SYLLABUS SCHEME OF COURSE FOR B.E ELECTRICAL 3 RD SEMESTER

S.no	Course Code	Course	Marks Allotted				Total	Lecture per Week			Credits
			Theory	Practical External	Sessional	Practical (Internal)		L	T	P	
1.	ELE-301	Principles of Electrical Engg.	100/61	-------	25/19	---------	125	2	1	0	3
2.	ELE-302P	Principles of Electrical Engg. Lab	-------	35/21	--------	15/11	50	----	--	2	2
3.	ECE-301	Network Analysis	100/46	-------	25/15	--------	125	2	1	0	3
4.	ECE-302P	Network Analysis Lab	------	35/25	-----	15/11	50	----	--	2	2
5.	ECE-303	Electronics-I	100/45	-------	25/20	-----	125	3	1	--	4
6.	ECE-304P	Electronics –I lab	------	35/25	--------	15/11	50	----	--	2	2
7.	ECE-305	Electromagnetic Fields & Waves	100/46	------	25/20	-------	125	2	1	0	3
8.	ECE-306	Electrical Engineering Materials	100/62	-----	25/20	--------	125	2	1	0	3
9.	MTH-307	Mathematics -III	100/66	-----	25/16	-------	125	2	1	0	3
10.	ELE-303P	Electrical Workshop	-----	35/28	-------	15/12	50	----	--	3	
11.	ELE-308	Extra curricular Activity	------	-----	50/40	-----	50	---	--	2	2
	TOTAL		600	105	250	45	1000	13	6	8	27

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3rd Semester Syllabus

Principles of Electrical Engg. Course code: ELE-301

UNIT-I

Electric Circuit Laws: Basic electric circuit terminology, Ohm's law, Kirchhoff's current law. (KCL) and Kirchhoff's voltage law (KVL) circuit parameters (Resistance, Inductance and capacitance). Series and Parallel combinations of resistance, Inductance and capacitance, Nodal analysis.

UNIT-II

Energy Source: Ideal and practical voltage and current sources and their transformation. Dependent voltage sources and dependent current sources.

UNIT-III

D.C. Circuit Analysis: Power and energy relations, Analysis of series parallel D.C circuits, Delta star (Y) Transformation, Loop and Nodal methods, Thevinin's, Norton's theorem, Maximum Power transfer theorem, Superposition theorem.

UNIT-IV

A.C. Circuit Analysis: Basic terminology and definitions, Phasor and complex number representations, solutions of

sinusoidal excited, RC circuits, power and energy relations in a c circuits, Applications of network theorems to a.c. circuits, Resonance in series and parallel circuits.

UNIT-V

Steady State A.C. Three phase Circuits: Concept of a 3 phase voltage, wye (Y -) circuits. Delta circuits, current and voltage relations in Y and delta Circuits, characteristics of 3 phase systems.

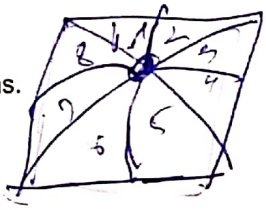
Books Recommended

- Electrical Engineering Principles by Vincent Deltoro, PHI Ltd
- Engineering Circuit Analysis by William H. Hayt & Kemmerly, McGraw- Hill Book Company

3rd Semester Syllabus

Principles of Electrical Engineering lab **Course code: ELE-302P**

1. To study the color coding of resistors
2. Connection of Ammeter, Voltmeter, Wattmeter and multi-meter in DC and AC circuits and selection of their ranges.
3. Use of LCR Q meter.
4. To study the series/parallel operation of resistors and verifying their effective values by LCR Q meter.
5. To verify the KVL and KCL in DC circuits.
6. To verify the star delta transformation of networks.
7. To verify the superposition theorem.
8. To verify the maximum power transfer theorem
9. Basic R, L, C circuits excited from A.C
10. To measure electric power in single-phase AC circuits with resistive load, RL load and RLC load.
11. To measure the power and power factor in three phase AC circuits.
12. To study the series resonance.
13. To study the parallel resonance.
14. To study the handling of CRO and use it for the study of different voltage waveforms.
15. Computer Aided Circuit Analysis (3 experiments)



3rd Semester Syllabus

Network Analysis **Course code: ECE-301**

UNIT-I

Development of the circuit Concepts: Charge and energy, capacitance, inductance and resistance parameters in the light of field and circuit concepts. Approximate realization of a physical system as a circuit. Reference directions for currents and voltages, conventions for magnetically coupled circuits, Circuit topology

UNIT-II

First order differential equation: Differential equations as applied in solving networks. Application of initial conditions. Evaluating initial conditions in networks.

UNIT-III

Wave form analysis and Laplace Transform; The unit step, ramp and impulse functions and Laplace transforms. Solution of network problems with Laplace transformation.Heavisides expansion theorem. Initial and final value theorem, Convolution integral, convolution as summation.

UNIT-IV

Network theorems and impedance functions: Complex frequency, transformer impedance and transform circuits, series and parallel combination of elements. Fosters reactance theorem and reciprocity theorem.

UNIT-V

Network Functions – Poles and Zeros: Ports of terminal pairs. Network functions for one port and two port network (ladder and general networks). Poles and zeros of network functions. Restriction on Pole and zero locations for driving point and transfer functions. Time domain behavior from pole zero plot.

UNIT-VI

Two port parameters: Relationship between two-port parameters. Admittance, impedance, transmission and hybrid parameters. Relationship between parameter sets. Parallel connection of two port Networks. Characteristic impedance of two port networks

UNIT-VII

Filters Filter fundamentals - pass & stop band, filter classification, constant-k and m-derived Filters. Behavior of Characteristic impedance over pass and stop bands Design of filters

Books Recommended

- Network Analysis by Van Valkenberg, IPH Ltd
- Network Analysis & Synthesis by F. Kuo
- Network Analysis by Ganesh Rao, Sanguine Technical Publisher

3rd Semester Syllabus

Network Analysis Lab **Course code: ECE-302P**

1. Study of CRO measurement of voltage frequency and phase of a given waveform.
2. To assemble RC circuit and observe its performance in low-pass and High-pass mode.
3. To assemble a series and parallel resonant circuit and observe their frequency response.
4. To measure impedance and band-width of a parallel tuned circuit and obtain its quality.
5. To measure characteristic impedance of symmetrical Tee and Pi networks.
6. To measure image impedance of a given asymmetrical T/Pi network.
7. For a given two port network measure ABCD parameters and H parameters.

3rd Semester Syllabus

Electronics I **Course code: ECE-303**

UNIT-I

Introduction to Semiconductors: Intrinsic and extrinsic semiconductors transport mechanism of charge carriers, electric properties, Hall effect etc. Electronic Devices, their characteristics and applications.

UNIT-II

P-N junction diode: Current components in p-n junction, characteristics-piece wise linear approximation, temperature dependence, Diode capacitance, and switching times, diode circuits' half wave, full wave rectifiers, clipping circuits etc. Basic operations of Zener, avalanche, schotky photo and tunnel diodes.

UNIT-III

BJT's: Types operation and characteristics, Ebers-Moll model, CE, CB and CC configuration input, output characteristics and graphical analysis of basic amplifier circuits. Biasing and Bias stability, Low frequency, h-parameter model. Analysis and Design of transistor amplifier circuits using h-parameters.

UNIT-IV

FET's: Operation and characteristics, model Application at low and high frequency, amplifiers, switching circuits, MOSFET types, Operation and characteristics.

References:

- Integrated Electronics by J. Millman& C. Halkias
- Microelectronics by Sedra & Smith
- Electronic Circuits by D. Schelling &Belove.
- Electronic Devices & Circuits by R. Boylestad

3rd Semester Syllabus

Electronics-I Lab **Course code: ECE-304P**

1. To obtain diode characteristics.
2. To assemble and observe the waveforms of half wave and full-wave rectifiers.
3. To obtain zener diode characteristics and to use zener diode as voltage regulator.
4. To observe the waveforms of different clipping and clamping circuits.
5. To obtain the characteristics of common emitter configuration & common base configuration
6. To obtain the frequency response of RC coupled CE amplifier.
7. To obtain characteristics of FET
8. To study the use of FET as an amplifier
9. To study the use of BJT & FET as switching devices.

3rd Semester Syllabus

Electromagnetic Fields and Waves **Course code: ECE-305**

UNIT-I

Coordinate systems and transformation:

Cartesian coordinates, Circular Cylindrical coordinates, spherical coordinates

UNIT-II

Vector calculus:

Differential length, area and volume, line surface and Volume integrals, del operator, gradient of a scalar, divergence of a vector and divergence theorem, curl of a vector and Stokes theorem

UNIT-III

Electrostatics:

Electrostatic fields, Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses' Law – Maxwell's equation, Electric dipole and flux lines, energy density In electrostatic fields.

UNIT-IV

Magneto statics:

Magneto-static fields, Biot-Savart's Law, Ampere's circuit law, application of ampere's law, magnetic flux density, Torque & Magnetic Moment, Flux through a closed circuit, Self & Mutual inductance.

UNIT-V

Waves and applications:

Polarization, EM waves in conductors, Depth of penetration, Sky wave propagation

Text Book:

- M. N. O. Sadiku, "Elements of Electromagnetic", 4 Ed, Oxford University Press.

Reference Books:

- W. H. Hayt and J. A. Buck, "Electromagnetic field theory", 7th Ed., TMH.
- Introduction to Electrodynamics by David J Griffth, Prentice Hall

3rd Semester Syllabus

Electrical Engineering Materials **Course code.ECE-306**

UNIT-I:

CRYSTAL STRUCTURE

Crystal Structure Crystalline state, Bravais lattices, Miller indices, reciprocal lattice, common crystal structures, interference phenomenon, Bragg's diffraction, crystal imperfections.

UNIT-II:

Free electron theory.

Free electron theory, Growth of single crystals, zone refining technique.

UNIT-III:

CONDUCTION.

Conduction in metals and alloys, conductors and resistors. Semiconductors, their properties and applications. Superconductivity and superconductors.

UNIT-IV:

MAGNETISM.

Magnetism: Magnetic properties of materials, diamagnetism, para-magnetism, ferromagnetism, domain dimensions, anti ferromagnetism, and ferromagnetism, ferrites and other magnetic materials.

UNIT-V:

Dielectric materials

Dielectric materials, , polarization in static and alter field, piezoelectricity, polarizability and dielectric constant, optical transition in solids, absorption emission and radiation.

