availability, Recent trends in Power Generation, Interconnected Generation of Power Plants.

Section-B

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.

Section-C

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.

NON-CONVENTIONAL ENERGY SOURCES: Wind, Solar, Tidal, Ocean, and Geothermal sources of Energy, fuel cell, Magneto Hydro Dynamic (MHD) system.

Section-D

ELECTRIC ENERGY CONSERVATION & MANAGEMENT: Energy management, Energy Audit, Energy Efficient Motors, Co-generation.

Course outcomes:-

Students will be able to:-

CO1 - Get the basic introduction about different power generating plant.

CO2 - knowledge about Planning of best generating station according to the different conditions available.

CO3 - Get the advantage and disadvantage of every generating station.

CO4 - Get the knowledge about the Energy management.

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)

EE-310-F **DIGITAL SYSTEM DESIGN**

L	T	P
3	1	-

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

. 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 behavioral dataflow and structural models.

Section-B

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.

Section-C

COMBINATIONAL & SEQUENTIAL CIRCUIT DESIGN:VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders , code converters, comparators, implementation of Boolean functions etc. VHDL Models and Simulation of Sequential Circuits Shift Registers, Counters etc.

Section-D

DESIGN OF MICROCOMPUTER & PROGRAMMABLE DEVICE : Basic components of a computer, specifications, architecture of a simple microcomputer system, implementation of a simple microcomputer system using VHDL Programmable logic devices : ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design implementation using
CPLDs and FPGAs

Course Outcomes:

Students will be able to

CO1 - Use methodologies to understand and design complex digital systems.

CO2 - Create circuits that realize specified digital functions.

CO3 - Identify logic and technology-specific parameters to control the functionality, timing, power, and parasitic effects.Be able to complete a significant VLSI design project having a set of objective criteria & design constraints.

REFERENCE BOOKS:

1. Ashenden - Digital design,Elsevier
2. IEEE Standard VHDL Language Reference Manual (1993).
3. Digital Design and Modelling with VHDL and Synthesis : KC Chang; IEEE Computer Society Press.
4. "A VHDL Primmer" : Bhasker; Prentice Hall 1995.
5. "Digital System Design using VHDL" : Charles. H.Roth ; PWS (1998).
6. "VHDL-Analysis & Modelling of Digital Systems" : Navabi Z; McGraw Hill.
7. VHDL-IV Edition :Perry; TMH (2002)

8. ”Introduction to Digital Systems” : Ercegovac. Lang & Moreno; John Wiley (1999).
9. Fundamentals of Digital Logic with VHDL Design : Brown and Vranesic; TMH (2000)
10. Modern Digital Electronics- III Edition: R.P Jain; TMH (2003).
11. Grout - Digital system Design using FPGA & CPLD 'S,Elsevier

EE-324-F **CONTROL SYSTEM LAB**

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

LIST OF EXPERIMENTS:

ANY SIX EXPERIEMENTS (from Sl. No1-11).

1. To study speed Torque characteristics of
   a) A.C. servo motor
   b) DC servo motor .
2. (a) To demonstrate simple motor driven closed loop DC position control system.
   (b) To study and demonstrate simple closed loop speed control system.
3. To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots .
4. To study a stepper motor & to execute microprocessor or computer-based control of the same by changing number of steps, direction of rotation & speed.
5. To implement a PID controller for temperature control of a pilot plant.
6. To study behavior of 1 order,2 order type 0,type 1 system.
7. To study control action of light control device.
8. To study water level control using a industrial PLC.
9. To study motion control of a conveyor belt using a industrial PLC

MATLAB BASED (ANY FOUR EXPT.)

10. Introduction to MATLAB (Control System Toolbox), Implement at least any

    Different Toolboxes in MATLAB, Introduction to Control Systems Toolbox.

    Determine transpose, inverse values of given matrix.

    Plot the pole-zero configuration in s-plane for the given transfer function.
    Plot unit step response of given transfer function and find peak overshoot, peak time.

    Plot unit step response and to find rise time and delay time.

    Plot locus of given transfer function, locate closed loop poles for different values of k.

    Plot root locus of given transfer function and to find out S, Wd, Wn at given root & to discuss stability.

    Plot bode plot of given transfer function and find gain and phase margins
    Plot the Nyquist plot for given transfer function and to discuss closed loop stability, gain and phase margin.

Course Outcomes:

After the completion of the course, students will be able to:

CO1 - Understand and demonstrate the simple control loop systems.

CO2 - Study the lead, lag, lead-lag compensators.

CO3 - Understand various control systems like light control device, water level system any more.

CO4 - Operate various basic control system experiments on MATLAB.

MICRO-CONTROLLER & EMBEDED SYSTEM DESIGN

EE-320-F **LAB**

L	T	P
–	–	2

Class Work: 25
Exam: 25
Total: 50
Duration of Exam: 2 Hrs.

List of Experiment:

8051/AT 89C51 microcontroller

3. Write an Assembly language Programme (ALP) to generate 10 kHz square wave.
4. To study implementation & interfacing of Display devices Like LCD, LED Bar graph & seven segment display with Microcontroller 8051/AT89C51
5. To study implementation & interfacing of Different motors like stepper motor, DC motor & servo Motors.
4. Write an ALP for temperature & pressure measurement.
5. Write a program to interface a graphical LCD with 89C51.
6. To study Programming and Transmission & reception of data through Serial port & study of Parallel printer port.

PIC Microcontroller

7. To interface PWM based voltage regulator using PIC Microcontroller .
8. Study and analysis of interfacing of Graphical LCD using PIC controller
9. Study and interfacing of IR (RC5 protocol) and RF Communication using PIC controller
10. Study of SD/MMC card Interface using 18F4550

Course Objective

Students will be able to:
CO1 - To understand the architecture of microcontrollers.
CO2 - To understand the applications of these controllers.
CO3 - To get some introduction to interfacing devices.

EE-326-F 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.

Course outcomes:

By the end of the course students will be able to:

CO1 - Familiarize with design of electrical and magnetic circuit for all static and rotating machines.
CO2 - Analyze the range of specific electric and magnetic loadings.
CO3 - Students get familiarize with different models of machines with different performance and can be proceed for fabrication of suitable model.
CO4 - Student would be able to proceed for calculated design parameters with validation to design software.
CO5 - Design of field magnet and d.c. machines with different specifications.

EE-328-F **POWER SYSTEMS LAB**

L	T	P
-	-	2

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

1. To draw the operating characteristcs of IDMT relay.
2. To study the performance of Earth fault relay.
3. To study the performance of a over voltage relay.
4. To study the performance of under voltage relay.
5. Testing of breakdown strength of a transformer oil.
6. To study flash point test of transformer oil.
7. To find ABCD ,Hybrid & Image parameters of a model of transmission line.
8. To study performance of a transmission line under no load condition & under load at different power factors.
9. To observe the Ferranti effect in a model of transmission line.
10. To study performance characteristics of typical DC distribution system in radial & ring main configuration..
11. To study characteristics of MCB & HRC Fuse.
12. To study radial feeder performance when a) fed at one end b) fed at both ends.

