

KURUKSHETRA UNIVERSITY KURUKSHETRA
SCHEME OF STUDIES AND EXAMINATION
BE. II YEAR ELECTRICAL ENGINEERING SEMESTER – III

Course No.	Course Title	Teaching Schedule				Marks of Sessional	Examination		Total Marks
		L	T	P	Total		Theory	Practical	
MATH-201-E/ HUM-201-E	Mathematics - III / Basics of Industrial Sociology, Economics and Management	3	1	-	4	50	100	-	150
*EE-201-E	Transmission and Distribution	3	1	-	4	50	100	-	150
*EE-203-E	Network Analysis & Synthesis	3	1	-	4	50	100	-	150
EE-205-E	Analog Electronics	3	1	-	4	50	100	-	150
EE-207-E	Electrical Machines-I	3	1	-	4	50	100	-	150
EE-209-E	Electrical Measurements & Measuring Instruments	-	1	-	4	50	100	-	150
*EE-211-E	Electrical Measurements & Measuring Instruments lab.	-	-	2	2	25	-	25	50
EE-213-E	Analog Electronics Lab	-	-	2	2	25	--	25	50
EE-215-E	Electric Machines-I lab.	-	-	3	3	25	-	25	50
*EE-217-E	Network Analysis & Synthesis Lab.	-	-	2	2	25	-	25	50
*EE-219-E	Electrical Workshop	-	-	2	2	25	-	25	50
	TOTAL	18	7	9	35	425	600	125	1150

*Common with all branches.

KURUKSHETRA UNIVERSITY KURUKSHETRA
SCHEME OF STUDIES AND EXAMINATION
BE. II YEAR ELECTRICAL ENGINEERING SEMESTER – IV

Course No.	Course Title	Teaching Schedule				Sessional	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
MATH-201-E/ HUM-201-E	Mathematics - III / Basics of Industrial Sociology, Economics and Management	3	1	-	4	50	100	-	150	3
EE-202-E	Power generation & Control	3	1	-	4	50	100	-	150	3
EE-204-E	Digital Electronics	3	1	-	4	50	100	-	150	3
EE-206-E	Communication Systems	3	1	-	4	50	100	-	150	3
EE-208-E	Signal & System	3	1	-	4	50	100	-	150	3
EE-210-E	Electrical Machine –II	3	2	-	5	50	100	-	150	
EE-212-E	Power System Lab. – I	-	-	2	2	25	-	25	50	3
EE-214-E	Electrical Machine Lab –II	-	-	3	3	25	-	25	50	3
EE-216-E	Signal & System Lab	-	-	2	2	25	-	25	50	3
EE-218-E	Digital Electronics Lab	-	-	2	2	25	-	25	50	3
EE-220-E	Communication Systems Lab	-	-	2	2	25	-	25	50	3
	TOTAL	18	8	9	35	425	600	125	1150	

Note : Practical Training of 6 weeks duration during summer vacation, evaluation in V Sem.

**BASICS OF INDUSTRIAL SOCIOLOGY, ECONOMICS
AND MANAGEMENT**

HUM – 201 E
L T P
3 1 -

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 3 Hrs.

UNIT-I

Meaning of social change, nature of social change, theories of social change. The direction of social change, the causes of social change, the process of social change. Factors of social change – the technological factors, the cultural factors, effects of technology on major social institutions, social need of status system, social relations in industry.

UNIT-II

Meaning of Industrial Economic, Production Function, its types, Least Cost Combination, Law of Variable Proportion, Laws of Return – Increasing, Constant & Diminishing.

Fixed & variable costs in short run & long run, opportunity costs, relation between AC & MC, U-shaped short run AC Curve.

Price & Output Determination under Monopoly in short run & long run. Price Discrimination, Price Determination under Discriminating Monopoly. Comparison between Monopoly & Perfect Competition.

UNIT-III

Meaning of Management, Characteristics of Management, Management Vs. Administration, Management – Art, Science & Profession, Fayol's Principles of Management.