UNIT-VI:

SPECIAL PURPOSE MATERIALS

Materials for resistors, capacitors and inductors, properties and application of plastic materials

Books Recommended

- Introduction to Solid State physics by Kittle
- Solid state Physics by Dekker
- Physical Met. Principles by Reed hill
- Material Science and Engineering by Raghavan
- Electronic Processes in Materials by Azaroff.

3rd Semester Syllabus

Mathematics III **Course code. MTH-307**

UNIT –I

Definition of Laplace transformation, Laplace transformation of some elementary functions. Sectional or piecewise Continuity. Functions of exponential order. Sufficient conditions for existence of Laplace transforms. some important properties of Laplace transformation.

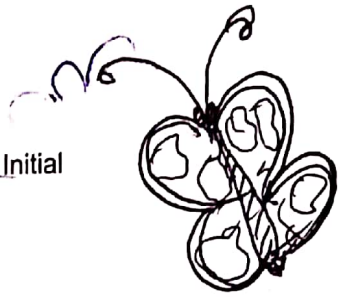
UNIT –II

Definition of inverse Laplace transform, lerch's theorem (*statement only). Some important properties of inverse Laplace – transforms.

UNIT III

FOURIER TRANSFORM

Fourier integral transform, Fourier sine and cosine theorems and their inverse.



UNIT IV

Z- Transform:

Definition, Linearity property, Z- transform of elementary functions, shifting theorems, Initial And Final value theorem. Convolution theorem. Inversion of Z-transforms.

Reference books.

- Lapalace transforms by Murray R.Spiegel, Ph.d. (Schaum's Outlines)
- Lapalace transformation by M.L Khanna
- Lapalace transformation by Dr J.S Bindra and K.S. GILL

3rd Semester Syllabus

ELECTRICAL WORKSHOP **Course Code ELE-303P**

UNIT-I

Brief description of wires and cables: Types of wires and cables, grade of wires. Size of wires, Allowable voltage drops in different electric circuits, Allowable maximum temperature-rise in wires or cables, study of gauge, diameter and cross-sectional area of wires and determination of their current-carrying capacity (as per the Indian Standards institution (I.S.I.), use of gauge meter to find the size (dia, & gauge no and area) of wires, comparison between solid conductor and stranded conductor-Exercise.

UNIT-II

Wiring Accessories: Different types of switches, sockets, fuses, Lamp holders, wall plugs, power distribution boards, bus bars, Thimbles, etc. and their use in practice exercises. Points to be observed while taking up wiring, cleat wiring, casing wiring, looping in system of wiring, conduit wiring, concealed wiring, Metal sheathed wiring or lead covered wiring, C.T.S. or T.R.S wiring, Joints in cables, Design of all the wiring systems for different uses exercise.

UNIT-III

Earthing. Why an electrical installation is earthed, earth plate or electrode, Distance of Earth pit from a building, Different types of earthings, the appliances to be earthed, earth leakage trip or circuit breaker. Electric shock, causes of electric shock, precautions to be taken while working on an electric line, treatment of electric shock exercise.

UNIT-IV

Electrical Appliances:- Electric bells, Electric Heater, classification of lamps (brief description), How to connect and use a fluorescent lamp, Lean, lamp, Industrial lamps, street lighting lamps and different kinds of fixtures.

UNIT-V

Faults in wiring system and their remedies: Lamp does not light up, over bright or under bright lamp, excessive heating in the wiring systems, Leakage in the wiring system, defect in the fluorescent lamp circuits and corresponding remedies.

Books Recommended: Electric Wiring by Samuddar.

Syllabus SCHEME OF COURSE FOR B.E ELECTRICAL 4th SEMESTER

S.no	Course Code	Course	Marks Allotted				Total	Lect. per week			Credits
			Theory	Practical External	Sessional	Practical Internal		L	T	P	
1.	ELE-401	Electrical Machines I	100 72	-------	25/24	---------	125	2	1	0	3
2.	ELE-402P	Electrical Machines I Lab	-------	35/23	--------	15/13	50	----	---	2	2
3.	ELE-403	Control Systems -I	100 74	-------	25/24	--------	125	2	1	0	3
4.	ELE-404P	Control Systems I Lab	------	35/31	-----	15/12	50	----	----	2	2
5	ECE-401	Electronics-II	100/78	-------	25/23	-----	125	2	1	--	3
6.	ECE-402P	Electronics-II Lab	------	35/23	-----	15/13	50	----	----	2	2
7.	ECE-403	Digital Electronics Logic Design	100/66	-----	25/21	--------	125	2	1	0	3
8.	ECE-404P	Digital Electronics Logic Design Lab	------	35/26	-----	15/11	50	----	----	2	2
9.	ECE-405	Signals and Systems	100/66	-----	25/19	--------	125	3	1	0	4
10.	ECE-406P	Signals and Systems lab	------	35/31	-----	15/13	50	----	----	2	2
11.	MTH-402	Mathematics-IV	100/60	-----	25/15	--------	125	3	1	0	4
	TOTAL		600	175	150	75	1000/738	13	7	10	30

4th Semester Syllabus

ELECTRICAL MACHINES –I **Course code: ELE-401**

UNIT-I

Transformers

Single Phase Transformers, Introduction, classification, construction, Electromotive force, E.m.f. Equation, Equivalent circuit model, Phasor diagrams, Losses and efficiency, Voltage regulation, Transformer tests (polarity test, open circuit test and short circuit test), All day efficiency, Frequency response, Parallel operation, Auto-transformers, Excitation phenomenon in transformers Three Phase Transformers Construction, Connections, Open delta, Ratings, Phase Conversions Special Purpose Transformers Impedance matching transformers, Isolation transformers, constant current and constant voltage Transformers, Instrument Transformers (Introduction)

UNIT-II

Direct current Machines: Generators and Motors.

General introduction, principles of operation of D.C machines, construction of D.C machines (Generators and motors), e.m.f and torque equations, power stages and efficiency, commutation and armature reaction, characteristics of D.C Generators, parallel operation, torque and speed of D.C Motors, characteristics of various types of D.C motors, speed control of D.C motors, starting and electric braking.

UNIT-III

Selection of D. C. Motors for various Applications

Electric drives, characteristics of electric drives, selection of D. C. motors for domestic, commercial and industrial

applications.

Books Recommended

- Electric Machines by Nagrath and Kothari
- Electric Machinery Fundamentals by Chapman
- Electric machinery and Transformers by Irving Kosow

4th Semester Syllabus

ELECTRICAL MACHINES LABORATORY-I **Course code: ELE-402P**

Experiments on Transformers

1. To perform open circuit and short circuit tests on a single-phase transformer
2. To perform polarity test on a single phase transformer
3. To determine the efficiency and voltage regulation of a single phase transformer
4. To perform Sumpner's test on two identical transformers
5. To study three phase connections on a bank of three single phase transformers
6. Draw the magnetization characteristics (E vs I_f) of DC generator.
7. Draw load circuit characteristics (V vs. I_L) of shunt generator.
8. Draw load circuit characteristics (V vs. I_L) of series generator.
9. Draw the load characteristics of DC compound generator
10. Draw the speed Vs armature current characteristics of DC shunt motor.
11. To study speed control of a dc separately excited motor by:-
    (i)Armature Resistance Control
    (ii)Field Control

Nyquist Plot
Bode
Pole
Nichols Chart
Relative Stability
PID Controller.

4th Semester Syllabus

Control Systems-I **Course code. ELE-403**

UNIT-I

Introduction to linear Control System: Control Systems, types of control systems, feedback and its effects, transfer functions, mathematical modeling of physical systems.

UNIT-II

System Representations: Block diagrams, signal flow graphs,
Time Domain Analysis of Control Systems. Typical test signals for time response of control systems, time domain performance of first and second order control systems (steady state response and transient response), P I D Controllers.

UNIT-III

Stability of Control Systems: Stability characteristic equation, stability of linear time invariant systems, Routh-Hurwitz Criterion, Root locus plot. Relat

UNIT-IV

Frequency Domain Analysis of Control Systems: Frequency domain characteristics second order systems relative stability, polar and Bode plot representation of loop gains of control systems, Nyquist plots. Graphical methods of determining gain margin and phase margin, Nichols chart.

Books Recommended

- Modern Control Engineering by K. Ogatta
- Automatic Control Systems by B. C. Kuo
- Control Systems by Normans Nise, Willey Publications

4th Semester Syllabus

Control System Lab-I **Course code. ELE-404P**

List of experiments

1. To study the performance of relay control combination of PI AND PID control schemes in a typical thermal scheme.
2. To study the role of feedback in a DC speed control system
3. To generate the response of a LTI system with standard signals
4. To study the series,parallel and feedback analysis using Matlab
5. To study the time domain characteristics of first and second order system using Matlab
6. To study the stability of a LTI system using Matlab (Root locus, Bode Plot, Pole Zero plot, Nyquist Plot

4th Semester Syllabus

Course Code.ECE-401

Electronics II

UNIT-I

Feedback Basics: Negative feedback, Effect of negative feedback on the performance of amplifiers e.g. on bandwidth. Types of feedback amplifiers, current shunt, current series, voltage shunt, and voltage series feedback. Analysis of feedback amplifiers circuits.

UNIT-II

Sinusoidal Oscillators: Basic operations, analysis of general oscillator circuit, Barkhausen's criteria, various types of oscillator circuits and their analysis, Design of practical oscillator circuits.

UNIT-III

Operational Amplifiers: Operational amplifiers stages, Differential amplifier, CMRR, Ideal and practical operational amplifier, characteristics and properties. OP-AMP as Inverting and Non-inverting amplifier, Linear Applications, Difference amplifier, Integrator and Differentiator, Instrumentation Amplifier, Precision Rectifiers. OP-AMP in analog computation. Non-linear Applications, OP-AMP Comparator, Schmitt Trigger, Sample & Hold Circuit, Active Filters, Frequency response of OP-AMP, Gain Bandwidth product, Slew rate, Signal to noise ratio.

UNIT-IV

Multivibrators and Wave Form Generators: Bistablemultivibrators, Bistable circuit as a memory element, Generation of Square & Triangular waves using Astablemultivibrator, Generation of the standard Pulse-The Monostablemultivibrator, Integrated circuit Timers, Implementation of Astable&Monostablemultivibrators using 555 Timer.

UNIT-V

Power Amplifiers and Power Supplies: Classification of power amplifiers, Class A, Class B, Class AB and Class C power amplifiers; analysis and design.

