EE III Semester

The Papers for S.Y. B. Tech. III Semester classified are as under :

	Subject code	Subject Name	L:T:P	Hours / Week	Credits	Examination Schedule (Marks)						
						Sessional	Theory	Min Pass	Practical	Min Pass	Total	Min Pass
1	EVS-201L	Environmental Studies	L:T	3	3	30	70	28	-	-	100	40
2	MAT-201L	Mathematics-III	L:T	4	3.5	30	70	28	-	-	100	40
3	EE-201L	Power Generatio & Control	L:T	4	3.5	30	70	28	-	-	100	40
4	EE-203L	Network Analysis & systhesis	L:T	4	3.5	30	70	28	-	-	100	40
5	EE-205L	Electrical Machines-I	L:T	4	3.5	30	70	28	-	-	100	40
6	EE-207L	Electrical Measurements and Measuring instruments	L:T	4	3.5	30	70	28	-	-	100	40
7	EE-203P	Network Analysis & Synthesis Lab	P	2	1	30	-	-	70	28	100	40
8	EE-205P	Electrical Machines-I Lab	P	3	1.5	30	-	-	70	28	100	40
9	EE-207P	Electrical Measurements and Measuring instruments Lab	P	2	1	30	-	-	70	28	100	40
10	EE-209P	Electrical Workshop Lab	P	2	1	30	-	-	70	28	100	40
11	EE211P	Skills & Innovation Lab	P	3	0	30	-	-	70	28	100	40

Note: Please verify the Scheme & Syllabus before final the above list.

ME III Semester

The Papers for S.Y. B. Tech. III Semester classified are as under :-

Sr.	Subject code	Subject Name	L:T:P	Hours / Week	Credits	Examination Schedule (Marks)						
						Sessional	Theory	Min Pass	Practical	Min Pass	Total	Min Pass
1	HUM-201L	Fundamentals of Management	L	3	3	30	70	28	-	-	100	40
2	MAT-201L	Mathematics-III	L	3+1	3.5	30	70	28	-	-	100	40
3	ECE-211L	Instrumentation	L:T	2+1	2.5	30	70	28	-	-	100	40
4	ME-201L	Mechanics of Soids-I	L	3+1	3.5	30	70	28	-	-	100	40
5	ME-203L	Production Technology	L	3+2	3.5	30	70	28	-	-	100	40
6	ME-205L	Thermodynamics	L	3+3	3.5	30	70	28	-	-	100	40
7	ME-207L	Machine Drawing	L	1+4	3	30	70	28	-	-	100	40
8	ME-201P	Mechanics of Solids Lab	P	2	1	30			70	28	100	40
9	ME-203P	Production Technology Lab	P	3	1.5	30	-	-	70	28	100	40
10	PSY201L	Personality Development	L	2+1	0	30	70	28	-	-	100	40

Note: Please verify the Scheme & Syllabus before final the above list.

Revised Scheme of B. Tech. - Electrical Engineering

EDP

SEMESTER-III

Subject Area	Course Code	Course Name	L	T	P	Credits
ES-6	EVS-201-L	Environmental Studies	3	-	-	3
BS-6	MAT-201-L	Mathematics-111	3	1	-	3.5
PC-1	EE-201-L	Power Generation & Control	3	1	-	3.5
PC-2	EE-203-L	Network Analysis & Synthesis	3	1	-	3.5
PC-3	EE-205-L	Electrical Machines –I	3	1	-	3.5
PC-4	EE-207-L	Electrical Measurements and Measuring instruments	3	1	-	3.5
	EE-203-P	Network Analysis & Synthesis Lab	-	-	2	1
	EE-205-P	Electrical Machines -I Lab	-	-	3	1.5
	EE-207-P	Electrical Measurements and Measuring instruments Lab	-	-	2	1
	EE-209-P	Electrical Workshop Lab	-	-	2	1
MC-3 (Non-Credit)	EE-211-P	Skills & Innovation Lab (2 Unit)	-	-	3	-
	Total					25

SEMESTER-IV

Subject Area	Course Code	Course Name	L	T	P	Credits
HS-4	HUM-201-L	Fundamentals of Management	3	0	-	3
ES-7	EE-202-L	Electrical Engineering Materials and Semiconductor Devices	3	1	-	3.5
PC-5	EE-204-L	Transmission & Distribution	3	1	-	3.5
PC-6	EE-206-L	Digital Electronics	3	1	-	3.5
PC-7	EE-208-L	Control System	3	1	-	3.5
PC-8	EE-210-L	Electrical Machines-II	3	1	-	3.5
	EE-204-P	Power System-I Lab	-	-	2	1
	EE-206-P	Digital Electronics Lab	-	-	2	1
	EE-208-P	Control System Lab	-	-	2	1
	EE-210-P	Electrical Machine -II Lab	-	-	3	1.5
MC-4 (Non-Credit)	PSY-201-L	Personality Development(2Unit)	2	1	-	-
	Total					25

Subject Area	Abbreviation
Humanities & Social Science	HS
Basic Science	BS
Engineering Sciences	ES
Professional Subjects Core	PC
Professional Subjects Electives	PE
Open Subjects Electives	OE
Project Work, Seminar and/or Internship in Industry Or Elsewhere	PW
Mandatory Courses (Qualifying)- Non Credit	MC

Prof. Prabhakar 24/07/17

Neha Gupta 24/07/2017

17/7/17

Dean (FET)

Environmental Studies ✓

Course Code: EVS-201-L **Course Credits: 3** **Mode: Lecture(L) and Tutorial(T)** **Type: Compulsory** **Contact Hours: 3 hours (L) + 01 hour (T) per week.** **Examination Duration: 03 hours.**	**Course Assessment Methods (Internal: 30; External: 70)** Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answer type question. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: Student should have prior knowledge of basic environment science

Objectives:

- To enhance knowledge skills and attitude to environment.
- To understand natural environment and its relationship with human activities.

