### Scheme of Instruction and Evaluation

I Semester of II Year of 4-Year B.Tech. Degree Programme

**Electrical & Electronics Engineering**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course</th>
<th>Lectures</th>
<th>Tutorials</th>
<th>Drawing / Practicals</th>
<th>Hours of Instructions per week</th>
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</table>
UNIT - I

1. **Complex Integration**: Line integration in complex plane, Cauchy’s integral Theorem, Cauchy’s integral formula. Series expansion of complex functions: Taylor’s series and Laurent’s series, Zeros and singularities. Residues- Residue Theorem- evaluation of real integrals using Residue Theorem (contours of the type semi circle and circle only) 8+3

UNIT- II

2. **Laplace Transforms**: Laplace transform-Inverse Transform-Properties of Laplace Transforms- Laplace Transform of unit step function, impulse function, and periodic functions- Convolution theorem, Solution of ordinary differential equations with constant coefficients and system of ordinary differential equations with constant coefficients using Laplace Transforms. 8+3

UNIT - III

3. **Fourier Series**: Expansion of a function as Fourier series for a given range- Fourier series of even and odd functions- Half range cosine and sine series expansions. 8+3

UNIT - IV

4. **Partial Differential Equations**: Solution of wave equation, Heat flow equation, and Laplace equation by the method of separation of variables and problems of vibrating string, One dimensional unsteady heat flow, two dimensional steady state heat flow(Problems based on Fourier-Trigonometric series only) 12+3

**TEXT BOOK:**


**REFERENCE BOOKS:**

EE - 212 NETWORK THEORY

Class: II/IV B.Tech. I Semester   Lectures: 3, Tutorial: 1
Branch: EEE,                     University Examination: 100 marks
Duration of University Examination: 3 hours  Sessionals: 50 marks

UNIT - I

Network Topology : Topological description of networks - Lumped Vs Distributed circuits -
Network graph theory - Tress, Co-Tress and loops - Incidence matrix - Tie-set and cut-set
Matrices - Kirchoff’s Laws and analysis of Networks.

Network Theorems and applications for A.C. Circuits : Thevenin’s - Norton's - Reciprocity-
Millmen's - Maximum power-Telligen's –Compensation and Substitution Theorems. (9 + 3)

UNIT - II

Time response analysis of networks: Transient analysis of R-L,R-C,R-L-C series and parallel
networks with step , impulse , sinusoidal and pulse excitation-initial conditions-Special signal
waveforms-Ramp, Triangular, Train of pulses, delayed input.
P-SPICE : Introduction to P-SPICE - representation of circuit elements - Analysis of circuits
using P-SPICE - Simple problems (9+3)

UNIT - III

Two port networks : Characterisation of linear time invariant two port networks - Open circuit
impedance Parameters - Short circuit admittance parameters - transmission parameters – Inverse
transmission parameters - Hybrid parameters -Inverse Hybrid parameters - Inter relationship
between parameters - Inter connections of two port networks –Ladder network-Bridged-T,
Parallel-T and Lattice-T network-Network representation of element devices - Network
transmission criteria. (9+3)

UNIT - IV

Network Functions : Network functions for 1-port and 2-port networks and their relationships -
Ladder Networks - General Networks - Poles and Zeros of Network functions - Restrictions of
pole-zero locations for driving point functions.

Network Synthesis : Positive real function properties - Hurwitz Polynomials - Even and odd
functions - Test for positive Real functions - Elementary synthesis operation - Properties and
Foster and Cauer forms of RL, RC and LC networks. (9+3)

TEXT BOOKS:
1. M.E.Van Valkenberg, “Network Analysis” PHI

REFERENCES:
1. J.Edminister & M.Nahvi, “Electric Circuits” Schaum’s Outlines.TMH
2. D.Roy Choudhary, “Network analysis and Synthesis”New age Publishers
UNIT – I


UNIT – II


3-ϕ A.C. Circuits: Production of 3-ϕ Voltages, Voltage & Current relationships of Line and Phase values for Star and Delta connections, 3-ϕ Power Measurement by two-wattmeter method. (9+3)

UNIT – III

Magnetic circuits: Self and Mutual Inductance, Dot Convention, Coefficient of Coupling.


UNIT – IV


1-Phase Induction Motors: Production of Rotating Field in various type of 1-ϕ Phase Motors Split Phase, Capacitor Start, Capacitor run, Shaded Pole motors and Applications.