Personnel Management – Meaning & Functions, Manpower – Process of Manpower Planning, Recruitment & Selection – Selection Procedure.

Training – Objectives & Types of Training, Various Methods of Training. Labour Legislation in India – Main provisions of Industrial disputes Act 1947;

UNIT – IV

Marketing Management – Definition & Meaning, Scope of Marketing Management, Marketing Research – Meaning, Objectives.

Purchasing Management – Meaning & Objectives, Purchase Procedure, Inventory Control Techniques.

Financial Management – Introduction, Objectives of Financial decisions, Sources of Finance.

Note : Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all, taking at least one from each unit.

TEXT BOOKS :

1. “Modern Economic Theory” Dewett, K.K., S. Chand & Co.

2. “Economic Analysis” K.P. Sundharam & E.N. Sundharam (Sultan Chand & Sons).
3. “Micro Economic Theory” M.L. Jhingan (Konark Publishers Pvt. Ltd.).
4. “Principles of Economics” M.L. Seth (Lakshmi Narain Aggarwal Educational Publishers – Agra).
5. “An Introduction to Sociology”, D.R. Sachdeva & Vidya Bhusan.
6. “Society – An Introductory Analysis”, R.M. Maclver Charles H. Page.
7. “Principles and Practices of Management : R.S. Gupta; B.D. Sharma; N.S. Bhalla; Kalyani.

REFERENCE BOOKS

1. “Organization and Management : R.D. Aggarwal, Tata McGraw Hill.
2. Business Organization and Management : M.C. Shukla

MATH-201 E**MATHEMATICS - III**

L	T	P
3	1	-

Theory	:	100	Marks
Sessional	:	50	Marks
Total	:	150	Marks
Duration of Exam:		3 Hrs.	

UNIT - I

Fourier Series : Euler's Formulae, Conditions for Fourier expansions, Fourier expansion of functions having points of discontinuity, change of interval, Odd & even functions, Half-range series.

Fourier Transforms : Fourier integrals, Fourier transforms, Fourier cosine and sine transforms. Properties of Fourier transforms, Convolution theorem, Parseval's identity, Relation between Fourier and Laplace transforms, Fourier transforms of the derivatives of a function, Application to boundary value problems.

UNIT-II

Functions of a Complex Variables : Functions of a complex variable, Exponential function, Trigonometric, Hyperbolic and Logarithmic functions, limit and continuity of a function, Differentiability 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, Conformal transformation, Standard transformations (Translation, Magnification & rotation, inversion & reflection, Bilinear).

UNIT-III

Probability Distributions : Probability, Baye's theorem, Discrete & Continuous probability distributions, Moment generating function, Probability generating function, Properties and applications of Binomial, Poisson and normal distributions.

UNIT-IV

Linear Programming : Linear programming problems, Formulation, Solution of Linear Programming Problem using Graphical method, Simplex Method, Dual-Simplex Method.

Text Book

1. Higher Engg. Mathematics : B.S. Grewal
2. Advanced Engg. Mathematics : E. Kreyzig

Reference Book

1. Complex variables and Applications : R.V. Churchill; Mc. Graw Hill
2. Engg. Mathematics Vol. II: S.S. Sastry; Prentice Hall of India.
3. Operation Research : H.A. Taha
4. Probability and statistics for Engineer : Johnson. PHI.

Note : Examiner will set eight question, taking two from each unit. Students will be required to attempt five questions taking at least one from each unit.

EE- 201-E TRANSMISSION AND DISTRIBUTION

L T
3 1

Theory : 100 Marks
Sessional : 50 Marks
Total : 150 Marks
Time : 3 hrs.

UNIT-I

GENERAL:-

Importance of electric power, power system components, Growth of power systems in India, power supply network, effect of voltage on conductor size, comparison of conductor vol. In typical supply systems elementary high voltage DC transmission DC transmission and its advantages and disadvantages.