Course outcomes:

CO-1 Students will be able to enhance and analyze human impacts on the environment.
CO-2 Integrate concepts & methods from multiple discipline and apply to environmental problems
CO-3 Design and evaluate strategic terminologies and methods for sustainable management of environmental systems.
CO-4 Field studies would provide students first-hand knowledge on various local environment aspects which forms an irreplaceable tool in the entire learning process.

Unit-I

Multidisciplinary nature of Environmental studies: Definition, scope and importance, need for public awareness; Concept Structure and function of an ecosystem: Producers, consumers and decomposers, Energy flow in the ecosystem ,Ecological succession ,Food chains, Food webs and ecological pyramids: Introduction, types, characteristics features, structure and function of Forest ecosystem, Grassland ecosystem ,Desert ecosystem, Aquatic ecosystem (Ponds, Stream, lakes, rivers, oceans, estuaries); Biodiversity: Introduction, Definition: genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and option values; Biodiversity at global, national and local level, India as a mega-diversity nation, Hot-spot of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Unit-II

Renewable and non-renewable resources, Natural resources and associated problems ,Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people; Water resources: Use and over utilization of surface and ground water, floods, droughts conflicts over water, dams benefits and problems; Mineral resources: Use and exploitation, environmental effects of extracting and mineral resources; Food resources: World food problem, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity; Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies; Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification, Role of an individual in conservation of natural resources, Equitable use of resources for suitable lifestyle.

CHAIRPERSON,
Deptt. of Environmental Science

Unit-III

Definition of Environment Pollution. Causes, effects and control measures of- Air Pollution, Water Pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management: Causes effects and control measures of urban and industrial wastes, Role of and individual in prevention of pollution, Pollution case studies; Disaster management: floods, earthquake, cyclone and landslides; Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies; different laws related to environment: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act., Issues involved in enforcement of environmental legislation, Public awareness

Unit-IV

Social issues and the Environment: From unsustainable to Sustainable development, Urban problems related to energy Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people: its problem and concern, case studies; Environment ethics: Issues and possible solutions;Wasteland reclamation, Consumerism and waste products; Human Population growth, variation among nation, Population explosion: Family Welfare Programme, Environment and human health , Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies

Field Work: Visit to a local area to document environmental assets- river/forest/grassland/hill/mountain, Study of simple ecosystems – ponds, river, hill slopes etc; Study of common plants, insects, birds; Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.

TEXT BOOK:

1. Erach Bharucha . "Environmental Studies for Undergraduate Courses", University Grants Commission and Bharati Vidyapeeth Institute of Environment Education and Research, Pune, University press pvt. Ltd. (India)
2. Fundamental concepts in Environmental studies by Dr. D.D. Mishra. S. Chand publications

REFERENCE BOOKS:

1. Essentials of Ecology and Environmental Science by Dr. S. V. S. Rana, PHI Learning Pvt. Ltd. Delhi
2. Environmental Chemistry by Anil Kumar De, Wiley Eastern Limited.
3. Environmental Science by T.G. Miller, Wadsworth Publishing Co, 13th edition.
4. Ecology and Environment by P. D. Sharma, Rastogi publications

MATHEMATICS-III

Course Code: MAT-201-L Course Credits: 3.5 Mode: Lecture(L) and Tutorial(T) Type: Compulsory Contact Hours: 3 hours (L) + 01 hour (T) per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Two minor tests each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc (6 marks) and end semester examination of 70 marks. For the end semester examination, nine question are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus, it will contain seven short answer type question. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: Basic knowledge of calculus, complex analysis and statistics.

Course outcomes:

CO-1 Problems of Fourier series and Fourier transforms used in engineering applications
CO-2 Calculation of improper/ singular integrals with the help of complex analysis
CO-3 Statistical tests for system goodness.
CO-4 Problems of LPP and their interpretation.

Unit-I

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 cosine 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.

Unit-II

Functions of Complex Variable: Definition, Exponential function, Trigonometric and Hyperbolic functions, 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. Integration of complex functions. Cauchy Theorem, Cauchy- Integral formula.

Unit-III

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).

Unit-IV

Probability Distributions and Hypothesis Testing: Expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions. Testing of a hypothesis, tests of significance for large samples. Student's t-distribution (applications only), Chi-square test of goodness of fit. **Linear Programming:** Linear programming problems formulation, Solving linear programming problems using (i) Simplex method.

Text books:

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

Reference books:

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

POWER GENERATION AND CONTROL

Course Code: EE-201-L Course Credits: 3.5 Mode: Lecture (L) and Tutorial (T) Type: Compulsory Contact Hours: 3 hours (L) + 1 hour (T) per week Examination Duration: 03 hours.	Course Assessment Methods (Internal: 30; External: 70) Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: None

Objectives:

- To acquaint with the imperative power plant factors, related economics and energy tariffs.
- To provide the knowledge of various types of power plants, their operations and combined working
- To elaborate the major equipments (Exciters, Voltage Regulators and Speed Governors and associated control.