Learning outcomes:

By the end of the course students will be able to:

CO1 - Understand the performance of different types of relays and their operating characteristics.
CO2 - Analyze the performance of a transmission line at different power factors.
CO3 - Analyze flash point test and breakdown strength of transformer oil.
CO4 - Understand characteristics of MCB & HRC Fuse.
CO5 - Understand the different type of distribution systems.

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

B. Tech. (Electrical Engg.)

SEMESTER VII

F ' Scheme

EFFECTIVE FROM THE SESSION 2012-13

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
EE-403-F	Electric Drives And Control	3	1	-	4	50	100	-	150	3
ECE-409-F	Digital Signal Processing	3	1	-	4	50	100	-	150	3
EE-405-F	Power System Operation And Control	3	1	-	4	50	100	-	150	3
	*Open Elective	3	1	-	4	50	100	-	150	3
	*Dept Elective	3	1	-	4	50	100	-	150	3
EE-409-F	Computer Applications To Power System Analysis	3	1	-	4	50	100	-	150	3
EE-413-F	Electric Drives And Control Lab.			3	3	50	-	50	100	3
ECE-429-F	Digital Signal Processing Lab	-	-	2	2	25	-	25	50	3
EE-419-F	Computer Applications To Power System Analysis Lab.	-	-	3	3	50	-	50	100	3
GFEE-401-F	General Fitness For The Profession	-	-	-	-		-	50	50	3
EE-401-F	Practical Training – II	-	-	-	-	-	-		-	-
	TOTAL	**18**	**6**	**8**	**32**	**425**	**600**	**175**	**1200**	

List of Open Electives

4.	HUM-451-F	Language Skills for Engineers
2.	HUM-453-F	Human Resource Management
3.	HUM-459-F	Renewable Energy Resources and Technology
4.	ME-451-F	Mechatronics Systems
5.	IC-455-F	Intelligent Instrumentation for Engineers
6.	OR-401-F	Operations Research

List of Dept Electives

1. EHV AC/DC (EE-432-F)
2. Fuzzy Logic Control (IC-404-F)
3. Recent Trends in De-regulated Power Systems (EE-438-F)
4. High Voltage Engineering (EE-442-F)
5. Electrical Power Quality (EE-444-F)
6. Power Management (EE-450-F)

Note:

6. **Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.**
7. ***Student will be permitted to opt for any one elective run by the other departments. However, the departments will offer only those electives for which they have expertise. The choice of the students for any elective shall not be a binding for the department to offer, if the department does not have expertise.**
8. **A team consisting of Principal/Director, HOD of concerned department and external examiner appointed by University shall carry out the evaluation of the student for his/her General Fitness for the Profession.**
9. **Assessment of Practical Training-II, carried out at the end of VI semester, will be based on seminar, viva-voce and project report of the student from the industry. 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.**

M.D. UNIVERSITY, ROHTAK

Scheme of studies & Examination

B. Tech. (Electrical Engg.)

SEMESTER VIII

F ' Scheme

EFFECTIVE FROM THE SESSION 2012-13

Sr. No	Course No	Subject	Internal Marks	External Marks	Total Marks
1.	**EE- 402-F**	Industrial Training/Institutional Project Work	150	150	300

Note:

The students are required to undergo Industrial Training or Institutional Project Work of duration not less than 4 months in a reputed organization or concerned institute. The students who wish to undergo industrial training, the industry chosen for undergoing the training should be at least a private limited company. The students shall submit and present the mid-term progress report at the Institute. The presentation will be attended by a committee. Alternately, the teacher may visit the Industry to get the feedback of the students.

The final viva-voce of the Industrial Training or Institutional Project Work will be conducted by an external examiner and one internal examiner appointed by the Institute. External examiner will be from the panel of examiners submitted by the concerned institute approved by the Board of Studies in Engg. & Technology. Assessment of Industrial Training or Institutional Project Work will be based on seminar, viva-voce, report and certificate of Industrial Training or Institutional Project Work obtained by the student from the industry or Institute.

The internal marks distributions for the students who have undergone Industrial Training consist of 50 marks from the industry concern and 100 marks by the committee members consisting of faculty members of concerned department of the parent institute.

The teachers engaged for Institutional Project work shall have a workload of 2 hours per group (at least 4 students) per week.

Course Outcomes:

At the end of this course the student shall be able to

CO1 have an understanding how to work in actual industry environment

CO2 utilise the technical resources

CO3 write technical/training reports

CO4 give oral presentation related to the work completed

EE-403-F **ELECTRIC DRIVES AND CONTROL**

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

ELECTRICAL DRIVES: Introduction, Classification, advantages, Characteristics of Electric Motors, choice of electrical drive machines, status of ac and dc drives.

CONTROL OF ELECTRICAL DRIVES: Modes of operation, closed loop control of drives, sensing of current and speed, Microprocessor based control of electric drives

Section -B

DYNAMICS OF ELECTRICAL DRIVES: Fundamental torque equations, multi-quadrant operation, equivalent values of drive parameters, load torque components, types of loads.

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.

Section -C

DC MOTOR DRIVES: Starting, Acceleration control, braking, transient analysis, Converter fed dc drive & chopper fed dc drive.

PMBLDC & PMSAC DRIVES: Permanent Magnet Brushless D C drive, Permanent Magnet Sine-fed drives, Switched Reluctance Machine Drives.

Section -D

INDUCTION MOTOR DRIVES: Starting, Acceleration control, braking, transient analysis, Static control techniquesstator frequency control, stator voltage control, rotor resistance control. Static Scherbius system & static Kramer system, vector control.

Course Outcomes:

Students will be able to

CO1 - Understand the characteristics of dc motors and induction motors.

CO2 - Understand the principles of speed-control of dc motors and induction motors.

CO3 - Understand the power electronic converters used for dc motor and induction motor speed control.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

ECE-409-F DIGITAL SIGNAL PROCESSING

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

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.

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

Section-B

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.

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

Section-C

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.

Section-D

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

Course Outcomes:

Students will be able to

CO1 - Represent signals mathematically in continuous and discrete-time.

CO2 - Analyse FIR and IIR systems.

CO3 - Design digital filters for various applications.

CO4 - Apply digital signal processing for the analysis of real-life signals.

TEXT BOOKS :

7. Digital Signal Processing : Proakis and Manolakis; Pearson

8. Digital Signal Processing: Salivahanan, Vallavaraj and Gnanapriya;TMH

REFERENCE BOOKS:

10. Digital Signal Processing: Alon V. Oppenhelm;PHI

11. Digital Signal processing (II-Edition): Mitra, TMH

EE-405-F POWER SYSTEM OPERATION AND CONTROL

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

AUTOMATIC GENERATION CONTROL: Load frequency control (single area case), load frequency control and economic dispatch, optimal load frequency control, Load Management.

Section -B

ECONOMIC LOAD DESPATCH: Introduction, Optimal Operation of Generators of Bus bar, Unit Commitment, Reliability Considerations, Optimal Generation Schedule Hydro thermal optimal scheduling.