Books Recommended

- Integrated Electronics by J. Millman& C. Halkias
- Microelectronics by Sedra& Smith
- Electronic Circuits by D. Schelling & Belove.
- Electronic Devices & Circuits by R. Boylestad

4th Semester Syllabus

Course code.E-402P

Electronic Circuits-II LAB

1. To assemble current series feedback amplifier and study its performance.
2. To assemble a voltage shunt feedback amplifier and study its performance.
3. To assemble an RC phase shift oscillator.
4. To assemble a differential amplifier and obtain its CMRR.
5. To study different applications of OPAMPS.
   - (i) OP-AMP as an inverting amplifier.
   - (ii) OPAMP as a non inverting amplifier
   - (iii) OPAMP as an integrator
   - (iv) OPAMP as a differentiator
6. Obtain frequency response of an OP-AMP & hence find its bandwidth.
7. Study performance of multivibrator circuits using 555 chip in following modes:
   - (i) Bistable
   - (ii) Monostable
8. Design and verify practically performance of power amplifiers:
   - (i) Class A
   - (ii) Class C

4th Semester Syllabus

Digital Electronics and Logic Design **Course code: ECE-403**

1. Review of Binary, octal and hexadecimal number systems. Various types of codes.
2. Boolean algebra and Boolean theorems.
3. Logic gates and implementation of Boolean functions with various types of logic gates. Circuit equivalence.
4. Simplification techniques and minimization by K- map methods.

5. Combination logic and arithmetic circuits. Encoders and Decoders, Multiplexes and De multiplexes.
6. Sequential circuits – state diagrams and state tables, design and analysis of flip flops, registers, counters, Synchronous and Asynchronous operation of sequential circuits. Analog to Digital converter, Digital to Analog converter.
7. Latches and memory organizations. ROM's, EPROM's and RAM's Dynamic and Static.
8. Introduction to PLA's

Books Recommended

- Digital Logic & Computer Design by M. M. Mano
- Digital principles and applications by A. P. Malvino
- Switching Circuits by Marcus
- Digital Electronics By Floyd, Pearson Education
- Digital Electronics By Ronald J Tocci, McGraw-Hill publication

4th Semester Syllabus

Digital Electronics and Logic Design LAB **Course code. ECE-404P**

1. To verify the truth table of following logic gates:
   (i)AND OR and NOT
   (ii)NAND, NOR, XOR and XNOR
2. To implement XOR and XNOR using universal logic gates.
3. To verify De Morgan's law using logic gates.
4. To design and realize:-
   (i)Half adder and verify its truth table.
   (ii)Full adder and verify its truth table.
5. To design a multiplexer/de multiplexer using two input NAND gates
6. To design a Mod-10 counter.
7. Design and realize the following flip flops using logic gates.
   (i)RS flip flop
   (ii)JK flip flop
   (iii)D flip flop
   (iv)T flip flop

4th Semester Syllabus

Signals and Systems **Course code. ECE-405**

UNIT-I

Introduction to Signals & Systems: Definition of a signal & System, Classification of Signals, Basic operations on Signals, Elementary Signals, Systems viewed as interconnection of operations, Properties of Systems, Sampling theorem, Graphical & Analytical proof of Band-limited signals, Impulse Sampling, Aliasing

UNIT-II

Linear Time Invariant (LTI) Systems: Time-Domain representation & Characterization of LTI systems, Impulse response representation, Convolution integral & Convolution sum, properties of LTI systems, Stability criteria for LTI systems, Elements of Continuous time & Discrete-time LTI systems.

UNIT-III

Fourier Representation of Signals: Fourier representation of Signals, Continuous -time Fourier series and their properties, Application of Fourier series to LTI systems, Fourier Transform & its properties, Applications of Fourier Transform to LTI systems, Discrete-time Fourier Transform & its properties. Circular Convolution, Relationship to other transforms.

UNIT-IV

Laplace Transform: Introduction & Definition, Region-of- convergence, Properties of Laplace transform, Inverse Laplace Transform, Applications of Laplace Transform in analysis of LTI systems, Unilateral Laplace transform & its applications to solve differential equations, Analysis of Electric circuits.

UNIT-V

Z-Transform: The Z-Transform, Region-of-convergence, properties of Z-Transform, Inverse Z-Transform, Transform Analysis of Discrete-time LTI systems, Unilateral Z-Transform & its applications to LTI systems described by difference equations

Books Recommended

- Signals & Systems by Haykins

- Signals & Systems by Ziemer
- Signals & Systems by Sanjay Sharma

4th Semester Syllabus

Signals and Systems lab **Course No. ECE-406P**

List of experiments

1. Generation of basic elementary signals using MATLAB:
   (i)Unit step.
   (ii)Sin signal.
   (iii)Signum signal.
   (iv)Delta signal.
   (v)sinc function.
2. Generation of discrete time signals.
3. Generation of continuous time signals.
4. Convolution of two sequences
5. Laplace transforms of continuous signals and inverse laplace transform of signals.
6. Z Transform of discrete time signals and inverse Z transform.
7. Fourier Transform of signals.

4th Semester Syllabus

Mathematics-IV **Course code: MTH-402**

UNIT-I

Complex Variables:

Review of Complex numbers, Applications of De-moivre's theorem, complex functions, and hyperbolic functions. Analytic functions, Cauchy Riemann equations, Complex integration, Cauchy's fundamental theorem Cauchy's integral formula, Cauchy's inequality and Liouville's theorem on integral function, Taylor's and Laurent's expansions, Zeros and poles of analytic functions, Residues and Contour integration. Conformal Mappings, Bilinear Transformation.

UNIT-II

Wavelet Transform:

Continuous wavelet transform, Basic properties of wavelet transform, discrete wavelet transform, Orthonormal wavelets, Multi resolution analysis, Construction of orthonormal wavelets, Daubchies wavelets and algorithms. Band limited wavelets, Balian low theorem.

Books Recommended:

- Complex Variables and Appications by R.V.Churchill, Mac- Graw Hill International Book Company.
- Theory of functions by E.C.Titchmarsh, Oxford university press.
- Advanced Engineering Mathematics by R.K.JainandS.R.K. Iyenger, Narosa-2001.
- A first course on Wavelets by Eugenio Hernandezand Guido Weiss,C.R.C.Press,Boca Raton, New York.
- Ten lectures on Wavelets by I,Daubchies, SIAM

Autoxmrs, Tests, Intro DC motor gen (working, Par

SYLLABUS SCHEME OF COURSE FOR B.E ELECTRICAL 5th SEMESTER

S.no	Course code	Course	Theory	Marks Allotted			Total	Lect. per week			Credits
				Practical External	Sessional	Practical Internal		L	T	P	
1.	ELE-501	Electrical machines-II	100/84	-------	25/24 (22)	---------	125	2	1	0	3
2.	ELE-502P	Electrical machines-II laboratory	-------	35/27	--------	15/13	50	----	---	2	2
3.	ELE-503	Microprocessor	100/73	-------	25/24 (19)	--------	125	2	1	0	3
4.	ELE-504P	Microprocessor Laboratory	------	35/30	-----	15/13	50	----	----	2	2
5	ELE-505	Control System -	100/91	-------	25/23	-----	125	2	1	--	3
6.	ELE-506P	Control System Laboratory-II	------	35/29	-----	15/14	50	----	----	2	2
7.	ELE-507P	Computer Aided Design & Simulation Laboratory	100/82	-----	25/22	--------	125	2	1	0	3
8.	ECE-513	Communication Systems	100/47	-------	25/19	---------	125	2	1	0	3
9.	ECE-514P	Communication System Laboratory	-------	35/30	--------	15/11	50	--	---	2	2
10.	MTH-503	Mathematics-V	100/82	-----	25/23	--------	125	3	1	0	4
11	ELE-508	Extra curricular activity	------	-----	50/43	-----	50	--	---	2	2
	TOTAL		600/459	140/116	200/173	60/51	1000/802	13	6	10	29

5th Semester Syllabus

Electrical Machines- II **Course code: ELE-501**

UNIT-I

Basic Concepts in A.C. Rotating Electrical Machines

Rotating magnetic field, Magneto-motive force and flux distribution, Induced voltage, Production of torque, Leakage fluxes, losses and efficiency

UNIT-II

Induction Machines

Three Phase Induction Motors

Principle of operation of an induction motor, Construction, Types, Equivalent circuit, Torque/speed characteristics, Induction motor tests, Starting, Speed control, Induction generator, Schrage Motor, Circle Diagram, Applications and selection

UNIT-III

Single-Phase Induction Motors

Types of 1-phase induction motors, analysis and testing of 1-phase induction motors, universal motor

UNIT-IV

Synchronous Machines

Constructional features, Types and working principle, windings, Equivalent circuit, voltage regulation and its

determination, saturation effect, parallel operation, Two-axis theory, Salient type machines, steady-state power-angle characteristics, Excitation systems, V-curves, synchronous capacitors, Hunting, synchronous Machine Transients, Analysis of sudden 3-phase short circuit, Transient power-angle characteristics.

Books Recommended

- Electric Machines by Nagrath and Kothari
- Electric Machinery Fundamentals by Chapman
- Electric machinery and Transformers by Irving Kosow
- Electrical Machines By Ashfaq Hussain
- Electrical Machines By V.K Mehta

5th Semester Syllabus

Electrical Machines- II laboratory **Course code: ELE-502P**

1. To study the different parts of an Induction motor
2. To determine the equivalent-circuit parameters of a3 –φ Induction motor by
3. No Load test (ii) Blocked rotor test
4. To determine the Torque / speed characteristics of a 3-φInduction motor
5. To study the speed control of an Induction motor by pole-changing method
6. To determine the equivalent circuit parameters of a1-φ Induction motor by
   (I) No Load test (ii) Blocked rotor test
7. To study different methods of starting of single – phase induction motor.
8. Experiments on synchronous machines:
9. Study of the construction of a synchronous machine.
10. To obtain the OCC and SCC of a synchronous machine by Synchronous impedance method.
11. To synchronize an alternator with bus bars using bright / dark lump method.
12. To find voltage regulation of an alternator by actual loading,
13. To obtain the V-curves and inverted V-curves of a synchronous motor,

695

5th Semester Syllabus

Microprocessor **Course code: ELE-503**

UNIT-I

Introduction to microprocessor, Microprocessor architecture and its operations, Memory, Input & output devices, Logic devices for interfacing, The 8085 MPU, Memory interfacing.

UNIT-II

Basic interfacing concepts, Interfacing output displays, Interfacing input devices, Memory mapped I/O, Flow chart symbols, Data Transfer operations, Arithmetic operations, Logic Operations, Branch operation, Writing assembly language programs, Programming techniques: looping, counting and indexing.