Course outcomes:

CO1. Study and understand the economic aspects of power plants for their optimal designing and operations

CO2. Ability to judge the suitability of site for different types of power plants along with their layout, basic components classification and operation

CO3. Learning of combined working of power plants based on load duration curve to improve the continuity, security and integrity of electric power supply

CO4. Enhancement of in-depth knowledge of imperative power station equipments and power control

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

i) Excitation system – purpose and requirements of excitation system, brushless excitation systems.
ii) Voltage regulators – function and characteristics of automatic voltage regulators, solid regulator.
iii) Speed governing – purpose of speed governing system, hydraulic type, speed governing system for steam turbines and hydro turbines.
iv) 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.

REFERENCS BOOKS:

1. Electric power generation, B.R.Gupta .
2. Power Plant Engineering: G.D.Rai
3. Power plant Engg.: R. K. Rajput, Dhanpat Rai and Sons .
4. Power plant Engg.: Wakil
5. A course in electric power system, Soni , Gupta , Bhatnagar, Dhanpat Rai and Sons .
6. Power System Engineering, Nagrath and Kothari, TMH, New Delhi.
7. Electric Power: S.L. Uppal, Khanna Publishers

NETWORK ANALYSIS & SYNTHESIS

Course Code: EE-203-L
Course Credits: 3.5
Mode: Lecture(L) and Tutorial(T)
Type: Compulsory
Contact Hours: 3 hours (L) + 01 hour (T) per week.
Examination Duration: 03 hours.

Course Assessment Methods (Internal: 30; External: 70)
Two minor test each of 20 marks, class performance measured through percentage of lecture attend (4 marks), assignments, quiz etc (6 marks) and end semester examination of 70 marks

For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: Student should have prior knowledge of basic fundamental circuit analysis techniques and basics of electrical engineering including KVL, KCL, mesh analysis, nodal analysis, and theorems.

Objectives:

- To analyze networks using graph theory and study transient response of series circuit to various signals.
- To provide students with basic information on how to perform circuit analysis using network parameters.
- To make the students learn how to synthesize an electrical network from a given impedance/admittance function.

Course outcomes:

CO1. Application of network topology and graph theory for network analysis

CO1. Students will be able to solve the Network problems using differential equation approach and transform methods and also to find the transient response to various types of signals.

CO2. Determination of stability of the network by mathematically formulating the network functions and its pole-zero locations.

CO3. Calculation of impedance, admittance, hybrid and ABCD parameters for network analysis.

CO4. Learning of fundamental concept of different type of filters & their characteristics.

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-II

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

Unit- III

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-IV

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.

REFERENCE BOOKS:

1. Network Analysis & Synthesis: Umesh Sinha; Satya Prakash Pub.
2. Network Analysis & Synthesis: A. Chakrabarti, Dhanpat Rai and Co.
3. Circuit Analysis: G.K. Mithal; Khanna Publication.
4. Network Analysis: Van Valkenburg; PHI
5. Network Analysis & Synthesis: F.F.Kuo; John Wiley & Sons Inc.
6. Introduction to modern Network Synthesis: Van Valkenburg; John Wiley
7. Basic circuit theory: Dasoer Kuh; McGraw Hill.
8. A Course in Electrical Circuit Analysis by Soni & Gupta; Dhanpat Rai Publication.
9. Networks and Systems: D.Roy Choudhury; New Age International.

ELECTRICAL MACHINES-I

Course Code: EE-205-L Course Credits: 3.5 Mode: Lecture (L) and Tutorial (T) Type: Compulsory Contact Hours: 3 hours (L) + 1 hour (T) per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: Student should have introductory knowledge of electrical machines covered in basics of Electrical Engineering (EE-101-L).

Objectives:

- To impart the basic knowledge of magnetic circuits and understanding of principle of electromechanical energy conversion.
- To provide sound knowledge of principle of operations, constructional features, and characteristics of 1- ϕ transformers, 3- ϕ transformers and DC machines
- To understand various tests, characteristics determination and analysis of performance of these machines

Course outcomes:

CO1. Fundamental knowledge of magnetic circuits and electromechanical energy conversion devices.

CO2. Understanding of the construction and principle operation of single phase and three phase transformers.

CO3. Testing of transformer and utilization of test results to determine equivalent circuit parameters, efficiency and voltage regulation for performance evaluation.

CO4. Analysis of different types of 3 phase transformers, phase conversions and inrush phenomenon

CO5. In depth study of DC machines along with their suitability for specific industrial application as well as to choose an appropriate method of speed control.

Unit-I

Magnetic circuits: Magneto motive force magnetic field strength, permeability, reluctance, analogy between electric and magnetic-circuits, series and parallel magnetic circuits, practical magnetic circuits, permanent magnet and their applications.

Principles of Electro- Mechanical energy conversion: Basic Principle, energy, force and torque of singly, multiple excited system, reluctance torque, basic rotating machine, e.m.f and m.m.f of distributed winding, harmonics in mmf., revolving field, torque production, asynchronous and synchronous torque, winding factors.

Unit-II

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,

Unit-III

Auto-transformer: Principle, construction, comparison with two winding transformers, application, Introduction to tap-changing & phase-shifting transformers.

Three phase transformers: Construction, various types of connection of three phase transformer, their comparative features, Zig-Zag connection, Phase-Conversion: Three to two phase, three to six phase and three to twelve phase conversions, parallel operation, Inrush current, harmonics, effect of construction on input current.

Unit-IV

DC 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.