Section -C

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.

Section -D

AUTOMATIC VOLTAGE CONTROL & EXCITATION SYSTEMS: AVRs, role of AVR on transient stability of system, type 0 & 1 excitation system, power system stabilizers.

VOLTAGE STABILITY: Basic concept, Voltage collapse, Modelling & prevention.

TEXT BOOKS:

9. Power System Engineering, : I.J. Nagrath & D.P. Kothari :TMH
10. Power System Stability Volume-I : E.W. Kimbark, John Wiley & Sons.
11. Power System Operations and Control : S. Sivanagaraju & G. Sreenivasan; Pearson

Course Outcomes:

CO1 - To make students understand Economic operation of power system and importance of LFC control.

CO2 - To allow students discuss about thermal and hydro power plants operation in meeting the load demand optimally. (State and central wide installation).Also expressing importance of reactive power control through seminars.

CO3 - To improve student's ability in solving problems (numerical problems at present) by posing different problem models related to Economic Load Dispatch, Load Frequency Control and reactive power control.

CO4 - Ability to discuss single area load frequency control and two area load frequency control.

REFERENCE BOOKS:

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

EE-413-F **ELECTRIC DRIVES AND CONTROL LAB**

L T P
- - 2

Practical: 50
Class Work: 50
Total: 100
Duration of Exam: 3 Hrs.

LIST OF EXPERIMENTS

4. To study Single phase bridge converter drive & study ramp comparator firing circuit for same.
5. To study Single phase Half converter drive & study ramp comparator firing circuit for same.
6. To study Single phase AC motor control drive by anti parallel SCR & DIAC – TRIAC configuration.
7. Speed control of FHP synchronous motor using Three phase Cycloconverter. to observe current and voltage waveform at different frequency.
8. Speed control of FHP synchronous motor using **VSI Inverter** & to observe current and voltage waveform at different frequency.
9. To obtain speed –torque characteristics of 1 H.P DC series motor in Open/close loop using IGBT/MOSFET and to observe current and voltage waveform at different duty factors.
10. To draw speed-torque char. Of Three phase Fully controlled rectifier fed 1 H.P separately excited DC motor at different firing angle and To observe current & voltage waveform at different firing angles.
11. To obtain speed –torque characteristics of 1 H.P DC series motor in open/close loop using single phase converter and to observe current & voltage waveform at different firing angles.
12. Speed torque char. of Three phase VSI inverter fed FHP induction motor drive and to observe current and voltage waveform at different frequency.
10. Speed torque char. of Three phase CSI inverter fed FHP induction motor drive and to observe current and voltage waveform at different frequency.
3. Regenerating and Breaking of DC motor using two Quadrant chopper with active load and to draw negative speed torque curve.

Course Outcomes:

Students will be able to

CO1 - Understand the characteristics of dc motors and induction motors.
CO2 - Understand the principles of speed-control of dc motors and induction motors.
CO3 - Understand the power electronic converters used for dc motor and induction motor speed control.

ECE-429-F **DIGITAL SIGNAL PROCESSING LAB**

L T P
- - 2

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

LIST OF EXPERIMENTS:

Perform the experiments using DSP Hardware Processor using Programmes in C Language:

2. To understand sampling theorem & generation of waveforms like sine, square & Triangle.
3. To study Quantization technique.
4. To study PCM encoding & Hamming code generation.
5. To Study Digital modulation techniques ASK/FSK& PSK.
6. To study FIR Filter Implementation.
7. To study Auto correlation & Linear convolution.

Experiments To be performed on MATLAB

4. Represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
5. To develop program for discrete convolution.
6. To develop program for discrete correlation.
7. To design analog filter (low-pass, high pass, band-pass, band-stop).
8. To design digital IIR filters (low-pass, high pass, band-pass, band-stop).
9. To design FIR filters using windows technique.

Course Outcomes :

Students will be able to:
CO1 - learn to represent real world signal in digital format.
CO2 - learn to apply the linear system approach to signal processing problems using high level programming language.
CO3 - Learn to implement linear filters in real time DSP chips.

NOTE:
At least ten experiments have to be performed in the semester.

EE-409-F COMPUTER APPLICATION TO POWER SYSTEM ANLYSIS

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

INTRODUCTION: Introduction to the growth of power systems, Model representation of transmission line introduction, performance of transmission systems, Ferranti effect, security analysis, Contingency analysis.

Section-B

LOAD FLOW STUDIES: Introduction, Bus Admittance Matrix, Formation of Y Bus, Tree graph, Co-tree, Primitive network, Bus Incidence matrix, Formulation of Y Bus using singular transformation, Load flow equations Approximate Load flow study, Gauss-Seidel method for Load flow Study, Algorithm and flow, Chart for Computer application to Load flow studies, using G-I method, Newton-Raphson method for Load flow studies, Algorithm and flow chart for Computer Application to Load flow studies using N.R. Method. Decoupled Load flow Studies, Fast Decoupled Load flow. Comparison between G-S & NR. methods. Load flow Study of Distribution System.

Section-C

SYMMETRICAL AND UNSYMMETRICAL FAULT ANALYSIS: Single line to ground fault, Line to Line fault, Double line to Ground fault and symmetrical fault. Consideration of Pre fault currents. Symmetrical Components.

DIGITAL TECHNIQUES IN FAULT CALCULATIONS: Review of symmetrical components, Sequence networks for synchronous machines, transforms and transmission Lines. Bus Impedance matrix, Algorithm for formulation of Bus. All types of modifications, digital technique in short circuit Studies of: Single line to ground fault, Line to Line fault, Double line to Ground fault and symmetrical fault. Consideration of Pre fault currents.

Section-D

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:

2 Power Systems Engineering by S. K. Gupta, Umesh publication
3 Power System Analysis & Design with CD by Glover, Cengage Learning
4 Power System Engg., by B.R.Gupta: S. Chand.
5 Power System Analysis: Hadi Saadat, TMH, New Delhi.
6 Computer Techniques in Power System analysis by M. A. Pai

Course Outcomes:

CO1 - Recent techniques and computer application for modeling of practical and large interconnected power system networks using programming languages.

CO2 - Recent methodologies for simulation and analysis of power system networks like real and reactive power flows and optimal scheduling.

CO3 - Effect of outage of any impartant component of power system on the operation and reliability of power systems.

CO4 - Algorithm required to find out parameters for monitoring and control of power system in real time from actual measurement data.

CO5 - Computer Algorithms used to solve differential pertaining to power system to assess the stability performance of power systems.

REFERENCE BOOKS

1. Advance power system analysis and dynamics by L.P. Singh: Wiley Eastern ltd.
2. Electrical Energy system theory: An introduction by O.I.Elgerd : TMH.
3. Elements of power system analysis by W. D. Stevenson: M.G.H.
4. Power System Engineering by I.J.Nagrath & D.P.Kothari: TMH.
5. Computer methods in power system by G. W. Stagg and A. H. El-Abiad: M.G.H.