UNIT-III

Additional data transfer and 16 bit arithmetic instruction, Arithmetic operations related to memory, Logic operation: rotate, compare, counter and time delays, Illustrative program: Hexadecimal counter, zero-to-nine, (module ten) counter, generating pulse waveforms, debugging counter and time delay, Stack, Subroutine, Restart, Conditional call and return instructions, Advance subroutine concepts, The 8085 Interrupts, 8085 vector interrupts.

UNIT-IV

Program: BCD-to-Binary conversion, Binary-to-BCD conversion, BCD-to Seven Segment code converter, Binary-to-ASCII and ASCII-to-Binary code conversion, BCD Addition, BCD Subtraction, Introduction to Advance instructions and Application, Multiplication, Subtraction With carry.

UNIT-V

8255 Programmable peripheral interface, Direct Memory Access and 8237 DMA controller. Introduction to 8086 microprocessor: Architecture of 8086 (Pin diagram, Functional block diagram, Register organization).

Text Book:

- Ramesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085. Edition, Penram International Publication (India) Pvt. Ltd.
- Douglas V. Hall, "Microprocessors and Interfacing", 2nd Edition, TMH, 2006th

Reference Book:

- Kenneth L. Short, "Microprocessors and programmed Logic", 2nd Ed, Pearson Education Inc.

5th Semester Syllabus

Microprocessor Lab **Course code: ELE-504P**

1. Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
2. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
3. To perform multiplication and division of two 8 bit numbers using 8085.
4. To find the largest and smallest number in an array of data using 8085 instruction set.
5. To write a program to arrange an array of data in ascending and descending order.
6. To convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085
7. To interface stepper motor and rotate it in clockwise and anticlockwise direction.

5th Semester Syllabus

CONTROL SYSTEM-II **Course code: ELE-505**

UNIT-I

State variable modeling.

Block diagram, transfer function and signal flow graphs in state space.

UNIT-II

Introduction to Modern Control Theory: State Equations, State Transition Matrix, State transition equations, State Diagrams, concept of controllability and observability. State variable analysis and design solution of state vector equations, design using state – variable feedback.

UNIT-III

Digital control system:

Hardware elements of a digital control system, Z- transform, inverse Z-transform, difference equations, pulse transfer function. Discrete time system analysis.

UNIT-IV

Nonlinear control systems.

Linearization of Non-linear control system about and nominal operating point, Analysis and design using linearized models.

UNIT-V

Advanced control techniques:

Fuzzy logic control
Adaptive control
Neural Network based control.

Books Recommended

- Modern Control Engg by K.Ogatta
- Automatic Control System by B.C. KUO

5th Semester Syllabus

CONTROL SYSTEM-II LAB **COURSE CODE: ELE-506P**

List of Experiments

1. System identification using frequency domain techniques
2. Lead/ lag compensator design
3. Microprocessor based PID control
4. Computer control of systems.
5. Control of stepper motor
6. Control system (State Space)
7. Fuzzy logic and neural network tool boxes.

5th Semester Syllabus

COMPUTER AIDED ANALYSIS AND DESIGN LAB **COURSE CODE: ELE-507P**

Use of MATLAB in:

1. Analysis of D.C Circuits
2. Transient and steady state analysis of a.c/d.c circuits.
3. Analysis of control systems
4. Analysis of Electric Machines and Transformers.
5. Design of Transformers.
6. Design of machines.
7. Use of MATLAB and SIMULINK Tool boxes.
8. Use of Control System (State Space), Fuzzy Logic &Neural Network Tool Boxes

5th Semester Syllabus

COMMUNICATION SYSTEMS

Course code: ECE-513

UNIT I

Introduction: Overview of Data Communication system, Data Communication channels Need for modulation, Baseband and Pass band signals, Amplitude Modulation: Single Side Band Modulation, DSB-SC, DSB-C, SSB Modulators and Demodulators, Vestigial Side Band (VSB), , Radio Transmitter and Receiver.

UNIT II

Angle Modulation, Tone Modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulators and Demodulators, Approximately Compatible SSB Systems, Stereophonic FM Broadcasting, Phase modulator.

UNIT III

Pulse Modulation Digital Transmission of Analog Signals: Sampling Theorem and its applications, Pulse Amplitude Modulation (PAM), Pulse Width Modulation, and Pulse Position Modulation. Their generation and Demodulation, PDM Digital Representation of Analog Signals, Pulse Code Modulation (PCM), PCM System, Issues in digital transmission: Frequency Division Multiplexing, Time Division Multiplexing ,Line Coding and their Power Spectral density, T1 Digital System, TDM Hierarchy,STDM,WDM

UNIT IV

Differential Pulse Code Modulation, Delta Modulation. Adaptive Delta Modulation, Voice Coders, Sources of Noises, Frequency domain representation of Noise, Superposition of Noises, Linear filtering of Noises ,

UNIT V

Noise in Amplitude Modulation: Analysis, NYQUISTS THEOREM AND SHANONS THEOREM Signal to Noise Ratio, Figure of Merit ,Noise in Frequency Modulation: Pre emphasis ,De Emphasis and SNR Improvement, Phase Locked Loops Analog and Digital.

Text Book:

- H. Taube, D L Schilling, GoutomSaha, "Principles of Communication", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd.

Reference Books:

- B.P. Lathi, "Modern Digital and Analog communication Systems", 3 rd Edition, Oxford University Press, 2009.
- Simon Haykin, "Communication Systems", 4th Edition, Wiley India.
- H. P. HSU & D. Mitra, "Analog and Digital Communications", 2ND Edition, Tata McGraw-Hill Publishing Company Ltd.

5th Semester Syllabus

COMMUNICATION SYSTEMS- LAB

COURSE CODE: ECE 514P

LIST OF EXPERIMENTS:

1. Generation and modulation of amplitude modulated signals
2. Generation and detection of frequency modulated signals.
3. To measure sensitivity, selectivity, and fidelity of a radio receiver.
4. To Generate PAM and PDM Signals
5. To Test a Pulse Code Modulator
6. To Measure the SNR of the following
   (i)A.M system
   (ii)F.M. system

5th Semester Syllabus

MATHEMATICS-V **Course Code: MTH-503**

UNIT-I

Numerical Methods, Statistics and Probability

Finite Difference: Difference Table and its usage. The difference operator's Δ, ▼and the operator E.

UNIT-II

Interpolation:

Interpolation with equal intervals, Newton's advancing difference formula. Newton's backward difference formula.

Interpolation with unequal intervals. Newton's divided difference formula. Lagrange's interpolation formula.

UNIT-III

Central Differences:

The central difference operator δ and the over raging operator μ. Relations between the operators.Gauss forward and backward interpolation formula, Sterlings, Bessel's, Laplace and Everetts formulae.

UNIT-IV

Numerical solution of algebraic and Transcendental Equations:

Graphic Method, Regula-Fast method, Balzano's Process of bisection of intervals, Newton-Raphson Method and its geometrical significance.

UNIT-V

Numerical Integration:

Numerical Integration, General Quadrature Formula. Simpson's one-third and three-eight rules, Weddles' rule, Hardy's rule, Trapezoidal rule.

UNIT-V

Numerical Solution of ordinary differential equations:

Numerical solution of ordinary differential equations, Picard's method. Taylor's series method, Euler's method, Runge-Kutta Method.

Books Recommended:

- Numerical Methods for Scientists and Engineering by M.K.Jain, S.R.Iyengar&
- R.K. Jain, Wiley Eastern Ltd.
- Mathematical Numerical Analysis by S.C. Scarborough, Oxford and IBH publishing Company.
- Introductory methods in Numerical Analysis by S.S.Sastry, Prentice Hall of India.
- Theory and problems in Numerical methods by T.VeerRarjan and T. Ramachandaran Tata McGraw- Hill publishing company, New Delhi, 2004.
- Numerical Methods for Mathematics, Sciences and engineering 2ndedition by John H. Mathews Prentice – Hall of India, New Delhi 2003
- Fundamentals of Mathematical Statistics by S.C.Gupta and V.K.Kapoor, Sultan Chand & Sons New-Delhi,Latest edition
- Statistical Theory and Methodology in Science and Engineering by Brownlee, John Wiley and Sons.
- Introduction to Mathematical Statistics by R.E. Walpole 3Rd edition New York Macmillan publication.

SYLLABUS SCHEME OF COURSE FOR B.E ELECTRICAL 6 th SEMESTER

S.n	Course Code	Course	Marks Allotted				Total	Lect. Per week			Credits
			Theory	Practical	Sessional	Practical		L	T	P	
1.	ELE-601	Power Systems-I	100 /71	-------	25 /20	---------	125	2	1	0	3
2.	ELE-602P	Power Systems Laboratory	-------	35 /31	--------	15 /11	50	----	---	2	2
3.	ELE-	Power Electronics	100 /63	-------	25 /18	--------	125	2	1	0	3
4.	ELE-604P	Power Electronics laboratory	------	35 /32	-----	15 /11	50	----	----	2	2
5	ELE-605	Electrical machine	100 /75	-------	25 /19	-----	125	2	1	---	3
6.	ELE-606	Electrical Measurement	100 /71	-------	25 /19	---------	125	2	1	0	3
7.	ELE-607P	Electrical Measurement Lab	------	35 /32	-----	15 /11	50	----	----	2	2
8.	ELE-608	Power Engineering	100 /80	-------	25 /24	---------	125	2	1	0	3
9.	MECH-ELE-609/E ELE-611/E	Elective-I	100 /76	-------	25 /22	---------	125	2	1	0	3
10.	MECH-ELE-610P/E ELE-612P/E	Elective-I Laboratory	------	35 /29	-----	15 /11	50	----	----	2	2
11	ELE-613P	Minor Project	------	-----	50 /46	-----	50	---	---	2	2
	TOTAL		600/	140/	200/	60/44	1000 /772	12	6	10	28

6th Semester Syllabus

Power system I **COURSE CODE: ELE-601**

UNIT-I

DC and AC Distribution system

Introduction to a power system (an overall view) distribution systems feeder, distribution, service mains classification, connection schemes, various types of dc and ac distributors, voltage drop calculations.

UNIT-II

Overhead AC transmission lines:-

Line parameters, types of conductors. Aluminum Conductor Steel Reinforced (ACSR) etc. Stranding and bundling of conductors. Resistance calculations skin effect, proximity effect. Inductance and capacitance of single phase &three phase single circuit and double circuit lines. Representation and performance of short medium and long lines, ABCD constants, surge impedance, Ferranti effect, power flow through a transmission lines.

UNIT-III

Insulators for overhead lines:-

- Materials for insulators, types of insulators, potential distribution over a string of suspension insulators, methods for equalizing the potential. Interference of power lines with communication circuits, electrostatic and electromagnetic effect.