REFERENCE BOOKS:

1. P. .S Bhimbra "Electric Machines" Khanna Publishers.
2. I. J. Nagrath & D.P. Kothari "Electric Machines" TMH
3. R. K. Rajput, "Electric Machines", Laxmi Publications
4. B. L. Theraja, A. K. Theraja, "Electrical Technology-vol. II-AC DC machines", S. Chand
5. Fitzgerald & Kingsley "Electric Machinery" MGH
6. E.O.Taylor, " Theory, Performance & design of AC commutator machines", WP
7. A.S. Langsdorf , "Theory of alternating current machinery", TMH.
8. Ashfaq Hussain, Electric Machines, Dhanpat Rai
9. P. K. Mukherjee and S. Chakravorty, "Electrical Machines", Dhanpat Rai Pub.

ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

Course Code: EE-207-L Course Credits: 3.5 Mode: Lecture(L) and Tutorial(T) Type: Compulsory Contact Hours: 3 hours (L) + 01 hour (T) per week Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)**: Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answer type question. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: Basics of electrical engineering.

Objectives:

- To understand the basic concepts of measurement and measuring systems.
- To study detailed construction and working of various measuring instruments.

Course outcomes:

CO1. To impart the knowledge of fundamentals of measuring instruments and their characteristics.

CO2. Study of various types of instrumentation based on principle operation and measurements of various electrical quantities

CO3. Understand the working principle and construction of the measuring instruments like wattmeter, energy meter, power factor & frequency meter.

CO4. Measurement of inductance, capacitance & resistances with bridges & instruments.

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-II

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, Electro-dynamic Type, Moving iron type (attraction, repulsion & combined types), Hot wire type & Induction type, Electrostatic type Instruments.

Unit-III

Wattmeters & enegry meters : Construction, operating principle, Torque equation, Shape of scale, Errors, Advantages & Disadvantages of Electrodynamics & 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 & Electrodynamics 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 Equation, Circuit diagram, Phasor diagram, advantages, disadvantages, applications of Maxwell's inductance, inductance-capacitance, Hay's, Anderson,'s Owen's, De-Sauty's, Schering's & Wein's bridges, Shielding & Earthing.

REFERENCE BOOKS:

1. A Course in Electrical & Electronic Measurement & Instrumentation, A. K. Sawhney; Khanna Pub.
2. Electrical Measurements, E.W. Golding
3. Electronic & Elect. Measurement & Instrumentation by J.B.Gupta; Kataria & Sons.
4. Electronic Instrumentation & Measurement Technique, W.D.Cooper & A.D. Helfrick.
5. Measuring Systems, E.O. Doeblin; TMH.

NETWORK ANALYSIS AND SYNTHESIS LAB

Course Code: EE-203-P Course Credits: 1 Mode: Practical Type: Compulsory Contact Hours: 2 hours per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Internal continuous assessment of 30 marks on the basis of class performance and attendance in practical classes For the end semester practical examination the assessment will be done out of 70 marks by the external and internal examiners.

Prerequisite: Student should have introductory knowledge of basics of Electrical Engineering (EE-101-L).

Objectives:

- To verify and analyze the theoretical concepts of ac circuits, two port networks and filters.
- Calculations of Z, Y and ABCD parameter of two port networks and study of frequency response of various filters.

Course outcomes:

CO1. Ability to analyze transient response and determination of frequency & bandwidth of series AC circuit.
CO2. Calculation of Z, Y and ABCD parameter of two port Networks
CO3. Plot of frequency response of low and high pass filter and their analysis.
CO4. Ability to synthesize two port networks.

LIST OF EXPERIMENTS:

1. To study transient response of RC circuit.
2. To study 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.

ELECTRICAL MACHINES-1-Lab

Course Code: EE-205-P Course Credits: 1.5 Mode: Practical Type: Compulsory Contact Hours: 3 hours per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Internal continuous assessment of 30 marks on the basis of class performance and attendance in practical classes. For the end semester practical examination the assessment will be done out of 70 marks by the external and internal examiners.

Prerequisite: Student should have theoretical knowledge of electrical machines covered in Electrical Machines-I(EE-205-L).

Objectives:

- To select the range of apparatus based on the ratings of transformers and DC machines to be tested.
- To perform various tests on single phase transformers and DC machines, losses determination and evaluation of their performance.
- To learn various speed control methods of DC machines experimentally and hence the suitability for a particular application.

Course outcomes:

CO1. Ability to select the range of instruments based on the rating of transformer and DC machine to be tested

CO2. Evaluation of efficiency by finding the losses experimentally.

CO3. Conversion of three phase supply to two phase supply using Scott connection.

CO4. Study of various speed control methods of DC machines along with their suitability for specific application.

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.

ELECTRICAL MEASURMENTS & MEASURING INSTRUMENTS LAB

Course Code: EE-207-P Course Credits: 1 Mode: Practical Type: Compulsory Contact Hours: 2 hours per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Internal continuous assessment of 30 marks on the basis of class performance and attendance in practical classes. For the end semester practical examination the assessment will be don out of 70 marks by the external and internal examiners.

Prerequisite: Student should have introductory knowledge of electrical machines covered in basics of Electrica Engineering (EE-101-L).

Objectives:

- To Train the students in the field of measurements of various electrical quantities using suitable methods & instruments.
- To calibrate various instruments.

Course outcomes:

CO1. Exposure to various instruments and method to measure various electrical quantities.
CO2. Hands on experience to calibrate voltmeter ammeter and energy meter.
CO3. Study of two – wattmeter method experimentally and measurement of power in a three phase circuit.