EE-419-F COMPUTER APPLICATIONS TO POWER SYSTEMS ANALYSIS LAB

L T P	
- - 2	Practical : 50 Class Work : 50 Total : 100 Duration of Exam : 3 Hrs.

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.

Course Outcomes:

At the end of the course the student will be able to
Co1 - develop computer program for formation of the Y Bus and Z Bus of a generalized network.

CO2 – will be able to perform short circuit study for any type of fault.

CO3 – will be able to study the features of EMTP and MATLAB Power System block.

EE-432-F **EXTRA HIGH VOLTAGE AC/ DC**

L T P
3 1 -

Exam : 100
Sessionals : 50
Total : 150
Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section A

Break Down Mechanism of Gaseous Materials :
Mechanism of Breakdown of gases, Townsend's first Ionization Co-efficient, Townsend's second Ionization Coefficient, Townsend's Breakdown Mechanism, Streamer Theory of Breakdown in gases, Paschen's law.

Breakdown in Liquid and Solid Dielectrics: Suspended Particle Theory, Cavity Breakdown, Electro-convection Breakdown, Breakdown in solid Dielectrics, Intrinsic Breakdown, Electromechanical Breakdown, Breakdown due to Treeing and Tracking, Thermal Breakdown, Electrochemical Breakdown.

Section -B

Generation of High Voltage AC. and D.C : Half wave and Full wave Rectifier, Cockroft Walton Voltage Multiplier Circuit, Ripple in Multiplier Circuit, Electrostatic Vandegraff Generator, Generation of High Alternative Voltage, Cascade Transformer, Resonant Transformer, Generation of High Frequency A.C. High Voltage

Generation of Impulse Voltages and Currents: Standard Impulse Wave Shapes, Impulse Generator Circuit, Multistage Impulse Generator, Marx's Circuit, Generation of Switching Surges, Impulse Current Generation, Tripping and Control of Impulse Generator

Section -C

Measurement of High Voltage and Current: Sphere-Gap, Uniform field Spark gap, Rod Gap, Electrostatic Voltmeter, Generating Voltmeter, Impulse Voltage Measurement using Voltage divider, Measurement of high DC, AC and Impulse Current.

High Voltage Testing of Electrical Equipments : Testing of line Insulator, Testing of Cable, Testing of Bushings, Testing of Power Capacitor, Testing of Power Transformers, Testing of Circuit Breaker.

Section -D

Transients & Insulation Co-ordination in Power System: Over Voltage due to disturbances in D.C & A.C. System, Lightening surges, Switching Surges, Insulation Co-ordination in Power System, Surge Arrestor, Application of surge Arrestor.

Learning outcomes:

By the end of the course students will be able to:

CO1 - Understand breakdown phenomena in gases and to e**lucidate** the concepts used for the generation of high voltages and currents.

CO2 - Elucidate the concepts used for the measurement of high voltages and currents and design corresponding circuits.

CO3 - Understand high voltage testing techniques of Power apparatus and causes of over voltage in Power systems.

CO4 - Design the layout of Gas Insulated substations and to **know** the concepts of insulation coordination.

CO5 - Identify significance of DC over AC transmission system, types and application of HVDC links in practical power systems.

TEXT BOOK:

1. High Voltage Engineering By M.S. Naidu & V. Kamaraju - TMH Publication

REFERENCE BOOKS:

1. J. Arrillaga, High Voltage Direct Current Transmission. Pub: Peter Peregrinus Ltd. on behalf of I.E.E Power Engg. Series.
2. Rakos Das Begamudre, Extra EHV A.C Transmission. PHI Publication.
3. C.L Wadhwa , High Voltage Engineering. Pub.: New Age International Ltd.

IC-404-F **FUZZZY CONTROL SYSTEM**

L T P
3 1 -

Theory/Exam : 100
Class Work : 50
Total : 150
Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

INTRODUCTION: Fuzzy control from an industrial perspective, knowledge-based controllers, knowledge representation in KBC's.

THE MATHEMATICS OF FUZZY CONTROL:
Vagueness, fuzzy logic versus probability theory, fuzzy sets, their properties & operations on fuzzy sets, fuzzy relations & operations on fuzzy relations, the Extension Principle, Fuzzy propositions, The Compositional Rule of Inference, Different implications, Representing a set of rules.

Section -B

FKBC DESIGN PARAMETERS: The PKBC architecture, choice of variables & content of rules, Derivation of rules, choice of membership functions, choice of scaling factors, choice of fuzzification procedure, choice of defuzzification procedure, comparison and evaluation of defuzzification methods.

Section -C

NONLINEAR FUZZY CONTROL: The Control Problem, The FKBC as a Non-Linear Transfer Element, Types of FKBC such as PID-like FKBC, Sliding Mode FKBC, Sugeno FKBC.
STABILITY OF FUZZY CONTROL SYSTEMS: The State space approach, Stability and robustness indices, input-output stability, circle criterion, the conicity criterion.

Section -D

ADAPTIVE FUZZY CONTROL: Design & Performance Evaluation, Approaches to Design such as membership function tuning using gradient descent, membership function tuning using performance criteria, the self-organizing controller, model based controller.

TEXT BOOK:
An Introduction to Fuzzy Control: D.,Driankov, H.Hellendoorn and M.Reinfrank.; Narosa.

REFERENCE BOOKS:
Fuzzy Control Systems : Abraham Kandel and Gideon Imngholz; Narosa

Course Outcomes:

CO1 - To Expose the students to the concepts of feed forward neural networks

CO2 - Utilize the state of the art topics of fuzzy control in their research activities.

CO3 - Design fuzzy systems and fuzzy controllers.

CO4 - To teach about the concept of fuzziness involved in various systems. To provide adequate knowledge about fuzzy set theory.

CO5 - To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.

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EE-438-F RECENT TRENDS IN DEREGULATED POWER SYSTEM

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

Deregulation of the Electricity Supply Industry:

Background of deregulation and the current situation, Benefits from a competitive Electricity Market, After effects of Deregulation.

Section -B

Power System Operation in Competitive Environment :

Role of Independent System operator, Operational Planning activities of ISO, operational planning activities of Genco.

Section -C

Transmission open Access and Pricing Issues:

Power Wheeling, Transmission Open Access, Cost component in Transmission, Pricing of Power Transmissions, Security Management in Deregulated environment, Congestion management in Deregulation.

Section -D

Reliability and Deregulation :

Reliability Analysis, Optimal Power Flow as a Basic Tool, Unit Commitment, Formation of Power Pools.

Course Outcomes:

ThE STUDENTS WILL COME TO KNOW ABOUT THE

CO1 - Deregulation of the Electricity Supply Industry.

CO2 - Power System Operation in Competitive Environment.