UNIT-IV

Corona: Visual and critical disruptive voltage, Conditions affecting corona, power loss due to corona, practical considerations.

UNIT-V

Mechanical design of transmission lines. Sag and Tension calculations

References:

- Elements of power system analysis by W. D Stevenson
- Transmission and distribution of electrical energy by H. Cotton And Rubber
- Power system engineering by Nagarath and Kothari.
- Electric Energy System by Elgerd

6th Semester Syllabus

Power system- I Lab **COURSE CODE: ELE-602P**

LIST OF EXPERIMENTS:

1. AC distribution
2. DC distribution
3. Efficiency , regulation & ABCD parameters of Transmission line
4. Study of cables and find charging currents.
5. Study of different types of insulators.
6. Computer simulation of different types of power systems

6th Semester Syllabus

Power Electronics **COURSE CODE ELE-603**

UNIT-I

An Introduction to Power Electronics

UNIT-II

Power semiconducting devices. SCRs, TRIAC, DIAC Introduction to Modern Power and semiconducting devices like power transistor, power MOSFET, IGBT and GTO

UNIT-III

Firing & Driver Circuits. Line Commutated Converters: 2- pulse, 3-pulse, 6-pulse and higher pulse configurations

UNIT-IV

A.C. Phase control. Integral cycle control.

UNIT-V

Choppers. Principle and basic chopper circuits.

UNIT-VI

Inverters. Voltage source and current source inverters and PWM techniques.

UNIT-VII

Application of Power Electronic technology.

Induction cooking, UPS. Speed control, light intensity control.

References:

- "Power Electronics" - M. H. Rashid 3rd edition, PHI / Pearson publisher 2004.
- "Power Electronics" – Mohan, Undeland& Robbins
- Power Electronics & AC drives by B.K Bose

6th Semester Syllabus

Power Electronics Lab **Course code: ELE-604P**

1. To obtain V-I characteristics of SCR and DIAC.
2. To obtain the static emitter characteristics of UJT.
3. To Study Various Firing Schemes of an SCR and Draw the traces of various waveforms,
4. R & RC Triggering techniques

5. To study a Single- phase half wave converter and plot source voltage, load voltage and load current for r and r-l circuits.
6. To study a single phase semi- converter and plot source voltage, load voltage and loads Current For R and RL loads
7. To study a single-phase full-converter and plot source voltage, source current, load voltage and load current for R and R-L loads.
8. To study three phase converter
9. To study step down chopper
10. To study AC voltage controller
11. To study single phase voltage source inverter

6th Semester Syllabus

ELECTRICAL MACHINE DESIGN

Course Code: ELE 605

UNIT-I

Principles of Electrical Machine Design:
Considerations in design, design factors, limitations in design, modern trends in design.

UNIT-II

Armature Winding Design. Winding design, integrated approach for windings, A.C armature windings, production of emf in windings, Mmf distribution of armature windings, eddy current losses in conductors.

UNIT-III

Design of D.C Machines: Output equation, Main dimensions, Armature design, Armature windings, Design of commutator and brushes, Design of Field systems, Design of inter poles.

UNIT-IV

Design of single-phase and three-phase Transformers : Output equation, core design, winding design, yoke design, Design of transformer tank with tubes, design of insulation.

UNIT-V

Design of Induction Motors (1-phase and 3-phase): Output equation, main dimensions, Stator winding, stator conductors, shape of stator slots, number of stator slots, stator core, rotor design (squirrel cage and wound rotor)

UNIT-VI

Design of Synchronous Machines: Main dimensions, length of air gap, stator design, rotor design.

Books Recommended:

- Electric Machine Design by A.K. Sawhney
- Design of Electrical Machines by Mittle and Mittla
- Electrical machine Design by R.K. Agarwal

6th Semester Syllabus

ELECTRICAL MEASUREMENT

Course code: ELE 606

UNIT-I

Definition of basic terms used in measurements.

UNIT-II

Electro-mechanical indicating instruments.

Classification, efforts utilized in measuring instruments, various forces in an electro-mechanical indicating instrument, errors and their types, various methods of damping, galvanometers (D' Arsonal and Ballistic) Ammeters and Voltmeters (PMMC, Induction, Electrostatic and Dynamometer type), errors in voltmeters and ammeters, extension of instrument range, ammeter shunts, voltmeter multipliers.

UNIT-III

Measurement of Power, Energy and Power Factor

Power measurement in three phase a.c. circuits using single phase and 3-phase watt meter, measurement of reactive power (Single phase and 3-phase), Energy measurement using induction type meter, Energy meter testing, Power factor meter.

UNIT-IV

Measurement of Resistance:

Resistance classification, Measurement of Low resistance using potentiometer method and Kelvin double bridge, Measurement of medium resistance using ammeter-voltmeter method, substitution method, Wheatstone bridge, Measurement of high resistance using loss of charge method, Meggar.

UNIT-V

Measurement of Inductance, Capacitance and Frequency using a.c bridges.

Potentiometers:

D.C potentiometers, Crompton potentiometer, application of D.C potentiometer, A.C Potentiometers, Drysdale Tinsley and Cambell Larsen Potentiometers, Applications of A.C Potentiometers.

UNIT-VI

Virtual Instrumentation:

Introduction to virtual Instrumentation. Measurement of Electrical and non-electrical Quantities using virtual instruments.

Books Recommended:

- Electrical Measurements and Measuring Instruments by Golding, Widdis.
- Electrical Electronic Measurements by A.K.Sawhney.
- Electrical Electronic Measurements by J.B.Gupta

6th Semester Syllabus

ELECTRICAL MEASUREMENT LAB **Course Code ELE 607P**

List of Experiments

1. Power Measurement in single phase and three phase circuits using single phase and three phase watt meters.
2. Energy Measurement using watt-hour meter as well as using wattmeter and stop watch.
3. To study the constructional details of an electromechanical indicating instrument with the help of demonstration type of instrument.
4. Measurement of Inductance and capacitance using Bridge techniques (Anderson's Bridge, Wheat Stone's Bridge.)
5. Measurement of Resistance by different methods (Loss of charge method, substitution Method, Kelvins Double Bridge)
6. To Study RC and LC models of a transmission line.
7. Measurement of Electrical and Non Electrical quantities using virtual instrumentation. (Dasylab)

6th Semester Syllabus

POWER ENGINEERING **Course code ELE 608**

UNIT-I

Economic Aspects and power factor improvement: Economics of generation, factors affecting the cost of generation, reduction of costs by interconnection of stations, curves useful in system operation, choice of size and number of generating units. Power factor, disadvantages of low power factor, methods of improving power factor, location of power factor improvement apparatus, and economics of power factor improvement.

UNIT-II

Power Tariff: Cost of generating station, fixed capital, running capital, annual cost, running charges, fixed charges, factors influencing the rate of tariff, designing tariff, different types of tariff, flat rate tariff, block rate tariff, two part tariff, maximum demand tariff, power factor tariff.

UNIT-III

Neutral Grounding: Neutral grounding, solid grounding, resistance grounding, reactance grounding, arc suppression coil grounding, earthing transformers, choice of methods of neutral grounding equipment, grounding for safety.

UNIT-IV

Overview of different types of power stations and their auxiliaries:

Thermal power plants, hydroelectric stations, nuclear power stations, diesel power stations, gas turbine plants.

UNIT-V

Overview of substations and substation equipment: C.T,P.T,Different Types Of Circuit Breakers.L.A,Main And Reserve Bus, Bus Coupler ,Isolator Etc

UNIT-VI

Illumination:

Principle of production of light, sources of light, filament lumps, halogen lamps, discharge lamps, sodium discharge lamps, mercury discharge lamp, dual lamp, fluorescent lamps, planned maintenance of lighting installations, arc lamps, laws of illumination, various lamp fittings, design of lighting systems, street lighting, recent trends in lighting systems.

UNIT-VII

Electric Heating:

Advantages, various heating methods (resistance and dielectric heating)

UNIT-VIII

Electric Traction:

Traction systems, choice of traction systems, tram ways, trolley bus, systems of track electrification, D.C system, single phase low frequency A.C system, three phase A.C system, composite system, traction mechanics, types of services, speed-time curves, tractive effort, power of traction motor, specific energy consumption, mechanics of train movement, power supply arrangements, overhead equipment, current collection systems, selection of traction motors.

Books Recommended

- Elements of Power Station Design by Deshpande
- The Art and Science of Utilization of Electric Energy by H. Pratab.
- Substation Design and Equipment by Satnam
- A Course in Electrical Power by Soni, Gupta and Bhatnagar

6th Semester Syllabus

Elective-I **COURSE NO: ELE 609/E**

DIGITAL SIGNAL PROCESSING

UNIT-I

Discrete Time Signals & Systems: Sequences, & sequence operations, Discrete-time systems. Linear Time – Invariant systems, impulse response, causality, stability. Frequency-Domain Representation of Discrete-Time signals and systems, Fourier Transforms, properties, theorems.

UNIT-II

Sampling of Continuous – Time Signals: Periodic sampling, frequency- domain representation of sampling, reconstruction of signals, discrete-time processing of continuous –time signals, continuous –time processing of Discrete-time signals, changing the sampling rate.

UNIT-III

Transform Analysis of Linear time Invariant Systems:Z-Transform, Region of Convergence, properties, Inverse Z-Transform, Frequency Response of LTI systems, system functions, linearconstant coefficient, difference equations FIR and IIR systems, Frequency Response.

UNIT-IV

Structure of Discrete-Time Systems: Block Diagram Representation of linear constant-coefficient Difference equations, signal flow graph representation. Basic structures for IIR systems, Transposed forms, Basic network structures for FIR systems.

UNIT-V

Filter Design Techniques: Design of Discrete-Time IIR filters from continuous– Time filters. Impulse invariance, bilinear transformation. Butterworth Chebyshev,Eliptic Approximation, low pass, high pass, band-pass and Band-stop filters, design of FIR filters by windowing. Kaiser, Hamming, Hamming windows.

Books Recommended:

- A.V Oppenheim and R. W Schafer: Discrete Time Signal Processing.
- John G. Proakis and D.G Manolavis: Digital Signal Processing Principles, Algorthins and Applications.
- Digital Signal Processing By Johny and Johnson

6th Semester Syllabus

Elective-I **COURSE CODE: ELE 610 P/E**

DIGITAL SIGNAL PROCESSING LAB.

1. Familiarization with DFT & FFT Algorithms
2. MATLAB exercises on Analysis of Signals using FFT
3. Introduction to MATLAB DSP Toolbox.
4. Familiarization with the Digital Signal Processing Trainer Kit.
5. Adding two 64-bit signed numbers and storing the result,
6. Multiplying two 32-bit numbers and storing the results,
7. Generating a sinusoidal signal,
8. Generating a pseudo random binary sequence,
9. Simulating FIR low-pass filter,
10. Simulating 10^{th} order IIR filter.