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.

ELECTRICAL WORKSHOP

Course Code: EE-209-P
Course Credits: 1
Mode: Practical
Type: Compulsory
Contact Hours: 2 hours per week.
Examination Duration: 03 hours.

Course Assessment Methods (Internal: 30; External: 70) Internal continuous assessment of 30 marks on the basis of class performance and attendance in practical classes.

For the end semester practical examination the assessment will be done out of 70 marks by the external and internal examiners.

Prerequisite: Student should have introductory knowledge of home appliances and basics of electrical engineering.

Objectives:

- To provide sound knowledge to student of repairing of home appliances
- To understand various testing of home appliances and methods of wiring.

Course outcomes:

CO1. Acquire the knowledge about various types of wiring system, tools, wiring and lighting accessories.
CO2. Hand on experience of testing and repairing of home appliance.
CO3. Learning construction & principle of operation of various types of instruments & protective devices.
CO4. Ability to design and fabricate single phase transformer & PCB for a circuit.

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, electrodynamics & 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.

SKILLS AND INNOVATION LAB

Course Code: **EE-211** Course Credits: 0.0 Mode: Practical Contact Hours: 03 hours per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70):** This is a non-credit course of qualifying nature. Internal practical evaluation is to be done by the course coordinator. The end semester practical examination will be conducted jointly by external and internal examiners.

Prerequisite: Basic knowledge of Physics & Digital Electronics.

Objectives:

- Understand and identify research topics related to Electrical Engineering through brain storming sessions.
- Propose a novel idea/modified technique/new interpretation after identifying the existing research work.
- Devise specific identified issue/problem in the form of research objectives.
- Work in a group and communicate effectively the research topic though presentation and/or brain storming.

Course outcomes:

CO-1 Understand the research analysis of issues/problems on topics related to Electrical Engineering

CO-2 Understand the techniques and tools used for research analysis.

CO-3 Understand literature related to a research topic.

CO-4 Communicate effectively the research topic though presentation and/or brainstorming.

Lab Contents

A group of students are required to carry out a study related to current development and emerging trends in the field of Electrical Engineering. Each group of students will also try to improve their basic skills in their respective field. The students may use the equipment's/machines/instruments available in the labs/workshops with the due permission of Chairperson/Director on recommendation of the Course Coordinator.

The students in consultation with the course coordinator will decide the topic of the study. The study report will be submitted by group at the end of semester and will be evaluated by Course Coordinator

FUNDAMENTALS OF MANAGEMENT

Course Code: HUM-201-L Course Credits: 3.0 Mode: Lecture (L) and Tutorial (T) Type: Compulsory Contact Hours: 3 hours (L) + 0 hour (T) per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: The students should have basic understanding of the concept of management and business organizations.

Objectives:

- To enhance knowledge skills and attitude to Management.
- To understand management and its relationship with organisation.

Course outcomes:

CO-1 To develop the basic understanding of the concept of management and functions of management.
CO-2 the students will come to know about Human Resource management and Marketing management functions of management.
CO-3 Students will come to know about the production activities of any manufacturing organisations.
CO-4 To know that how finances are arranged and disbursed for all the activities of business organisations.

Unit-I

Concept of Management: Definitions, Characteristics, Significance, Practical Implications; Management Vs. Administration; Management- Art, Science and Profession; Development of Management Thoughts; Managerial Functions.

Unit-II

Concept of Human Resource Management: Human resource planning; Recruitment, Selection, Training and Development, Compensation; Concept of Marketing Management: Objectives and functions of Marketing, Marketing Research, Advertising, ConsumerBehaviour.

Unit-III

Concept of Production Management, Production Planning and Control, Material management, Inventory Control, Factory location and Production Layout.

Unit-IV

Concept of Financial Management, Capital Structure and various Sources of Finance, Working Capital, Short term and long term finances, Capital Budgeting.

REFERENCE BOOKS:

1. Marketing Management: S. A. Sherlikar; Himalaya Publishing House.
2. Financial Management: I.M. Pandey; Vikas Publishing House.
3. Production Management: B. S. Goel; Himalaya Publishing House.
4. Organisation and Management: R. D. Aggarwal; Tata McGraw Hill.
5. Principles and Practices of Management: R. S. Gupta, B. D. Sharma, N. S. Bhalla; Kalyani Publishers.

ELECTRICAL ENGINEERING MATERIALS AND SEMICONDUCTOR DEVICES

Course Code: EE-202-L Course Credits: 3.5 Mode: Lecture(L) and Tutorial(T) Type: Compulsory Contact Hours: 3 hours (L) + 01 hour (T) per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Two minor test each of 20 marks, class performance measured through percentage of lecture attend (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: Student should have introductory knowledge of atomic structure and properties of materials.

Objectives:

- Enhance the understanding of structural behavior of various types of electrical materials.
- Impart the thorough knowledge of the characteristics and hence applications of electrical materials.
- To learn about the characteristics of MOS devices and power devices.

Course outcomes:

CO1. Be able to apply core concepts of materials science to solve engineering problems.
CO2. Knowledge of dielectric and magnetic materials, their characteristics and applications.
CO3. Understanding of properties of semiconductor and construction of semiconductor devices.
CO4. Study of bipolar, MOS and power devices.

Unit-I

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

Unit-II

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

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

Unit-III

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

Construction and characteristics of devices:
Brief introduction to Planar Technology for device fabrication, metal -semiconductor junctions (ohmic and non-ohmic), breakdown mechanisms in p-n junction, zener diode, electrical and optical excitation in diodes, LED, solar cells and photo-detectors.