CO3 - Transmission open Access and Pricing Issues

REFERENCES:

1. Lei Lee Lal, Power System Restructuring and Deregulation. UK: John Wiley and Sons, 2001.
2. Kankar Bhattacharya, Math H.J.Bollen and Jaap E. Daalder, Operation of Restructured Power Systems. USA: Kluwer Academic Publishers, 2001.
3. Md Shahidehpour and Muwaffaq Alomoush, Restructured Electrical Power Systems. Marcel Dekker, Inc.
4. S.S. Rao, Switch Gear Protection and Power System Analysis. Khanna Publications

EE- 442-F **HIGH VOLTAGE ENGINEERING**

L T P
3 1 -

Theory marks : 100
Class Work marks : 50
Total marks : 150
Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

Introduction: Recent trends in high voltage transmission.

Conduction and breakdown: Conduction & breakdown in gases, liquids and solid dielectrics, insulator breakdown, insulation characteristics of long air gaps.

Section -B

Voltage gradients on conductors: Electrostatic fields of sphere gaps, fields of line charges and their properties, charge-potential relations for multi-conductor lines, surface voltage gradients on conductors, distribution of voltage gradient on sub conductors of bundle.;

Section -C

Corona: Corona and corona loss, corona loss formula, attenuation of travelling waves due to corona, audible noise generation and characteristics, corona pulses-their generation and properties, properties of pulse, radio interference.

Lightening: Lightening phenomenon, lightning stroke mechanism, principle of lightning protection, tower foot resistance, insulator flash over and withstand voltage, lightning arresters and their characteristics.

Section -D

H.V. testing and Lab equipments : Standard wave-shapes for testing, wave-shaping circuits: principles and theory; impulse generator, generation of ac high voltage for testing, generation of direct voltage, measurement of high voltage, general layout of H.V. Laboratory.

Course outcome.

The students will know

CO1 - Recent trends in high voltage transmission.

CO2 - several of methods of generating different test voltages, testing methods used in power equipments and design of high voltage laboratories.

CO3 - Concepts of corona and Lightening.

TEXT BOOKS:

1. E.H.V. AC Transmission: R.D. Begamudre, Wiley Eastern Ltd.
2. H.V. Engg.: V. Kamaraju and M.S. Naidu, T.M.H., N.Delhi.

EE-444-F **ELECTRICAL POWER QUALITY**

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

INTRODUCTION TO ELECTRICAL POWER QUALITY:
Definition of Power Quality, Power Quality Issues, Power Quality v/s Equipment Immunity, Electric Power Quality Standards.

POWER FREQUENCY DISTURBANCES: Common Power Frequency Disturbances, Voltage Sag, Isolation Transformers, Voltage Regulators, Static Uninterruptible Power Source Systems.

Section -B

ELECTRICAL TRANSIENTS: Types and Causes of Transients, Atmospheric Causes, Switching Loads On or Off, Interruption of Fault Circuits, Capacitor Bank Switching, Motor Start Transient, Power Factor Correction, Capacitor Switching

Transient. Section -C

HARMONICS: Definition of Harmonics, Causes of Voltage and Current Harmonics. Individual and Total Harmonic Distortion, Effect of Harmonics on Power System Devices, Guidelines for Harmonic Voltage and Current Limitation, Harmonic Current Mitigation.

Section -D

MEASURING & SOLVING POWER QUALITY PROBLEMS: Power Quality Measurement Devices, Harmonic Analyzers, Transient-Disturbance Analyzers, Oscilloscopes, Data Loggers and Chart Recorders, True RMS Meters, Power Quality Measurements.

Course Outcomes:

Students will be able to:

CO1 - Acquire knowledge about the power quality issues and electric power quality standards.

CO2 - Understand common power frequency disturbances and their solutions.

CO3 - Know about the types and causes of transients and their corrections.

CO4 - Understand harmonics, harmonic introducing devices and their effects

CO5 - Measure and solve the power quality problems.

REFERENCE BOOKS:

1. G.T. Heydt, Electric Power Quality. 2nd ed. West Lafayette, IN: Stars in a Circle, 1994.
2. A Ghosh, G. Ledwich, Power Quality Enhancement Using Custom Power Devices. Kluwer Academic, 2002
3. R.C. Dugan, M.F. McGranaghan and H.W. Beaty, Electric Power Systems Quality. New York: McGraw-Hill.1996.
4. C. Sankaran, Power Quality. CRC, 2002.
5. J. Arrillaga, D.A Bradely and P.S. Bodger, Power System Harmonics. New York: Wiley, 1985

EE-450-F **POWER MANAGEMENT**

L T P
3 1 -

Exam : 100
Sessionals : 50
Total : 150
Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

INTRODUCTION: Power Scenario, Power Development, Planning, Power resources, Environment-Power matters Plan, Pre-feasibility and feasibility studies, State relations for Power etc.

RESOURCES: Resources, Geophysical study, Seismic Considerations, Environmental Restraints, Resettlement and Rehabilitation.

Section -B

PROCUREMENT: Contracting and Procurement, Consulting Services, Types of Contracts, Project Management, Organization and Economy Management, Organizational Planning and Time Scheduling, Project Cost Control.

ENGINEERING: Engineering & General Layout of Equipments, Generator, Transformer and Switch Gear and Control Equipment, Construction Methods, Operation and Maintenance Principle, Maintenance organization and planning, Availability, life cycle cost & future development. Visits to sites.

Section -C

POWER SECTOR: Power sector structure in different states, Regulatory Regime in those states, Power utilities in Haryana, Grid management, Power financing, Visit to sites.

POWER STATION: Management of Fuel, water Resource Electricity deviend scenario storage and handling, Pricing, Contract etc., Human resource management. Visit to sites.

Section -D

RISK & HAZARD: Introduction to risk, rules and regulation Aspects of Risk & Hazard Health & risk assessment visit to site.

ELECTRICITY INDUSTRY STRUCTURE & SAFETY REGULATIONS BILL & ETC.: State and Central Power boards / Power corporations.

Course outcome

At the end of the course student will be able to know about the

CO1 - Power Planning, Power resources, Environment Power matters Plan, Pre-feasibility and feasibility studies and many more.
CO2 - ELECTRICITY INDUSTRY STRUCTURE & SAFETY REGULATIONS BILL & ETC.
CO3 - PROCUREMENT, Types of Contracts, Project Management, etc.
CO4 - Power utilities in Haryana

REFERENCE BOOKS:

C: Electricity Bill, Safety & Conservation Act
D: Arora & Dom Kundwar, A Course in Power Plant Engineering, Pub.: Dhanpat Rai Pub, 2000.
E: Jain & Bala Subranmanyam, “Power Plant Engineering”, Dhanpat Rai Pub.,
F: Butter Worth, A.B. Gill, “Power Plant Performance Management”, Pub: 1984.
G: P.C. Sharma, “Power Plant Engineering”, Dhanpat Rai Pub.,
H: David A. Decenzo, Stephen P. Robbins, Human Resource Management. New Delhi: PHI Pvt. Ltd., 2004.
I: P.K. Nag, Power Plant Engg. N.Delhi: TMH, 2003

HUM-459-F RENEWABLE ENERGY RESOURCES & TECHNOLOGY

L T P
3 1 -

Theory : 100
Class Work : 50
Total : 150
Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section –A

Introduction: Energy Sources and their availability, renewable energy sources, Prospects of renewable energy sources, application of non conventional and renewal energy sources.