6th Semester Syllabus

Elective-I

Course code: MECH-ELE -611/E

MECHANICAL. ENGINEERING

UNIT-I

THERMODYNAMICS: System and Surroundings, Zeroth Law, Temperature Scales, Equation of the state, First law, Steady flow, Isochoric, Isobaric, Isothermal, adiabatic and polytrophic processes, Properties of steam, Second law, Entropy change, Reversible Irreversible processes, Carnot's Cycle, Ranking Cycle, Modified Rankine Cycle, Flow through nozzle.

UNIT-II

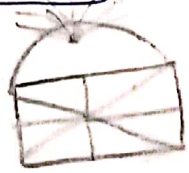
STEAM TURBINE: Impulse turbine, velocity and pressure compounding, work output, losses and efficiency, Reaction turbine, work output, losses and efficiency, degree of reaction, Modern steam power cycles, Regenerative and Reheat cycles, Governing of steam Turbines, fields of Application.

UNIT-III

I.C. ENGINES: Otto, diesel and Duel cycles, Magneto and battery ignition, detonation and pre-Ignition, Octane Number, Dropes, Diesel knock, Cetane Number, various I.C engines fuels, Carburation and Injection, Lubrication, Cooling, Governing of I.C.Engines, Fields of Application.

UNIT-IV

GAS TURBINES: Present status and future trends, Basic types and Cycles, Thermal refinements, jet propulsion, fields of Application.



LIST OF BOOKS RECOMMENDED:

- Steam Turbine Performance and Economics by Bartlett. McGraw Hill.
- Steam Turbine Theory and Practice by Kearton Pitman.
- Theory and Design of steam and Gas turbine. By Loe McGraw Hill.
- Steam Turbine Theory and Design by Shylakhin, Forein languages, publishing House.

6th Semester Syllabus

Elective-I

Course code: MECH-ELE-612P/E

MECHANICAL ENGINEERING Lab

1. Study of four stroke engine cut section.
2. Assemble/disassemble of two stroke engine.
3. Model study of basic types of boilers.
4. Valve timing diagram for 4 stroke diesel engine.
5. Study of carborator.

SYLLABUS SCHEME OF COURSE FOR B.E ELECTRICAL 7th SEMESTER

S.n	Course code	Course	Marks Allotted				Total	Lecture per week			Credits
			Theory	Practical External	Sessional	Practical Internal		L	T	P	
1.	ELE-701	Power System-II	100/55	-------	25	---------	125	2	1	0	3
2.	ELE-702P	Power System Lab-II	-------	35/32	--------	15/12	50	---	---	2	2
3.	ELE-703	Power System Protection	100	-------79	25/23	--------	125	2	1	0	3
4.	ELE-704P	Power System Protection Lab. /Field Visits	------	35/20	-----	15/10	50	---	---	2	2
5	ELE-703	Power System Reliability	100/74	-------	25/15	-----	125	2	1	---	3
6.	ECE701 ELE-708/E	Elective-I	100/89	-------	25/23	------	125	2	1	0	3
7.	ECE701L ELE-708P/E	Elective-I Lab.	------	35	-----	15	50	---	---	2	2
8.	ELE-711/E ELE-712/E ELE-713/E	Elective-II	100/83	-------	25/18	-----	125	2	1	0	3
9.	ELE-714/E MTH-705/E	Elective-III	100/76	-------	25/21	------	125	2	1	0	3
10.	ELE-715P	Project Preliminary Work/ Seminar		100/90			100				
	TOTAL		600	205	150	45	1000	12	6	6	24

7th Semester Syllabus

Power System –II **Course-code ELE-701**

UNIT-I

Underground Cables: Construction of a cable, insulating materials, types of cables- Mass impregnated, oil filled and gas filled paper cables. Solid dielectric cables, Gas filled cables, super conducting cables. Electrostatic stresses in a cable, capacitance of single core, double core and three core cables, current carrying capacity of a cable.

UNIT-II

Per Unit -representation of a power system: Single line diagram impedance and reactance diagram of a power system, per unit system calculations,

UNIT-III

Symmetrical components and their Application to Unsymmetrical fault analysis: Symmetrical components sequence, sequence impedance's sequence networks, unsymmetrical faults. Single line to ground ,double line, double line grounds on unloaded Alternator and a power system,3 phase short circuits, short circuits capacity of a bus, selection of circuit breakers

UNIT-IV

Generation of over- voltage on a power system: Response over voltages, switching over voltages, lightening over voltages, lightening phenomena protection of power, protection of power system against over- voltages, ground wires ,lightening arrestors, concept of insulation co-ordination ,basic impulse insulation level, standard impulse test wave, volt-time curve, location and ratings of lightening arrestors.

UNIT-V

Introduction to HVDC Transmission Lines: Advantages of HVDC Transmission, Limitations of HVAC Transmission, Economic Comparison, Various Links.

Text books:

- W.D. Stevenson, elements of power system analysis.
- H. cotton &H.barber, transmission and distribution of electrical energy.
- C.L Wadhwa,electrical power systems.

References

- J Nagrath and DP Kothari , power system engineering
- I.J Nagrath and DP Kothari, Modern power system analysis.
- O.I. Elgard,electric Energy systems theory.

7th Semester Syllabus

Power System –II Lab **Course Code ELE-702P**

1. Study of different types of cables.
2. To find insulation resistance of cables.
3. Calculation of positive negative and zero sequence impedance of Transformer.
4. Calculation of positive negative and zero sequence impedance of transmission line.
5. Calculation of positive negative and zero sequence impedance of Induction motor.

7th Semester Syllabus

POWER SYSTEM PROTECTION **Course Code: ELE 703**

UNIT-I

PROTECTIVE RELAYING: Function of protective relaying, fundamental principles, primary and backup relaying, functional characteristics. Operating principles and characteristics of the following electromechanical relays: Current, voltage, directional, current balance, voltage balance, differential relays, and distance relays.

UNIT-II

PROTECTION OF GENERATORS: Short- circuit protection of stator windings, protection against turn-to-turn fault, stator ground-fault protection, stator open circuit protection, Overheating protection, Overvoltage protection, Loss of excitation protection, rotor overheating protection, Protection against vibration, protection against motoring over speed protection, etc.

UNIT-III

TRANSFORMER PROTECTION: Short circuit protection, over current and earth-fault protection differential protection. Use of biased relay for differential protection, self balance system protection, differential magnetic balance protection, Buchholz relay, protection of parallel transformer banks, etc.

UNIT-IV

PROTECTION OF FEEDERS, BUSBARS AND TRANSMISSION LINES: Protection of feeders, time limit fuse, over current protection for radial feeders, protection of parallel feeders, differential protection for parallel feeders, protection of ring mains, differential pilot wire protection, Circulating current protection, protection for bus-bars, frame leakage protection, differential protection, for bus bars, protection for double bus-bar system, transmission line protection, using over-current relays, using distance relays. Setting of over-current and distance relays, coordination of relays. Phase fault and earth fault protection.

UNIT-V

FUSES and Circuit Breakers : Fusing element, classification of fuses, current-carrying capacity of fuses, high rupturing capacity (H.R.C.) cartridge fuses, characteristics of H.R.C. fuses, selection of HRC fuses. Types of circuit breakers, basic principle of operation, phenomena of arc, initiation of a arc, maintenance of arc, arc extinction, d. c.circuit breaking, a.c. circuit breaking, arc voltage and current waveforms in a.c.circuit breaking, restriking and recovery voltages, de-ionization and current choppings, ratings of circuit breakers, oil circuit breakers, air blast circuit breakers, SF6 Circuit breakers , Vacuum breakers.

Books Recommended:

- Art and Science of Protective Relaying by Mason.
- Protective relaying, Principles and Applications by J. L Black Burn
- Computer Relaying for Power Systems, by A.G. Phadkeand J.S Thorp. (John Wiley and sons New York 1988).
- Switchgear & protection by Ashfaq Hussain.

7th Semester Syllabus

POWER SYSTEM PROTECTION Lab **Course Code: ELE-704P**

List of Experiments

1. Study of various types of relays.
2. Characteristics of fuses of different relays.
3. Characteristics of inverse time over current relays.
4. Time graded protection using inverse time O/C relays
5. Visit to an Electric Sub-station to study various protective schemes.
6. Study of circuit breakers.
7. Study of differential protection scheme.
8. Study of an oil circuit breaker.

7th Semester Syllabus

Power System Reliability **Course Code: ELE-703**

UNIT-I

Generator System Models: State Load Model, Probability Methods, Unit Unavailability Outage Probability. Generating Capacity Limits – Recursive Techniques- Capacity Expansion Analysis – Scheduled Outages _ Reliability Indices – Frequency Duration Method.

UNIT-II

Interconnected Systems.

Two systems with Tie, Probability Array Methods, Reliability Indices, Variable Reserve and Maximum Peak Load Reserve, Multi Connected Systems, Operating Reserve, PJM Method, ORR UC Risk Economics & Reliability. Hot Reserve, Rapid Start Units, Security Function Approach.

UNIT-III

VARIOUS OTHER SYSTEMS: Distribution System. Interruption Indices, System Performance – risk prediction, Radial Systems, Effect of Load Transfer, Line Failures, Parallel and Mesh Networks. Industrial Systems.

Reference:

- Roy Billinton., Power System Reliability Evaluation., Plenum Press, New York, 1991
- Roy Billinton, Ronald N. Allan, Reliability Assessment of Large Electric Power Systems. IEEE press 1995
- R. Ramakumar, Reliability Engineering Fundamentals and Applications, Prentice Hall 1993
- Roy Billinton, Ronald W. Allan and Luigi Salvaderi, Applied Reliability Assessment in Electric Power Systems. IEEE Press 1991
- J. Endrenyi, Willey, Reliability Modeling in Electrical Power Systems, New York 1978.

7th Semester Syllabus

Elective I

Electronic Measurements and Instrumentation

Course Code ECE-701

UNIT-I

Measurement system and standards: Instrumentation system and its classification, primary and secondary standards, standards of various electrical quantities, IEEE standards, Static and dynamic response, Errors, and accuracy of an instrumentation system.

UNIT-II

Measurement of basic parameters: Galvanometer and its principle, moving coil, moving iron meters, true r.m.s meter, and bridge measurement of resistance, capacitance and inductance.