Unit-IV

Bipolar and MOS devices: BJT, UJT, JFET, MOSFETS
Power devices: Thyristor, Diac, Triac, GTO, IGBT, VMOS

REFERENCE BOOKS:

1. Electrical Engineering Materials: A.J. Dekker; PHI.
2. Electrical Engineering Materials: S.P Seth & P.V Gupta; Dhanpat Rai.
3. Solid State Electronic Devices: StreetMan & Banerjee; Pearson.
4. Electronic Devices & Circuits: Millman & Halkias; MGH.
5. Text Book of Power Electronics: H.C.Rai; Galgotia Publications.
6. Semiconductor devices: Jaspreet Singh; John Wiley.

TRANSMISSION AND DISTRIBUTION

Course Code: EE-204-L Course Credits: 3.5 Mode: Lecture (L) and Tutorial (T) Type: Compulsory Contact Hours: 3 hours (L) + 0 hour (T) per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Pre-requisite: Student should have foundation in basics of electrical engineering covering ac electrical circuits.

Objectives:

- To introduce the essentials of electric power systems.
- To provide a comprehensive overview of the terminology, electrical concepts, design considerations, construction practices and operational aspects of transmission and distribution systems.

Course outcomes:

CO1. Awareness of general structure power system, its growth in India and types of various supply systems.
CO2. Understanding of the mathematical modelling of transmission line and analyze the performance.
CO3. Inculcate the ability to analyze mechanical and electrical design aspects of transmission system
CO4. Exposure to underground cables and its comparison with overhead transmission lines

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

Underground 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.

REFERENCE BOOKS:

1. CL Wadhwa, Electric Power Sytems, Willey Eastern Ltd.
2. Gupta, Soni and Bhatnagar, A Course in Electrical Power: Dhanpat rai and sons
3. J.B.Gupta, A Course in Power Systems, S.K.Kataria and sons.
4. B.M.Weedy Electric power system:, John Wiley and sons.
5. S. N. Singh, , Electric Power Generation, Transmission and Distribution, Prentice Hall India
6. Luces M. Fualkenberry, Walter Coffer, Electrical Power Distribution and Transmission, Pearson Education

DIGITAL ELECTRONICS

Course Code: EE-206-L Course Credits: 3.5 Mode: Lecture (L) and Tutorial (T) Type: Compulsory Contact Hours: 3 hours (L) + 0 hour (T) per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: Student should have foundation in basics of electronics engineering.

Objectives:

- To understand fundamentals of digital electronic circuits and Binary codes
- To design basic circuits using Gates, Synchronous and Asynchronous sequential circuits A/D and D/A convertors.
- To aware the students about the advances in digital electronics.

Course outcomes:

CO1. Learning of basics of digital electronics
CO2. Ability to design simple combinational circuits using logic gates, multiplexers and decoders.
CO3. Understanding of designing combinational circuits and sequential circuits for real world problem.
CO4. Ability to design any digital system using digital ICs.

Unit-I

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-II

Combinational design using gates: Design using gates, karnaugh map and quine mcluskey 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-III

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-IV

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.

REFERENCE BOOKS:

1. Modern Digital Electronics (Edition III) : R. P. Jain; TM
2. Digital Integrated Electronics: Taub & Schilling; MGH
3. Digital Principles and Applications: Malvino & Leach; McGraw Hill.
4. Digital Design: Morris Mano; PHI.

CONTROL SYSTEM

Course Code: EE-208-L Course Credits: 3.5 Mode: Lecture(L) and Tutorial(T) Type: Compulsory Contact Hours: 3 hours (L) + 01 hour (T) per week Examination Duration: 03 hours	**Course Assessment Methods (Internal: 30; External: 70)** Two minor test each of 20 marks, class performance measured through percentage of lecture attend (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: Student should have prior knowledge of Network Analysis and Synthesis.

Objectives:

- To teach the fundamental concepts of Control systems and mathematical modeling of the System.
- To study the concept of time response and frequency response of the system
- To teach the basics of stability analysis of the system

Course outcomes:

CO1. Ability to develop mathematical model of physical systems and hence their designing

CO2. Ability to analyze the characteristics of closed-loop control systems, including steady-state and transient response, sensitivity and determination of errors and stability.

CO3. The students will be able to understand basic control system design methods, including root locus diagrams and frequency response methods.

CO4. Introduction to the basic concepts of proportional, integral, and derivative (PID) control and compensators and learning to design compensation circuits.

CO5. Determination of observability and controllability applying state variable analysis technique to state model of linear continuous time system

Unit-I

Introduction: Control system-open loop & closed loop, servomechanism.
Mathematical models of physical systems: Differential equation of physical systems, transfer function, blocks diagram algebra, signal flow-graphs, Mason's formula & its application.
Feedback characteristics of control systems: Feedback and non-feedback systems, Effects of feedback on sensitivity (to parameter variations), stability, overall gain etc.

Unit-II

Time response analysis: Standard test signals, time response of first order and second order systems, steady-state errors and error constants, design specification of second-order-systems.
Stability: The concept of stability, necessary conditions for stability, Hurwitz stability criterion, Routh stability criterion, Relative stability analysis.
The root locus technique: The Root locus concept, construction /development of root loci for various systems, stability considerations.