UNIT-II

LINE PARAMETERS:-

Evaluation of inductance, capacitance, resistance for single phase, three phase symmetrical unsymmetrical, transposed, untransposed single circuit, double circuit lines, skin and proximity effect.

PERFORMANCE OF LINES :

Classification of lines as short, medium and long, representation and detailed performance analysis of these lines including ABCD parameters. Detailed measurements and universal power circle diagram.

UNIT-III

MECHANICAL CONSIDERATIONS:-

Various types of line conductors, line supports, poles and towers, sag calculations, effect of wind, ice and temperature, stringing chart, sag template, line vibrations.

Insulators- Various types of insulator, voltage distribution, string efficiency, methods of increasing string efficiency.

CORONA –

Phenomenon of corona, disruptive critical voltage, visual critical voltage, corona loss, radio interference.

UNIT-IV

UNDER GROUND CABLES-

Classification and construction, insulation resistance, capacitance, capacitance determination, power factor in cables, capacitance grading, use of inter sheaths, losses, heat dissipation and temperature rise in cables, current rating, comparison with overhead lines.

Ref. Books:-

1. CL Wadhwa, "Electric Power Systems" (Wiley Eastern Ltd.)
2. IJ Nagrath and DP Kothari "Power System Engineering". Tata MGH.

NOTE : Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE-203-E NETWORK ANALYSIS & SYNTHESIS

L T P
3 1 0

Sessional : 50 Marks
EXAM : 100 Marks
TOTAL : 150 Marks
DURATION OF EXAM : 3 HRS

UNIT I**TOPOLOGY :**

Principles of network topology , graph matrices, network analysis using graph theory.

TRANSIENT RESPONSE :

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

UNIT 2**NETWORK FUNCTIONS :**

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

UNIT 3**CHARACTERISTICS AND PARAMETERS OF TWO PORT NETWORKS :**

Relationship of two-port variables, short-circuit Admittance parameters, open circuit impedance, parameters, Transmission parameters, hybrid parameters, relationships between parameter sets, Inter-connection of two port networks.

UNIT 4**TYPES OF FILTERS AND THEIR CHARACTERISTICS :**

Filter fundamentals, high-pass, low-pass, band-pass, and band-reject Filters.

NETWORK SYNTHESIS :

Positive real functions, synthesis of one port and two port networks, elementary ideas of Active networks.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

NOTE : Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE 205-E ANALOG ELECTRONICS

L T P
3 1 0

SESSIONAL : 50 Marks
EXAM. : 100 Marks
TOTAL : 150 Marks
DURATION OF EXAM : 3 HRS.

UNIT - 1

SEMICONDUCTOR DIODE:

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

DIODE CIRCUITS :

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

UNIT-2

TRANSISTOR AT LOW FREQUENCIES :

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

TRANSISTOR BIASING :

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

UNIT-3

TRANSISTOR AT HIGH FREQUENCIES :

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

FIELD EFFECT TRANSISTORS :

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

UNIT-4

OPERATIONAL – AMPLIFIER :

OP-AMP, differential amplifier and its DC, AC analysis, OP-AMP characteristics, Non-Inverting/Inverting Voltage and Current feedback linear and Non-Linear OP-AMP circuits.

REGULATED POWER SUPPLIES:

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

TEXT BOOK :

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

REFERENCE BOOKS :

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

NOTE : Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE-207-E
ELECTRICAL MACHINES - I

L T P
3 1 -

Theory :100 Marks
Sessional : 50 Marks
Total :150 Marks
Duration of Exam : 3 Hrs.

UNIT-I

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.

UNIT-II

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.

UNIT-III

Nature of magnetizing current, plotting of magnetizing 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.

UNIT-IV

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

TEXT BOOKS:

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

REF. BOOKS:

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

NOTE : Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE-209-E ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

L T P
3 1 0

Sessional	:50	Marks
Exam	:100	Marks
Total	:150	Marks
Duration of Exam	:3hrs	

UNIT-I

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

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

UNIT-III

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

UNIT-III

WATTMETERS & ENERGY 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 (Electrodynamics & Moving Iron types) & Frequency meters (Electrical Resonance Type, Ferrodynamic & Electrodynamic types).