UNIT-III

Transducers, Sensors and Actuators: Active and passive, transducers types: Resistive, Inductive, capacitive, Piezoelectric, Optical, Photo diodes; Measurement of physical, physiological, chemical quantities: Temperature, PH, luminescence, flow, pressure, torque, speed, acceleration, rotation, Stress, strain etc. Sensors for hostile environments, Actuators: Relays, solenoids, stepper motors.

UNIT-IV

Signal generators and analyzers: Function generators, RF Signal generator, sweep generator, frequency synthesizers, Wave Analyzers for Audio and Radiofrequency Waves. Measurement of harmonic distortion. Spectrum analysis.

UNIT-V

Digital instrumentation: Comparison of analog and digital techniques, digital voltmeter, digital multimeter, Frequency counter, Measurement of frequency and time interval, extension of frequency range, measurement errors.

UNIT-VI

Data acquisition system: Components of data acquisition system, interfacing of transducers, Single channel and Multichannel system, Multiplexing,

References:

- Electrical & electronic Measurements by A.K.Shawney
- Electronic Measurements by W.Cooper

7th Semester Syllabus

Elective I

Electronic Measurements and Instrumentation LAB.

COURSE CODE: ECE-701L

List of Experiments

1. Find Q of an LC circuit
2. To study use of an instrumentation amplifier
3. Study of ADC-0801
4. Study of DAC-0808
5. Experiments on study and use of transducer for common electrical and non-electrical quantities.
6. Experiments on wave form analysis for audio and radio range of signals.

7th Semester Syllabus

Elective I

Micro controllers and their application

Course Code: ELE-708/E

UNIT-I

Introduction: Historical background of micro-controllers, Introduction to Intel 8 bit & 16 bit Micro-controllers, Overview of 8051 family, Microcontrollers and Embedded processors, applications, Difference between microcontrollers and microprocessors.

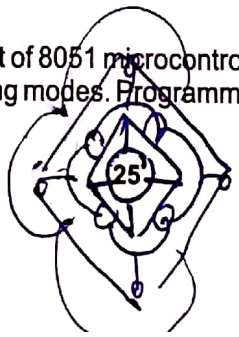
UNIT-II

8051 Hardware: Architecture of 8051, on chip oscillator, power saving modes of operation, Memory organization, special function Registers, Pin description.

UNIT-III

Instruction Set: Classification of instruction set of 8051 microcontroller, Arithmetic, logical, data transfer, Boolean and branching, single bit instructions, and Addressing modes. Programming.

UNIT-IV



8051 ports and timers: I/O port structures and operations (port-0 , port-1, port-2, port-3) programming of ports, 8051 timers, counter programming.

UNIT-V

8051 interrupts and serial communication: Basics of serial communication,8051 serial communication programming,8051 interrupts, programming of timer interrupts, programming serial communication interrupts,

UNIT-VI

Interfacing: Interfacing of LCD, ADC, stepper motor and Keyboard to 8051.

Recommended Books:

- The 8051 Micro-controller: Architecture, Programming and Applications by Kenneth J. Ayala (penram international)
- Programming & Customizing the 8051 Micro-controller by M. Predko
- The 8051 microcontroller and embedded systems.(Mazadi) by pearson.

7th Semester Syllabus

Elective I

Microcontrollers & their Application Lab. **COURSE CODE: ELE-708P/E**

List of Experiments

1. Addition of two 8bit numbers
2. Addition of two 16bit numbers
3. Find the sum of the values 79H, F5H,and E2H. Put the sum in registers R0(low byte) and R5 (high byte).
4. subtraction of two 8bit numbers
5. To display higher number in an array
6. To display an array of numbers in ascending order.
7. To display an array of numbers in descending order.
8. Generation of simple waveforms using micro-controllers.
9. Interfacing of LED's with the micro-controllers.

7th Semester Syllabus

Elective II

ELECTRICAL SUB STATION DESIGN **COURSE CODE: ELE-711/E**

UNIT-I

General aspects of sub-station: Design & layout with all equipment's.Bus bar arrangement with detailed layout. Isolating switches, location, rating, selection, operation and control. Interlocking. introduction of GIS.

UNIT-II

Voltage & Current Transformers: Governing specifications, rating & selection requirement of CT's & PT's for different protection schemes.

UNIT-III

Circuit Breakers: Standard ratings & selection. Restriking voltage & recovery voltage, particular performance & testing of circuit breaker.

UNIT-IV

Control & Relay panels: Design of control & relay panels. Planning of control circuit. Voltage selection scheme.

UNIT-V

General earthing of a substation: Complete design of earthing grid.

UNIT-VI

Auxiliaries: Wiring diagrams and control cable schedule. D.C Supply.

Books Recommended:

- Substation Design and Equipments (DhanpatRai Publications) P.S Satnam, P.V Gupta.
- Substation Design and Equipments by Ashfaq Hussain(PHI)

7th Semester Syllabus

Elective II

Neural Networks and Fuzzy Systems **Course code: ELE-712/E**

UNIT-I

Neural Networks: The role of neural networks in Engineering neural model, perceptron, linear network, initialization and training, back propagation, recurrent networks, Applications of neural networks.

UNIT-II

Fuzzy Systems: An introduction to fuzzy logic, Operations on fuzzy sets, Fuzzy relations, the extension principle, Fuzzy implications, Linguistic variables. The theory of approximate reasoning, an introduction to fuzzy logic controllers, Defuzzification methods, Inference mechanisms, Construction of data base and rule base of FLC.

Text Books:

- Neural Network Design, M.T. Hagan, VikasPublishersDelhi
- Haykin S., Neural Networks, 2ndEdition, Prentice Hall, 1999, ISBN 013 2733501
- Fuzzy logic & its applications, T. Ross, McGraw Hill International

7th Semester Syllabus

ELECTIVE II

Non conventional energy sources **Course NO. ELE-713/E**

UNIT-I

Different forms of non-conventional energy sources: Solar, bio-gas, wind, tidal, geo thermal etc.

UNIT-II

Basic bio-conversion mechanism: Source of waste, simple digesters, composition and calorific value of bio-gas.

UNIT-III

Wind and tidal energy generation: Special characteristics, turbine parameters and optimum operation, electrical power generation from wind/tidal energy.

UNIT-IV

Ocean thermal energy conversion (OTEC): Geo thermal energy – hot springs and stream injection, power-plant based on OTEC and geothermal springs.

UNIT-V

Solar Energy: techniques of collection, storage and utilization of solar energy, types of solar collectors, selective surfaces, solar thermal processor, heating, cooling, drying, power generation, etc. solar cell, I-V Characteristics, photo-voltaic arrays, sizing of arrays, effect of temperature and insulation of p-v arrays, requirement of batteries and their characteristics.

UNIT-VI

Fission energy: reactors, controlled fusion of hydrogen, helium etc, energy release rates, and present status and problems future possibilities. Photo-electric, thermo-electric, thermionic, MHD, and electric chemical devices.

Books Recommended:

- Non-conventional energy sources by G.D.RAI
- Non-conventional energy sources by Hassan Saed

7TH SEMESTER ELECTRICAL

ELECTIVE-III **COURSE CODE ELE-714/E**

7th Semester Syllabus

Elective III

Optimization Techniques **Course Code: MTH-705/E**

UNIT-I

Linear programming.

Foundation of linear programming problems, theory of convex sets, Graphical solution of L.P.P, Simplex Method, Two Phase Simplex Method, Duality in Linear Programming, Transportation and Assignment problem. Application of linear programming to Industrial problems.

UNIT-II

Non-linear programming.

quadratic form, Hessian Matrix, positive definite and Negative Definite, Method of Lagrange multipliers, Wolfe's method of solving Quadratic programming problem. Illustrations of some Civil Engineering problems.

Books Recommended

- Linear programming by S.I. Gass, McGraw Hill.
- Operations research an introduction, by HamidiA.Taha, Macmillan.
- Principles of Operations Research: with Application to Management Decisions, by H.M. Wagner, Prentice-Hall
- Linear Programming by Hadley, Adison Wasley.
- Non Linear and Dynamic programming by G.Hadley, Addison Wesley.
- Theory of Linear and Non-linear Programming by S.Vajda, Longmans(London)
- Foundations of Optimization, by D.I.Wilde and C.Boigtler Prentice Hall (1977)

SYLLABUS SCHEME OF COURSE FOR B.E ELECTRICAL 8 th SEMESTER

S.no	Course code	Course	Marks Allotted				Total	Lecture per week			Credits
			Theory	Practical External	Sessional	Practical Internal		L	T	P	
1.	ELE-801	Power System s-III	100	-------	25	---------	125	2	1	0	3
2.	HSS-802	General Management & Economics	100	-------	25	---------	125	2	1	0	3
3	ELE-803/E ELE-804/E ELE 805/E	Elective-I	100	-------	25	-----	125	2	1	---	3
4	ELE-806/E ELE-807/E ELE-808/E	Elective-II	100	-------	25	---------	125	2	1	0	3
5	ELE-809P	Project				400					
6	ELE-810/T	Tour & Training				100					
	TOTAL		400		100	500	1000	8	4	0	12

8th Semester Syllabus

POWERSYSTEMS-III **COURSE CODE: ELE 801**

UNIT-I

Load Flows: Nature and importance of the problem, Network modelformulation, algorithm for the formulation of Ybus matrix, formulation of Ybus by singular transformation, primitive network, Bus incidence matrix, load flow problem, load flow equations, bus classification – List of variables in load flow equations, Gauss - Seidel & New-Raphson method for solving load flow problem, comparison of load flow methods, De-coupled & Fast de-coupled power flow method, Modeling of tap-changing transformers and phase-shifters.

UNIT-II

Power System Stability: The stability problem, steady state, dynamic and transient stability, rotor dynamics and swing equation, power- angle curve, equal-area criterion of stability, Numerical solution of swing equation, Factors affecting

transient stability.

UNIT-III

Automatic Generation Control: Real power balance and its effect on system frequency, load frequency control of single area system – Models of speed governing system, turbine and generator load, steady state analysis and dynamic response, proportional plus integral control, two area load frequency control,

UNIT-IV

Control of voltage and Reactive Power: Generation and absorption of reactive power, Relation between voltage and reactive power, Need for voltage control at various system buses, Methods of voltage control – injection of reactive power, tap changing transformers, booster transformers, and phase – shift transformers.

UNIT-V

Economic Operation of Power System: Introduction, system constraints, economic dispatch neglecting losses, penalty factor, economic dispatch with losses, transmission loss equation, automatic load dispatching.

Books Recommended:

- Power System Analysis by J.J. Grainger and W.D Stevenson
- Electrical Power Systems by B.M. Weedy and Cory
- Power Systems Engineering by Nagrath and Kothari
- Electric Power Systems by C.L. Wadlhwa
- Electric Energy System Theory by O. I Elgard.