Unit-III

Frequency response & stability analysis: Correlation between time and frequency response, Polar Plots, Nyquist plots, Bode Plots, Nyquist stability criterion, Gain margin & Phase margin, relative stability using Nyquist Criterion, frequency response specifications.

Unit-IV

Compensation of control systems: Necessity of compensation, Phase lag compensation, phase lead compensation, phase lag lead compensation, feedback compensation.

State variable analysis: Concept of state, state variable and state model, state models for linear continuous time systems, diagonalization solution of state equations, concept of controllability and observability.

Control components: Working principle of synchronous, ac & dc tacho-generators, servomotors, magnetic amplifier, Stepper motor.

REFERENCE BOOKS:

1. Control System Engg: I.J. Nagrath & M. Gopal, New Age India.
2. Control Systems: R.S. Chauhan, Umesh Pub.
3. Automatic Control Systems: B.C. Kuo, PHI.
4. Modern Control Engg: K.Ogata; PHI.

ELECTRICAL MACHINES-11

Course Code: EE-210-L Course Credits: 3.5 Mode: Lecture (L) and Tutorial (T) Type: Compulsory Contact Hours: 3 hours (L) + 1 hour (T) per week. Examination Duration: 03 hours.	**Course AssessmentMethods (Internal: 30; External: 70)** Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Prerequisite: Student should have introductory knowledge of electrical machines covered in basics of Electrical Engineering (EE-101-L) and Electrical machines-II (EE-207-L).

Objectives:

- To provide sound knowledge of principle of operations, constructional features, and characteristics of 3- ϕ induction motors, 1- ϕ induction motors and synchronous machines.
- To understand various tests, characteristics determination and analysis of performance of these machines

Course outcomes:

CO1. In depth knowledge of induction machines that includes construction, principle of operation as motor and generator, testing and speed control.

CO2. Study of 1- ϕ induction motors and polyphase AC Commutator machines

CO3. In depth study that includes construction, principle of operation as generator and motor, testing and speed control of synchronous machines

CO4. Clear understanding of parallel operation of alternators, synchronization and load division

Unit –I

Induction machines:
Constructional features, production of torque, phasor diagram, equivalent circuit, performance analysis, torque slip characteristics, Testing: running light and blocked rotor test, load test, effect of rotor resistance, deep bar and double cage induction motor, Starting: starting methods of squirrel cage and wound rotor induction motor, Speed control: various methods of speed control of squirrel cage and wound rotor induction motor, effect of space harmonics, Generator operation.

Unit –II

Signal phase induction motors:
Constructional features double revolving field theory, equivalent circuit, determination of parameters, split phase starting methods & applications.

Polyphase AC Commutator Machines: Effect of voltage injection in rotor circuit of slip ring induction motor by auxiliary Commutator machines, Kramers & scherbius arrangement, principle and operation of doubly fed Commutator motor and schrage motor.

Unit –III

Synchronous generator:
Constructional features, Cylindrical rotor machine, Generated emf, circuit model and phasor diagram, armature reaction, synchronous impedance, voltage regulation and different methods for its estimation, Salient pole machine: Two reaction theory, analysis of phasor diagram, power angle characteristics, determination of x_d and x_q

Unit –IV

Parallel operation of alternators: Synchronization and load division.
Synchronous motor: Operating principle, circuit model, phasor diagram, effect of load, Operating characteristics of synchronous machines, V-curves, Inverted V- curves, starting methods and applications of synchronous motors.

REFERENCE BOOKS:

1. P. .S Bhimbra "Electric Machines" Khanna Publishers.
2. I. J. Nagrath & D.P. Kothari "Electric Machines" TMH
3. R. K. Rajput, "Electric Machines", Laxmi Publications
4. B. L. Theraja, A. K. Theraja, "Electrical Technology-vol. II-AC DC machines", S. Chand
5. Fitzgerald & Kingsley "Electric Machinery" MGH
6. E.O.Taylor, " Theory, Performance & design of AC commutator machines", WP
7. A.S. Langsdorf , "Theory of alternating current machinery", TMH.
8. Ashfaq Hussain, Electric Machines, Dhanpat Rai
9. P. K. Mukherjee and S. Chakravorty, "Electrical Machines", Dhanpat Rai Pub.

POWER SYSTEM - I LAB

Course Code: EE-204-P
Course Credits: 1
Mode: Practical
Type: Compulsory
Contact Hours: 2 hours per week,
Examination Duration: 03 hours.

Course Assessment Methods (Internal: 30; External: 70): Internal continuous assessment of 30 marks on the basis of class performance and attendance in practical classes.

For the end semester practical examination the assessment will be done out of 70 marks by the external and internal examiners.

Prerequisite: Theoretical knowledge of the subjects transmission and distribution, and materials

Objectives:

- To provide understanding of dielectric properties of insulating materials
- To understand and verify characteristics and performance analysis of transmission lines and relays.
- To provide hands on experience of parallel operation and synchronization of alternators.

Course outcomes:

CO1. Measurements of dielectric strength of transformer oil and string efficiency of string insulator.
CO2. Study of power angle characteristics and ABCD apparatus determination of transmission line.
CO3. Learning of synchronization and parallel operation of alternators.
CO4. Study and plot the characteristics of differential and IDMT static relay.
CO5. Ability to test and calibrate energy meter and C.T.

List of Experiments:

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

DIGITAL ELECTRONICS LAB

Course Code: EE-206-P Course Credits: 1 Mode: Practical Type: Compulsory Contact Hours: 2 hours per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Internal continuous assessment of 30 marks on the basis of class performance and attendance in practical classes. For the end semester practical examination the assessment will be done out of 70 marks by the external and internal examiners.