Enviormental Aspects of Electric Energy Geneneration: Introduction Thermal pollution, Atmospheric pollution, Effects of Hydroelectric projects,Nuclear power generation and enviorment, Green House Gas Effects, Global Environmental awareness,Energy options for Indian Economy.

Section -B

Solar Energy : Solar radiation estimation, Basic Principle of Solar Energy physical Principal of the conversion of solar radiation into heat, Collectors, Solar Energy storage system, solar thermal electric conversion, solar electric Power Plant & applications.

Wind Energy: Basic Principle of wind energy conversion, nature & Power of wind, site selection, wind energy conversion SYSTEM. Scheme for Electric Generation, Generator Control load control, Inter connected SYSTEM & applications.

Section -C

Bio Mass Energy: Biomass conversion technologies bio mass generation, classification of Bio Gas Plants material used in Bio Gas Plants., Selection of site & applications.

Geothermal Enrgy: Sources of Geothermal energy Estimation of Geothermal Power, Geothermal Power Plants, Geothermal energy in India and Prospects.

Ocean Energy: Ocean thermal electric conversion, site selection, Power Plant, Prospects of ocean energy in India, tidal Power tidal Power Plant, Prospects in India.

Section -D

MHD & Hydrogen Energy: Basic Principle MHD SYSTEM, advantages, Power OUTPUT of MHD Generation, future Prospects. Principle and classification of fuel cell energy, hydrogen as alternative fuel for Generation of Electrical Energy & applications.
Fuel Cell: Fuel Cell, Management of Fuel, Thermonic power generation, water Resource Electricity deviend scenario storage and handling, Pricing, Contract etc, Introduction to risk, rules and regulation Aspects of Risk & Hazard Health & risk assessment visit to site, Mini hydro generators.

Course outcomes:-

Students will be able to:-

CO1 - Knowledge about the different energy sources available.

CO2 - Gets the basic introduction about different non-conventional power generating plant.

CO3 - Knowledge about selection of power plant for different condition available.

CO4 - Get the knowledge about fuel cell and its working.

TEXT BOOKS:

3. Renewable Energy Sources and Emerging Technologies : D.P Kothari, K.C.Singla, Rakesh Ranjan- PHI Publications.
4. NON-Conventional energy Sources : G.D. Rai – Khanna Publications.
5. Renewal energy sources and their environmental aspects by Abbari: PHI
6. Electric Power : Dr. S.L. Uppal - Khanna Publications

REFERENCE BOOKS:

1. Power Plant Engineering : Jain & Bala Subramanyam

IC-455-F INTELLIGENT INSTRUMENTATION FOR ENGINEERS

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

INTRODUCTION:

Definition of an intelligent instrumentation system; feature of intelligent instrumentation ; components of intelligent instrumentation; Block diagram of an intelligent instrumentation.

Section -B

INTERFACING INSTRUMENTS & COMPUTERS:

Basic issue of interfacing; Address decoding; Data transfer control; A/D converter; D/A converter; Other interface consideration.

Section -C

INSTRUMENTATION/ COMPUTER NETWORKS:

Serial & parallel interfaces; Serial communication lines; Parallel data bus; EEE 488bus; Local area networks(LANs) : Star networks, Ring &bus networks, Fiber optic distributed networks, Field bus; Communication Protocols for very large systems: communication network rationalization.

Section -D

SOFTWARE FILTERS :

Description of Spike Filter, Low pass filter, High pass filter etc.

Course Outcomes

Upon successful completion of this course, a student should be able to:

CO1 - Know about the features, components and block diagram of the intelligent instruments.

CO2 - Know the basics of the INSTRUMENTATION/ COMPUTER NETWORKS

CO3 - Description of Spike Filter, Low pass filter, High pass filter etc.

TEXT BOOK:

1. Principles of measurement & Instrumentation: Alan S. Moris ; PHI

GFEE-402-F **GENERAL FITNESS FOR PROFESSION**

L T P
- - -

Class Work : 50
Practical : --- marks
Total Marks : 50 marks

At the end of each year students will be evaluated on the basis of their performance in various fields. The evaluation will be made by the panel of experts/examiners/teachers to be appointed by the Principal/Director of the College. A specimen perform indicating the weight age to each component/activity is given below :-

Name : _____
College Roll No. _____
Univ.Roll No. _____
Branch _____
Year of Admission _____

I. Academic Performance (15 Marks) :

(a) Performance in University Examination :-

Sem. Result %age of Number of Attempt Marks in which the Sem. obtained exam. has been cleared

I _____
II _____
III _____
IV _____
V _____
VI _____
VII _____

II. Extra Curricular Activities (10 Marks) : Item Level of Remarks Participation (Position Obtained)

Indoor Games _____
(Specify the _____
Games _____
Outdoor Games _____
(Specify the _____
Games) _____
Essay _____
Competition _____
_____
Scientific _____
Technical _____
Exhibitions _____
Debate _____
_____
_____
Drama _____
_____
_____
Dance _____
_____
_____
Music _____
_____
_____

Fine Arts _____
_____
_____
Painting _____
_____

_____
Hobby Club _____
_____
_____
N.S.S. _____
_____
_____
Hostel Management _____
Activities _____
_____
Any other _____
activity (Please _____
specify) _____

III. Educational tours/visitis/Membership of Professional Societies (5 Marks)

3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

IV. Contribution in NSS Social Welfare Floor Relief/ draught relief/Adult Literacy mission/Literacy Mission/ Blood Donation/Any other Social Service (5 Marks)

8. _____
9. _____
10. _____
11. _____
12. _____
13. _____

V. Briefly evaluate your academic & other performance & achievements in the Institution (5 Marks)

_____
_____
_____
_____
_____
_____

VI. Performance in Viva voce before the committee (10 Marks)

_____
_____
_____
_____
_____

***Marks obtained :**

1.( )+II( )+III( )+IV( )+V( )+VI( )

****Total Marks :**

Member Member Member Member Member

Course Outcomes

CO1 - Student will be try to perform well not only for academic performance.
CO2 – Student will be able to participate in activities like games and other extracurricular activities
CO3 – Student will be able to write technical paper, presentation and participate in competitions.

(OPEN ELECTIVES)

HUM-451-F **LANGUAGE SKILLS FOR ENGINEERS**

L T P
3 1 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to Attempt 5 questions out of 9 questions.

The real challenge before the students starts when they cross the threshold of the college after completing their degree. They, all of a sudden, find themselves competing for job/P.G. Degrees, through various entrance tests and interviews. Verbal ability forms a major portion of these tests. Without sound language skills and its semantic-syntactic know-how, the students with engineering background find themselves almost under- prepared for such tests. With this difficulty of students in mind, this course is proposed to make them technically proficient in handling the language skills required in competitive exams. The course would expose students to almost all variety of items, the common run of such tests as CAT, GMAT etc. And in the context of LPG, this cutting edge competence becomes imperative, and no professional education can afford to overlook this aspect.