8th Semester Syllabus

General Management & Economics **COURSE NO: HSS-802**

UNIT-I

General Management & Economics: The course is designed to introduce the student to the basic concept of Economics and Management so as to enable them to give optimal performance during professional life.

UNIT-II

Industrial Economics: Meaning & Importance of Industrialization. Organizations – Various types of organizations. Division of Economics, Basic Constituents (Micro and Macro Economics).

UNIT-III

Consumption and Market Structure: Law of demand and Elasticity of demand, Consumer's surplus, Utility and its measurement. Types of market structure – Perfect, Monopoly, Monopolistic and Oligopoly. Demand Forecasting Techniques. Meaning and factors influencing location of Industrial Units, Scale of Production - Large Vs Small Industrial Units. B Management

UNIT-IV

Introduction of Management: It's Nature, purpose and definitions. Process and functions of Management - Planning, Organizing, Actuating and Controlling. Functional Areas of management, Skills and role of Management. Planning: Nature and purpose of planning, Types of Plans, Steps in Planning Process.Objectives: The Nature and importance of objectives; Types of objectives, primary, Secondary, individualand personal Objectives, Guidelines for setting objectives.**Decision Making** Importance and limitations of Rational Decision Making, types of decisions – Programmed and non-programmed decisions – process of Decision Making under certainty, uncertainty and Risk. **Organizing:** Nature and Purpose of Organizing: Steps in Organizing/Process of Organizing: Formal and informal organization; Span of Control &factors determining effective span. **Decentralization of Authority**; The nature of decentralization- Degree of decentralization. Decentralization as philosophy & Policy. **Delegation of Authority:**Meaning of Authority/delegation steps in the process of delegation. Factors determining the degree of delegation. Art of delegation.

UNIT-V

Leadership:Meaning and importance, Leadership qualities **Motivation.**The Need – want – Satisfaction chain. **Controlling**.Nature and purpose of controlling, Steps in controlling/process of controlling Types of controls, Recruitments of effective controls.

Books Recommended

Management

- Industrial Organization and Management – Y. K. Bushan.
- Principles of Management – A.K. Chatterjee.
- Principles of Management – George Terry.
- Industrial Organization and Management – V.D. Sinha and Gad gill.
- Management by Kroontz& O' Donnell

Economics

- Elementary Economics Theory – K.K. Dewett and J.D. Verma.

- An Introduction to Economics – M.L. Sethi
- Advanced Economics – K.P.M. Sundram
- Indian Economics- K.K.Dewett and J.D. Verma
- Engineering Economics by Mansoor Ali & S. K. Delala

8th Semester Syllabus

Elective I

COURSE Code: ELE-803/E

Distribution system automation

UNIT-I

Introduction to distribution automation: Configuration of distribution system ,Nature of loads and load forecasting, Layout of substations and feeders ,Design considerations- Distribution system load flow, Optimum Sitting and Sizing of Substations, Optimum capacitor placement

UNIT-II

Distribution system monitoring and control: SCADA, Remote metering and load control strategies, Optimum feeder switching for loss minimization and load control. Distribution system restoration, Distribution system protection and switch gear, Power quality issues.

Books Recommended:

- Distribution systems Analysis and automation Juan M.Gers(IET)
- Power system-II by V.K Mehta (S CHAND)
- Control and Automation of Electrical power distribution systems by James North Cote(ISBN)

8th Semester Syllabus

Elective I

Industrial process instrumentation and telemetry **Course Code: ELE-804/E**

UNIT-I

Transducers: Definition, different types of transducers, transduction principles, classification of transducers and their characteristics, transducers for measurement of different physical variable like displacement, velocity, force, pressure, torque, thickness, strain, temperature, weight, humidity, moisture, PH value.

UNIT-II

Process Controllers: General purpose process controllers, control actions, and various types of controllers, feedback controllers, cascade controllers, feed forward controllers and ratio controllers.

UNIT-III

Telemetry: Introduction to telemetry, Remote control and supervisory control remoter signaling and signal transmission (Method and Media)

References:

- E.O. Deoblin " Measurement Systems"
- A.K. Sahney "A course in electrical and electronicmeasurement and
- Instrumentation" Dhanpat Rai and sons Publication.
- Norton H.N. " Handbook of transducers for electronic measuring systems"
- Neubert H. K. P "Instrumenttransducers: an introduction to their performance and design
- Grumberg E.L "Handbook of Telemetry and Remote Control
- GinzBeng " Fundamentals of Automation and Remote Control
- Swoloda G. "Telecontrol: Method of application of Telemetry and Remote Control.

8th Semester Syllabus

Elective I

Advanced Power Systems Control **Course Code: ELE-805/E**

UNIT-I

Unit commitment problem: introduction to UCP, thermal and hydral constraints in UC, priority list scheme method , unit commitment problem solution by priority list scheme method..

UNIT-II

Decoupling between P-F and Q-V Control loops, Coherency, load frequency control –classical and optimal, voltage control, Static-Var compensation, use of short term storage units , computer control.

UNIT-III

Description and definition of FACTS, basic types of controllers, SVC ,TCSC ,UPFC Static compensator, principle of operation and configuration.

UNIT-IV

Power transmission control using phase shifting transformers and UPFC, control of FACT devices for transient stability improvement- general consideration of FACT control strategies.

Books Recommended:-

- Power ;system operation and control by P.S.R. Murthy
- Economic Control of Interconnected Power systems by L.K. Kirchmayer
- Electric Energy systems Theory: An Introduction by Elgerd.

8th Semester Syllabus

Elective II

Course Code: ELE-806/E

Mechatronics

UNIT I:

Classification of mechanisms- basic kinematic concepts and definitions- degree of freedom ,mobility , kutzbach criterion, Gruebler's criterion, Grashof's law , kinematic inversions of four- bar chain and slider crank chains- limit positions ,mechanical advantage and transmission angle.

UNIT II:

Computer Integration of electro-mechanical systems, sensor modeling, actuator modeling, interfacing, mixed dynamic systems modeling, data acquisition and virtual instrumentation, real-time monitoring and control, Lab VIEW real-time data acquisition and control.

UNIT III:

MATHWORKS tools for real-time acquisition and control, laboratory experiments for Mechatronics.

Text books:

- Mechatronics, Dan Necsulescu Pearson education 2002
- Introduction to Mechatronics and Measurement Systems, Tata McGraw Hill.
- Theory of machines and mechanisms by Uicker , JJ Pennock GR.

8th Semester Syllabus

Elective II

Course Code: ELE-807/E

POWER SYSTEM ANALYSIS

UNIT-I

Power System Transients.

Origin and nature of transients and surges, Surge parameters of plan. Equivalent circuit representations. Lumped and distributed circuit transients. Line energization and de-energization transients. Earth and earth wire effects. Current chopping in circuit breakers. Short line fault condition and its relation to circuit breaker duty. Trapped charge effects. Effect of source and source representation in short line fault studies. Control of transients.

UNIT-II

Lightening Phenomenon.

Influence of tower footing resistance and earth resistance. Traveling waves in distributed parameter multi conductor lines, parameters as a function of frequency. Lightning arrestors and their rating, surge diverters in transient analysis. Influence of pole opening and pole reclosing.

UNIT-III

Insulation Co-ordination:

Over voltage limiting devices, dielectric properties, breakdown of gaseous insulation, tracking and erosion of insulation, high current arces, and metallic contacts.

References:

- Transients in Power Systems Lou van der Sluis, JohnWiley & Sons.
- Transients in Power Systems by V. A. Vanikov, Mir Publications, Moscow.
- Traveling Waves on Transmission Lines Bewley, L.V Dover Publications Inc., New York.

- High Voltage Insulation Engineering by Ravindera Arora, Wolfgang Mosch, New Age International Publishers Limited.
- Electrical Translents in Power Systems by Greenwood: A. John Wiley &Sons.

8th Semester Syllabus

Elective II

Course Code: ELE-808/E

Restructuring of Power System.

UNIT-I

Introduction: Basic concept and definitions, privatization, restructuring, transmission open access, wheeling, deregulation, components of deregulated system, advantages of competitive system.

UNIT-II

Power System Restructuring: An overview of the restructured power system, difference between integrated power system and restructured power system. Explanation with suitable practical examples.

UNIT-III

Deregulation of Power Sector: Separation of ownership and operation, Deregulated models, pool model, pool and bilateral trade's model, multilateral trade model.

UNIT-IV

Competitive electricity market: Independent System Operator activities in pool market, wholesale electricity market characteristics, central auction, single auction power pool, double auction power pool, market clearing and pricing, Market Power and its Mitigation Techniques, Bilateral trading, Ancillary services.

UNIT-V

Transmission Pricing: Marginal pricing of Electricity, nodal pricing, zonal pricing, embedded cost, postage stamp method, contract path method, boundary flow method, MW-mile method, MVA-mile method, comparison of different methods.

UNIT-VI

Congestion Management.

Congestion management in normal operation, explanation with suitable example, total transfer capability (TTC), available transfer capability (ATC).

References:

- "Power System Restructuring and Deregulation" edited by Loi Lei Lai, John Wiley & Sons. Ltd.
- "Understanding Electric Utilities and Deregulation", Lorrin Philipson and H. Lee Wilis, Marcel Dekker Inc, New York.

System Planning and Load Forecasting - Course Code: ELE-808/E

8th Semester Syllabus

Elective II

System Planning and Load Forecasting **Course Code: ELE-808/E**

UNIT-I

Forecasting: Needs uses and current status of forecasting-fundamentals of quantitative forecasting-explanatory and time serious forecasting-least square estimates-peak load forecasting- Accuracy of forecasting methods. Regression methods – Box Jenkins time serious methods. Problems facing electricity industry-Long term forecasting techniques –Methods of long term forecasting – Special load ssforecasting – Multivariate procedures- Short Term forecasting techniques.

UNIT-II

Forecasting and Planning: The role of forecasting in planning – comparison and selection of forecasting methods. The accuracy of forecasting methods – Pattern of the Data and its effects on individual forecasting methods. Time horizon effects on forecasting methods. Generation planning-fundamental economic analysis-Generation planning optimized according to generating unit categories distribution & transmission system planning.

Reference Books:

- Makridakis, Spyrox, forecasting methods and application, John Wiley, 1993
- X. Wing & J. R. MC Donald. Modern Power System Planning, McGraw Hill, 1993
- A.S. Pabla Electrical Power System Planning, MacMillan, Delhi 1998
- Sullivan Power System Planning McGraw Hill