UNIT-IV

LOW & HIGH RESISTANCE MEASUREMENTS: Limitations of Wheat stone 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, inductance-capacitance, Hays, Anderson, Owens, De-Sauty's, Schering & Weins bridges, Shielding & earthing.

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

REFERENCE BOOKS: 1. Electrical Measurements by E.W. Golding
2. Electronic & Elect. Measurement & Instrumentation by J.B.Gupta; Kataria & Sons.
3. Electronic Instrumentation & Measurement Technique, W.D.Cooper & A.D. Helfrick.
4. Measuring Systems by E.O. Doebelin; TMH.

NOTE: Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE-211-E

ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS LAB

L	T	P
0	0	2

Sessional	: 25	Marks
Exam	: 25	Marks
Total	: 50	Marks
Duration of Exam: 3hrs		

LIST OF EXPERIMENTS :

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

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

EE-213-E ANALOG ELECTRONICS-LAB

L T P
0 0 2

Sessional	:	25	Marks
EXAM	:	25	Marks
TOTAL	:	50	Marks
DURATION OF EXAM	:	3 HRS	

LIST OF EXPERIMENTS

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

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

EE-215-E**ELECTRICAL MACHINE LAB-I**L T P
- - 3Practical : 25 Marks
Sessional : 25 Marks
Total : 50 Marks
Duration of Exam : 3 Hrs.**LIST OF EXPERIMENTS**

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

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

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EE-217-E

NETWORK ANALYSIS AND SYNTHESIS LAB

L T P
0 0 2

Sessional	:	25	Marks
EXAM	:	25	Marks
TOTAL	:	50	Marks
DURATION OF EXAM	:	3 HRS	

LIST OF EXPERIMENTS :

1. Transient response of RC circuit.
2. Transient response of RL circuit.
3. To find the resonance frequency, Band width of RLC series circuit.
4. To calculate and verify "Z" parameters of a two port network.
5. To calculate and verify "Y" parameters of a two port network.
6. To determine equivalent parameter of parallel connections of two port network.
7. To plot the frequency response of low pass filter and determine half-power frequency.
8. To plot the frequency response of high pass filter and determine the half-power frequency.
9. To plot the frequency response of band-pass filter and determine the band-width.
10. To calculate and verify "ABCD" parameters of a two port network.
11. To synthesize a network of a given network function and verify its response.
12. Introduction of P-Spice

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

EE-219-E**ELECTRICAL WORKSHOP**

L T P
0 0 2

Sessional	:	25	Marks
EXAM	:	25	Marks
TOTAL	:	50	Marks
DURATION OF EXAM	:	3 HRS	

LIST OF EXPERIMENTS:

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

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

EE- 202E POWER GENERATION AND CONTROL

L T P
3 1 0

SESSIONAL	:	50	Marks
EXAM	:	100	Marks
TOTAL	:	150	Marks
DURATION OF EXAM	:	3 HRS	

UNIT-1**LOAD AND LOADING FORECASTING**

Load Curves, Maximum Demand, Load Factor, Diversity Factor, Capacity Factor, Utilization Factor, Types of Load, Load Forecasting.

POWER PLANT ECONOMICS

Choice of type of generation, size of generator and number of units, Cost of electrical energy, depreciation of plant, effect of load factor on cost of Electrical Energy.

TARIFFS AND POWER FACTOR IMPROVEMENT

Different types of tariffs and methods of power factor improvement.

UNIT-2**THERMAL POWER PLANTS**

Choice of site, Main and Auxiliary equipment fuel gas flow diagram, water stream flow diagram, working of power plants and their layout, characteristics of turbo generators.

HYDRO ELECTRIC PLANTS

Choice of site, classification of Hydro Electric Plants, main parts and working of plants and their layouts, characteristics of hydro electric generators.

UNIT-3**NUCLEAR POWER PLANTS**

Choice of site, classification of plants, main parts, layout and their working, associated problems.