Section A

Remedial English : Parts of speech, Gerunds, Participles and infinitives; Clauses; Sentence-constructions (unity; avoidance of choppy and rambling sentences, logic and consistency, conciseness, sequencing of ideas); Sentence errors-agreement between verb and subject, pronoun and antecedents, sequence of tenses, problems involving modifiers (dangling and misplaced modifiers); Shifts in point of view consistency of number and person, tense, mood, voice and subject; Parallelism; Omissions and mixed constructions.

Section B

Vocabulary : Methods of building vocabulary-etmological roots, prefixes and suffixes; Commonly used foreign words and phrases; spelling; words often confused synonyms and homonyms; one word substitutes; verbal idioms.

Section C

Punctuation and Mechanics: End Punctuation; internal Punctuation; Word Punctuation. Comprehension: Abstracting; Summarizing; Observation, Findings and Conclusions; Illustration and Inductive Logic; Deduction and Analogy.

Section D

Presentation: Oral presentation- Extempore, discussion on topics of contemporary relevance, Interviews.

Course Outcomes:

On successful complete of this course, the students should be able to:

CO1 - Understand about mechatronics and mechatronics elements

CO2 - Demonstrate how mechatronics integrates knowledge from different disciplines in order to realize engineering and consumer products that are useful in everyday life.

CO3 - Understand selection of suitable sensors and actuators; designing electro-mechanical systems.

CO4 - Work with mechanical systems that include digital and analogue electronics as a data acquisition model.

TEXT BOOKS:

1.Working with words by R. Gairns and S. Redman, Cambridge University Press, London.

4. Meanings into Words-Upper Intermediate Students Book, Deff/Jones, Foundation Books (Cambridge University Press), Delhi.

5. A Practical English Grammar by A.J. Thomson and A.V. Martinet, OUP, Delhi.

6. Examine your English by Margaret M. Maison, Orient Longman, New Delhi.

7. A Practical Guide to Colloquial Idom by W.J. Ball. Longman.

8. A guide to correct English by L.A. ill, Oxford.

9. Structural Essentials of english by H.whitehall, Longman.

10. Advanced English Practice by B.D. Graver, OUP, Delhi

11. Public Speaking, Sudha Publication Pvt. Ltd., New Delhi.

12. Group Discussion, Sudha Publication Pvt. Ltd., New Delhi.

HUM-453-F **HUMAN RESOURCE MANAGEMENT**

L T P
3 1 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section A

Understanding Organizational Behavior: Definition, Goals of Organizational behavior. Key forces affecting Organizational Behavior. Fundamental Concepts of Organizational Behavior. Motivation : Meaning, Objectives and importance of motivation. Theories of Motivation, Maslow's theory, Mc Greger's Theory Herzberg's theory. Morale : Meaning; Factors affecting morale, types of morale and productivity, Evaluation of morale, improving morale.

Section B

Communication: Definition & importance, Nature of leadership various approaches to leadership styles.
Leadership: Definition & importance, Nature of leadership various approaches to leadership styles.

Section C

Importance of human resources in industry, Definition of human resource management, mechanical approach towards personnel, Paternalism, Social system approach. Need for human resource planning, process of human resource planning, Methods of recruitment, Psychological tests and interviewing meaning and importance of placement Meaning and techniques of induction. Training and development : Concepts of training and development, importance of training and development, Management development its nature, purpose and method.

Section D

Significant factors affecting compensation, Methods of wage payment, Wage differentials, Causes of difference in Wages, Types of wage differentials, Wage incentives, Meaning, Objectives, types of incentive plans.

Course Outcomes:

After course completion students will

CO1 - Understanding Organizational Behavior.
CO2 - Nature of leadership various approaches to leadership styles.
CO3 - Importance of human resources in industry.
CO4 - Significant factors affecting compensation including basics of wages.

Text Books:

3. Human Resource and Personnel Management-K. Aswathappa-Tata McGraw Hill Publishing Company Ltd.
4. Personnel Management : C.B. Mamoria, Himalaya Publishing House.
5. Organisational Behavior-Dr. L.M. Prasad (Sultan Chand & Sons).

Reference Books:

4. Personnel Management & Industrial Relations : Dr. T.N.Bhagoliwal Sahitya Bhawan Agra.
5. Personnel Management : V.G. Karnik, Jaico Publishing House.
6. Personnel management & Industrial Relation : Tripathi : Sultan Chand & Sons.
7. Personnel Management-Arun Monappa & Mirza Saiyadain- Tata McGraw Hill Publishing Co. Ltd.

8. Personnel Management and Industrial Relations-D.C. Sharma & R.C. Sharma S.J. Publications.
9. Principles of Personnel Management-Edwin B. Flippo (McGraw Hill).
10. Organizational Behavior-K. Adwathappa.
11. Organizational Behavior-John W. Newsstorn & Keith Davis, Tata McGraw Hill Publishing Company Limited, New Delhi.

HUM-459-F RENEWABLE ENERGY RESOURCES & TECHNOLOGY

L T P
3 1 -

Theory : 100
Class Work : 50
Total : 150
Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

Introduction: Energy Sources and their availability, renewable energy sources, Prospects of renewable energy sources, application of non conventional and renewal energy sources.

Environmental Aspects of Electric Energy Generation: Introduction Thermal pollution, Atmospheric pollution, Effects of Hydroelectric projects, Nuclear power generation and environment, Green House Gas Effects, Global Environmental awareness, Energy options for Indian Economy.

Section -B

Solar Energy : Solar radiation estimation, Basic Principle of Solar Energy physical Principal of the conversion of solar radiation into heat, Collectors, Solar Energy storage system, solar thermal electric conversion, solar electric Power Plant & applications.

Wind Energy: Basic Principle of wind energy conversion, nature & Power of wind, site selection, wind energy conversion SYSTEM. Scheme for Electric Generation, Generator Control load control, Inter connected SYSTEM & applications.

Section -C

Bio Mass Energy: Biomass conversion technologies bio mass generation, classification of Bio Gas Plants material used in Bio Gas Plants., Selection of site & applications.

Geothermal Energy: Sources of Geothermal energy Estimation of Geothermal Power, Geothermal Power Plants, Geothermal energy in India and Prospects.

Ocean Energy: Ocean thermal electric conversion, site selection, Power Plant, Prospects of ocean energy in India, tidal Power tidal Power Plant, Prospects in India.

Section -D

MHD & Hydrogen Energy: Basic Principle MHD SYSTEM, advantages, Power OUTPUT of MHD Generation, future Prospects. Principle and classification of fuel cell energy, hydrogen as alternative fuel for Generation of Electrical Energy & applications.

Fuel Cell: Fuel Cell, Management of Fuel, Thermionic power generation, water Resource Electricity deviend scenario storage and handling, Pricing, Contract etc, Introduction to risk, rules and regulation Aspects of Risk & Hazard Health & risk assessment visit to site, Mini hydro generators.