Pre-requisite: Student should have foundation in basics of electronics engineering.

Objectives:

- To understand fundamentals of digital electronic circuits and Binary codes
- To design basic circuits using Gates, Synchronous and Asynchronous sequential circuits A/D and D/A convertors.
- To aware the students about the advances in digital electronics.

Course outcomes:

CO1. Learning of basics of digital electronics

CO2. Ability to design simple combinational circuits using logic gates, multiplexers and decoders.

CO3. Understanding of designing combinational and sequential circuits for real world problems.

CO4. Ability to design any digital system using digital ICs.

List of Experiments:

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. Design & realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer & De-multiplexer.
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.

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CONTROL SYSTEM LAB.

Course Code: EE-208-P Course Credits: 1 Mode: Practical Type: Compulsory Contact Hours: 2 hours per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Internal continuous assessment of 30 marks on the basis of class performance and attendance in practical classes. For the end semester practical examination the assessment will be done out of 70 marks by the external and internal examiners.

requisite: Student should have introductory knowledge of electrical Network analysis & synthesis and basics of Electrical Engineering (EE-101-L).

ctives:

- The aim to the course is to provide the students hand-on experience on behavior of various control D.C. system.
- The students will be familiarized with operation of servo motor and impact of system parameters
- To develop the ability to model and implement basic control systems

rse outcomes:

01. Comprehensive study of various control systems experimentally
02. Ability to design implement P, PI, and PID controllers
03. Experimental study of DC motor speed control
04. To familiarize with operation, characteristics and control of stepper motor with microprocessor.

ist of Experiments:

1. Experiment to study D.C. Position control system.
2. Experiment to study linear system simulator.
3. Experiment to study light intensity control using P & PI controller with provision for disturbance and transient speed control.
4. Experiment to study D.C motor speed control.
5. Experiment to study the stepper motor characteristics and its control through microprocessor kit.
6. Experiment to study Temperature control system..
7. Experiment to study Compensation design.
8. Experiment to study relay control system.
9. Experiment to study Potentials Metric Error detector.
10. Experiment to study SC Position control system.
11. Experiment to study Synchros.

ELECTRICAL MACHINES-II-Lab

Course Code: EE-210-P Course Credits: 1.5 Mode: Practical session Type: Compulsory Contact Hours: 3 hours per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Internal continuous assessment of 30 marks on the basis of class performance and attendance in practical classes. For the end semester practical examination the assessment will be done out of 70 marks by the external and internal examiners.

quisite: Student should have theoretical knowledge of electrical machines covered in Electrical Machines-II (EE-210-L).

ctives:

- To perform various tests on of 3- ϕ induction motors, 1- ϕ induction motors and synchronous machines, parameters and losses determination to evaluate their characteristics and performances.
- To provide the knowledge of parallel operation of alternators for load sharing.

se outcomes:

CO1. Evaluation of efficiency by finding the losses experimentally from direct load, open circuit and short circuit tests of 3- ϕ induction motors.
CO2. Enable to calculate voltage regulation of alternators by synchronous impedance and ZPF methods.
CO3. Understanding of parallel operation of alternators for load sharing.
CO4. Determination of V-curves and its analysis

of Experiments:

1. To determine the 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 determine the efficiency of induction motor.
3. To perform light running and block rotor test on a 1-phase induction motor and 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 of alternator 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.
   i. Determination of Xo of a synchronous machine.
   ii. Measurement Xd' + Xq' (Direct axis and Quardiantant axis).
8. To measure Xq 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 induction motor..
11. To study the parallel operation of synchronous generators.

PERSONALITY DEVELOPMENT

Course Code: PSY-201-L **Course Credit:** 0.0 **Contact Hours:** 03hrs/week **Mode:** Lectures (L-2;T-01) **Examination Duration:** 3 Hours	**Course Assessment Methods (Internal: 30; External: 70)** Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Objectives:

- Holistic development of the students.
- Make the students to understand self and personality through the interactive task based sessions.
- To develop the life skills required to lead an effective personal and professional life.

Expected outcomes:

CO-1 Understand the concept of self and personality.

CO-2 Develop the life skills required to lead an effective personal and professional life.

Unit-I

Understanding the concept of self, Self-Esteem, Characteristics of individuals with high and low self-esteem. Self-Confidence, Strategies of building self-confidence. Case Study.

Unit-II

Understanding Personality, Factors affecting Personality: Biological, Psychological Social, Theories of Personality: Freud, Allport.
Personality Assessment- Neo-Big Five Personality Test; T.A.T

Unit-III

Stress: Causes of Stress and its impact, Strategies of stress management.

Case study.

Unit-IV

Emotional Intelligence: Concept, emotional quotient why Emotional Intelligence matters, Measuring EQ, *Developing healthy emotions.*

Management of anger and interpersonal relations, Case study.

TEXT BOOKS:

1. Burger, J.M. (1990), Personality, Wardsworth: California.
2. Hall C.S.,Lindzey, G.(1978), Theories of Personality, New York: Wiley Eastern Limited.
3. Morgan, C.T.King R.A. Weisz, J.R., and Schopler, J. (1987), Introduction to Psychology, Singapore: McGraw Hill.
4. Byronb. D., and Kalley, N. (1961). Introduction to Personality: Prentice Hall.
5. Taylor,S.E., (2009). Health Psychology (9th Ed). New Delhi: Tata McGraw-Hill Publishing Company Ltd