DIESEL POWER PLANTS

Diesel plant equipment, diesel plant layout and its working, application of diesel plants.

COMBINED WORKING OF PLANTS

Advantages of combined operation plant requirements for base load and peak load operation. Combined working of run off river plant and steam plant.

UNIT-4**POWER STATION EQUIPMENT AND CONTROL**

- Excitation system – Purpose and requirements of excitation system, brushless excitation systems.
- Voltage regulators – Function and characteristics of automatic voltage regulators, solid regulator.
- Speed Governing – Purpose of speed governing system, Hydraulic type, speed governing system for steam turbines and hydro turbines.
- Automatic generation control – types of interconnection, Advantages of interconnection, real and reactive power control, single area automatic generation control, automatic generation control for two area system, types of automatic generation control for interconnection power systems.

Ref. Books :

- C.L. Wadhwa, “Electric Power System” (Willey Eastem Ltd.)
- IJ Nagnath and DP Kothari “Power System Engineering”. Tata MGH.

NOTE: Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE-204-E DIGITAL ELECTRONICS

L T P
3 1 0

SESSIONAL	:	50	Marks
EXAM	:	100	Marks
TOTAL	:	150	Marks
DURATION OF EXAM	:	3 HRS	

UNIT 1**FUNDAMENTALS OF DIGITAL TECHNIQUES :**

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

UNIT 2**COMBINATIONAL DESIGN USING GATES:**

Design using gates, Karnaugh map and Quine McCluskey methods of simplification.

COMBINATIONAL DESIGN USING MSI DEVICES

Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders / Subtractors, BCD arithmetic circuits, Encoders, Decoders / Drivers for display devices.

UNIT 3**SEQUENTIAL CIRCUITS:**

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

A/D AND D/A CONVERTERS:

Sample and hold circuit, weighted resistor and R -2 R ladder D/A Converters, specifications for

D/A converters. A/D converters : Quantization, parallel-comparator, successive approximation, counting type, dual-slope ADC, specifications of ADCs.

UNIT 4**DIGITAL LOGIC FAMILIES:**

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

PROGRAMMABLE LOGIC DEVICES:

ROM, PLA, PAL, FPGA and CPLDs.

TEXT BOOK :

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

REFERENCE BOOKS :

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

NOTE: Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE-206-E COMMUNICATION SYSTEMS

L T P
3 1 0

SESSIONAL	:	50	Marks
EXAM	:	100	Marks
TOTAL	:	150	Marks
DURATION OF EXAM	:	3 HRS	

UNIT 1**INTRODUCTION TO COMMUNICATION SYSTEMS :**

The essentials of a Communication system, modes and media's of Communication, Classification of signals and systems, Fourier Analysis of signals.

UNIT 2**AMPLITUDE MODULATION :**

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

ANGLE MODULATION :

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

UNIT 3**PULSE ANALOG MODULATION :**

Sampling theory, time division (TDM) and frequency division (FDM) multiplexing, pulse amplitude modulation (PAM), pulse time modulation.

PULSE DIGITAL MODULATION :

Elements of pulse code modulation, noise in PCM systems, Measure of information, channel capacity, channel capacity of a PCM system, differential pulse code modulation (DPCM). Delta modulation (DM)

UNIT 4**DIGITAL MODULATION TECHNIQUES:**

ASK, FSK, BPSK, QPSK, M-ary PSK.

INTRODUCTION TO NOISE:

External noise, Internal noise, S/N ratio, noise figure.

TEXT BOOKS :

1. Communication systems (4th edn.) : Simon Haykins; John Wiley & Sons.
2. Communication systems: Singh & Sapre; TMH.

REFERENCE BOOKS :

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

NOTE: Eight questions are to be set in total covering entire course selecting two questions each unit. Each question will be of equal marks Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE-208-E SIGNAL AND SYSTEMS.

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3	1

Theory: 100 Marks
 Sessional: 50 Marks
 Total : 150 Marks
 Time: 3 Hrs.