Course Outcomes:

Students will be able to:

CO1 - Knowledge about analysis and design of Load Commutated CSI and PWM CSI

CO2 - Learn analysis and design of series Inverters.

CO3 - Acquire knowledge about analysis and design of Switched Mode Rectifiers,APFC, DC-DC converters &Resonant converters.

TEXT BOOKS:

5. Renewable Energy Sources and Emerging Technologies : D.P Kothari, K.C.Singla,

Rakesh Ranjan - PHI Publications.
6. NON-Conventional energy Sources : G.D. Rai – Khanna Publications.
7. Renewal energy sources and their environmental aspects by Abbari: PHI
8. Electric Power : Dr. S.L. Uppal - Khanna Publications

REFERENCE BOOKS:

2. Power Plant Engineering : Jain & Bala Subramanyam

ME-451-F **MECHATRONICS SYSTEMS**

L T P
3 1 -

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section A

INTRODUCTION : Definition – Trends - Control Methods: Standalone , PC Based (Real Time Operating Systems, Graphical User Interface , Simulation) - Applications: SPM, Robot, CNC, FMS, CIM.

SIGNAL CONDITIONING : Introduction – Hardware - Digital I/O , Analog input – ADC , resolution , sped channels

Filtering Noise using passive components – Resistors, capacitors - Amplifying signals using OP amps – Software - Digital Signal Processing – Low pass , high pass , notch filtering

Section B

PRECISION MECHANICAL SYSTEMS : Pneumatic Actuation Systems - Electro-pneumatic Actuation Systems - Hydraulic Actuation Systems - Electro-hydraulic Actuation Systems - Timing Belts - Ball Screw and Nut - Linear Motion Guides - Linear Bearings - Harmonic Transmission - Bearings- Motor / Drive Selection.

ELECTRONIC INTERFACE SUBSYSTEMS : TTL, CMOS interfacing - Sensor interfacing - Actuator interfacing – solenoids , motors Isoation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers , over current sensing , resetable fuses , thermal dissipation - Power Supply - Bipolar transistors/ mosfets

Section C

ELECTROMECHANICAL DRIVES : Relays and Solenoids - Stepper Motors - DC brushed motors - DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.

MICROCONTROLLERS OVERVIEW : 8051 Microcontroller , micro processor structure - Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications.

Programming –Assembly , C (LED Blinking , Voltage measurement using ADC).

Section D

PROGRAMMABLE LOGIC CONTROLLERS : Basic Structure - Programming : Ladder diagram - Timers, Internal Relays and Counters - Shift Registers - Master and Jump Controls - Data Handling - Analog input / output - PLC Selection - Application.

PROGRAMMABLE MOTION CONTROLLERS : Introduction - System Transfer Function - Laplace transform and its application in analysing differential equation of a control system - Feedback Devices : Position , Velocity Sensors - Optical Incremental encoders - Proximity Sensors : Inductive , Capacitive , Infrared - Continuous and discrete processes - Control System Performance & tuning - Digital Controllers

6. P , PI , PID Control - Control modes – Position , Velocity and Torque - Velocity Profiles – Trapezoidal

7. S. Curve - Electronic Gearing - Controlled Velocity Profile - Multi axis Interpolation , PTP , Linear , Circular - Core functionalities – Home , Record position , Go to Position - Applications : SPM, Robotics.

Course Outcomes: On successful complete of this course, the students should be able to:

CO1 - Understand about mechatronics and mechatronics elements
CO2 - Demonstrate how mechatronics integrates knowledge from different disciplines in order to realize engineering and consumer products that are useful in everyday life.
CO3 - Understand selection of suitable sensors and actuators; designing electro-mechanical systems.
CO4 – Work with mechanical systems that include digital and analogue electronics as a data acquisition model.

TEXT BOOKS :

3. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.
4. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

REFERENCES :

3. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
4. Mechatronics – N. Shanmugam / Anuradha Agencies Publisers.
5. Mechatronics System Design / Devdas shetty/Richard/Thomson.

IC-455-F INTELLIGENT INSTRUMENTATION FOR ENGINEERS

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

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

INTRODUCTION:

Definition of an intelligent instrumentation system; feature of intelligent instrumentation; components of intelligent instrumentation; Block diagram of an intelligent instrumentation.

Section -B

INTERFACING INSTRUMENTS & COMPUTERS:

Basic issue of interfacing; Address decoding; Data transfer control; A/D converter; D/A converter; Other interface consideration.

Section -C

INSTRUMENTATION/ COMPUTER NETWORKS:

Serial & parallel interfaces; Serial communication lines; Parallel data bus; EEE 488bus; Local area networks(LANs) : Star networks, Ring &bus networks, Fiber optic distributed networks, Field bus; Communication Protocols for very large systems: communication network rationalization.

Section -D

SOFTWARE FILTERS :

Description of Spike Filter, Low pass filter, High pass filter etc.

Course Outcomes

Upon successful completion of this course, a student should be able to:

CO1 - Know about the features, components and block diagram of the intelligent instruments.

CO2 - Know the basics of the INSTRUMENTATION/ COMPUTER NETWORKS

CO3 - Description of Spike Filter, Low pass filter, High pass filter etc.

TEXT BOOK:

1. Principles of measurement & Instrumentation: Alan S. Moris; PHI

OR-401-F **OPERATIONS RESEARCH**

L T P
3 1 0

Class Work : 50 Marks
Exam :100 Marks
Total : 150 Marks
Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section – A

Development – Definition– Characteristics and Phases – Types of models – operation Research models – applications.
ALLOCATION : Linear OPERATIONS-RESEARCH
Problem Formulation – Graphical solution – Simplex method – Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

Section – B

TRANSPORTATION PROBLEM – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy. Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem-Traveling Salesman problem.
REPLACEMENT : Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement. staffing problem, equipment renewal problem.

Section – C

System Reliability: Introduction-Definition-Failure Rates-Bath-tub shaped failure rate(Hazard Rate)-Reliability of systems-series arrangement and parallel arrangement-methods of assuring reliability.

Section – D

Information Theory-Introduction, measure of Information, binary unit of information , entropy, properties of average measure of entropy, important relations for various entropies, set of axioms for an entropy function, uniqueness theorem, communication system, noiseless channel, channel capacity, efficiency and redundancy, mutual information, encoding.

Course Outcomes:

CO1 - The students will be able to get awareness about the real world problems, their understanding and ability to formulate mathematical models of these problems. For example: Finance, Budgeting, Investment, Agriculturist, Transportation, Cable network, Traveling salesman and many more such problems.

CO2 - Students will be able to understand the major limitations and capabilities of deterministic operations research modeling as applied to problems in industry or government.
CO3 - The student will learn to handle and solve and analyzing problems using linear programming and other mathematical programming algorithms

TEXT BOOK :

5. OPERATIONS-RESEARCH / S.D.Sharma-Kedarnath

6. Introduction to O.R/ Taha/ Pearsons

REFERENCES: 1)Operation Research/A.P.VERMA/SK KATARIA AND SONS
2) Operations Research/P.K.GUPTA & D.S.HIRA