SIGNAL

UNIT-I

Types of signals:- Deterministic and Stochastic, periodic and a periodic, impulse functional sequences, analog and discrete, singular functions. Signal representation in terms of singular functions, orthogonal functions and their use in signal representation. Fourier series, Fourier and La-place transforms. Convolution theorem, geometrical interpretation and application.

UNIT-II

Probability concepts, random variable, pdf, cdf, moments, distributions, correlation functions. Characterization of stochastic signals.

Discretisation of analog signals – sampling, sampling theorem and its proof. Effect of under sampling, recovery of analog signals from sampled signal. Characterization of Discrete signals – in terms of impulse sequences, Z-transforms. Properties, conversion and applications of La-place, Fourier and Z-transforms.

SYSTEM

UNIT-III

Classification linear and non-linear, time invariant and time varying, Lumped and distributed. Deterministic and Stochastic. Casual and non causal, Analog and Discrete/Digital memory and memory less, 1 port and N – port, SISO, SIMO, MISO, MIMO.

UNIT-IV

System modeling in terms of differential, equations, state variables, difference equations and transfer functions.

Linear time invariant system properties, elementary idea of response determination to deterministic and stochastic signals. Concept of impulse response.

REF. BOOKS :

1. Fred J Taylor –“Principles of Signals and System”, MGH.
2. Simon Haykins – “Signal & Systems”, Wiley Eastern
3. A Papoulis – “Circuit and System” Modern Approach HRW

NOTE: Eight questions are to be set in total covering entire course selecting two questions each unit. Each question will be of equal marks Students will be required to attempt five questions in all, selecting at least one question from each unit.

ET-210-E ELECTRICAL MACHINES - II

L T
4 1

Theory: 100 Marks
Sessional: 50 Marks
Total : 150
Time: 3 Hrs.

UNIT –I**Basic Concept of Electrical Machines:-**

Winding factors, generated e.m.f. and m.m.f. of distributed a.c. winding, rotating magnetic field.

UNIT –II**Induction machines –**

- a) Constructional features, production of torque, phasor diagram, equivalent circuit, performance analysis, torque slip characteristics.
- b) Testing running light and blocked rotor test, load test.
- c) Effect of rotor resistance, deep bar and double cage induction motor.
- d) Generator operation.
- e) Starting – starting method of squirrel cage and wound rotor induction motor.
- f) Speed control – Various methods of speed control of squirrel cage and wound rotor induction motor.
- g) Effect of space harmonics.

UNIT –III**Signal phase induction motors-**

- a) Constructional features, double revolving field theory, equivalent circuit, determination of parameters.
- b) Split phase starting methods & applications.

UNIT –IV**Synchronous machines-**

- a) Constructional features.
- b) Cylindrical rotor machine.
 - I) Synchronous generator – Generated emf, circuit model and phasor diagram, armature reaction, synchronous impedance, voltage regulation and different methods for its estimation.
 - II) Synchronous motor – Operating principle, circuit model, phasor diagram, effect of load.
 - III) Operating characteristics of synchronous machines V-curves starting methods of synchronous motors.
- c) Salient pole machine-
Two reaction theory, analysis of phasor diagram, power angle characteristics, determination of x_d and x_q
- d) Parallel operation of alternators –
Synchronization and load division.

REF. BOOKS:-

1. PS Bhimbra “Electric Machinery” Khanna Publishers.
2. Nagrath & Kothari “Electric Machines” TMH
3. Fitzgerald & Kingsley “Electric Machinery” MGH

NOTE: Eight questions are to be set in total covering entire course selecting two questions each unit. Each question will be of equal marks Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE – 212 POWER SYSTEM – I

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SESSIONAL	:	25	Marks
EXAM	:	25	Marks
TOTAL	:	50	Marks
DURATION	:	3 HRS.	

1.
 - a) To measure the dielectric strength of transformer oil.
 - b) To find string efficiency of string insulator.
 - (i) Without guard ring.
 - (ii) With guard ring.
2. To measure ABCD parameters of transmission line.
3. To plot power angle characteristics of transmission line.
4. Parallel operation of two alternator.
5. To create unbalanced voltage system and to measure the sequence voltage by Segregating network.
6. To study the characteristics of transmission line represented by :
 - i) T-Network :
 - ii) Pie-Network
7. To study the characteristics of differential relay.
8. Testing and calibration of energy meter.
9. To plot the characteristics of IDMT static relay.
10. Testing of current transformer.

NOTE: Eight questions are to be set in total covering entire course selecting 10 questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE- 214-E
ELECTRICAL MACHINE-II LABORATORY

L T P
0 0 2

SESSIONAL	:	25	Marks
EXAM	:	25	Marks
TOTAL	:	50	Marks
DURATION OF EXAM	:	3 HRS	

1. Determine mechanical losses by light running of a three phase Induction Motor .
2. To perform Load test on a 3-phase induction motor & DC generator set and to determine the efficiency of induction motor.
3. Study and starting of 1 phase induction-motor. To perform light running and block rotor test and to determine the parameters of the equivalent circuit.
4. To perform the open circuit test and block rotor test on 3 phase induction motor and draw the circle diagram.
5. To find out the rotor resistance of a poly phase induction motor.
6. To calculate regulation by synchronous impedance method:-
 - I) Conduct open and short circuit test on a three phase alternator.
 - II) Determine and plot variation of synchronous impedance with I_f .
 - III) Determine S.C.R.
 - IV) Determine regulations for 0.8 lagging power factor, 0.8 leading power factor and unity power factor.
7. To plot V-Curves of a synchronous machine.
 - (a) Determination of X_o of a synchronous machine.
 - (b) Measurement $X_d' + X_q'$ (Direct axis and Quadrature axis).
8. To measure X_q of synchronous machine (negative sequence reactance).
9. To calculate regulation by ZPF. method.
10. To conduct the load test to determine the performance characteristics of the I.M..
11. To study the parallel operation of synchronous generators.

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

EE-216-E

SIGNALS & SYSTEMS LABORATORY.

L T P
0 0 2

SESSIONAL	:	25	Marks
EXAM	:	25	Marks
TOTAL	:	50	Marks
DURATION OF EXAM	:	3 HRS	

- 1 To study of time properties of Signals.
- 2 To verify basis properties of linear system (Superposition Theorem etc).
- 3 To demonstrate how sampling rules affect the outputs.
- 4 To study sampling theorem for low pass signals and band pass signals.
- 5 To study the LPF & HPF using RC Ckt.
- 6 To study band pass and band reject filters using RC ckt.
- 7 To study response of Pulse Amplitude Modulation & Demodulation process.
- 8 To study response of Pulse Width Modulation and Demodulation process.
- 9 To study response of Pulse Position Modulation and Demodulation process.
- 10 To study response of Pulse Code Modulation and Demodulation process.
- 11 To study the spectral response on spectrum analyzer? Having unit impulse, step I/P & sine input (for various ckt.).
- 12 To study signals synthesis via sum of various harmonics.

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

EE-218-E**DIGITAL ELECTRONICS LAB**L T P
0 0 2

SESSIONAL	:	25	Marks
EXAM	:	25	Marks
TOTAL	:	50	Marks
DURATION OF EXAM	:	3 HRS	

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. Design & realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer & Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design & verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.
9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.
10. To design & realize a sequence generator for a given sequence using J-K flip-flops.
11. Study of CMOS NAND & NOR gates and interfacing between TTL and CMOS gates.
12. Design a 4-bit shift-register and verify its operation . Verify the operation of a ring counter and a Johnson counter.

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

EE-220-E

COMMUNICATION SYSTEMS LAB

L T P
0 0 2

SESSIONAL	:	25	Marks
EXAM	:	25	Marks
TOTAL	:	50	Marks
DURATION OF EXAM	:	3 HRS	

LIST OF EXPERIMENTS:

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

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

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