Synchronous Generators and Motors: Principal of Operation and its Applications. (9+3)

TEXT BOOKS:

1. Vincent Del Toro “PRINCIPLES OF ELECTRICAL ENGINEERING” PHI
2. Edward Hughes, “ELECTRICAL TECHNOLOGY “, Pearson Publisher

REFERENCE BOOKS:

1. M.S. Naidu & S. Kamakshaiah, “INTRODUCTION TO ELECTRICAL ENGINEERING
3. Sudhakar and Shyam Mohan “NETWORK ANALYSIS AND SYNTHESIS” TMH
4. Nagrath and kothari “BASIC ELECTRICAL ENGINEERING “ TMH
EE-214 ELECTRICAL ENGINEERING MATERIALS

Class: II Year B.Tech. I Semester  
Lectures : 3  
Tutorial: 1
Branch: EEE  
University Examination: 100 Marks
Duration of University Examination: 3 Hrs  
Sessionals: 50 Marks

UNIT-I

UNIT-II

UNIT-III

UNIT-IV

TEXT BOOKS:

REFERENCE BOOKS:
1. A.J.Dekker “ELECTRICAL ENGINEERING MATERIALS” PHI
EI-215 ELECTRONIC DEVICES AND CIRCUITS – I

Class: II/IV B.Tech. I – Semester Lectures: 3
Branch: ECE, E&I, EEE University Examination: 100 marks
Duration of University Examination: 3 Hours Sessionals: 50 marks

UNIT – I

UNIT – II
Transistors, current components in NPN and PNP transistors, Ebers-Moll model. Small Signal LF h-parameter model, Determination of h-parameters – Analysis of transistor amplifier using h-parameters in CE, CB and CC configuration –simplified analysis for these configurations,BJT as a switch.

UNIT – III

UNIT – IV
Transistor biasing Thermal runway and thermal stabilization. The operating point stability Collector –to-base, self Bias. Stabilization against variations in V_{BE} and Beta for self bias circuits, FET biasing, Source self bias. Zero current drift biasing. Biasing against device variation. Biasing of enhancement type MOSFET.

TEXT BOOKS:

UNIT - I

1. **Introductory concepts and Definitions:** Properties of fluids; Fluid statics; pressure at a point; Hydrostatic pressure; Manometry; Hydrostatic forces on plane and curved Surfaces; Buoyancy; Stability of floating bodies Metacentric height: (5+3)

   **Fluid Kinematics:** Description of fluid flow; Velocity field; Acceleration of fluid element in general 3-D flow; Streamlines; Rotation of fluid Element and Conditions for irrotational flow; in 3-D flow and along a stream tube.

UNIT - II

2. **Fluid Dynamics:** Euler’s equation in 3-D flow and along a stream tube; Its integration to yield Bernoulli Equation and underlying assumptions; Energy equation; Linear-Momentum equations; Applications through orifices; Mouthpieces; Liquid Jets etc; Time of emptying of Vessels; Measurement of velocity and flow with pitot tube, prandtl tube, venturimeter, orificemeter, flow nozzle, Rotameter, sharp,crested,weirs: (9+3)

UNIT - III

3. Dimensional analysis and Dimensionless numbers; Formation of equations by Buckingham’s II – method, model Analysis. (3+1)

   Viscous Flow; Laminar flow through pipes and parallel plates by one-dimensional approach; Turbulent flow through pipe; velocity distribution; smooth and rough pipes; friction factor; moody’s chart; Local losses in pipes; problems of flow through pipes; plotting of energy gradient and hydraulic lines: (5+1)

UNIT - IV

4. Hydraulic machinery; Angular Momentum equation for a fluid machine; Hydraulic turbines – Main energy transfer types and their features; Application of basic tube functions and types; Main and Operational characteristics; cavitation and Methods to avoid it; Centrifugal and reciprocating pumps; construction and function of various components; simple calculations; characteristics. (10+2)

TEXT BOOKS AND REFERENCES:

1. V.L. streeter ; Fluid Mechanics, Mc Graw Hill Book Co.
LIST OF EXPERIMENTS

1. Verification of Superposition Theorem
2. Verification of Thevenin’s Theorem
3. Verification of Maximum Power Transfer Theorem
4. Measurement of 3-Phase Power By Two Watt Meter Method
5. Frequency Response of R-L-C Series Circuit
6. Determination of Parameters of a Choke Coil
7. O.C And S.C Tests on 1-Phase Transformer
8. Efficiency And Voltage Regulation of a 1-Phase Transformer By Direct Load Test
9. Speed Control of A D.C Shunt Motor
10. Load Test on 3-Phase Induction Motor
EE - 217 NETWORK LABORATORY EXPERIMENTS

Class: II Year B.Tech. I - Semester
Branch: EEE
Practicals: 3
Sessionals: 50 marks

LIST OF EXPERIMENTS

1. Verification of Superposition Theorem for AC circuits.
2. Verification of Thevenin's Theorem for AC circuits.
3. Verification of Maximum Power Transfer Theorem for AC circuits.
4. Verification of Reciprocity Theorem for AC circuits.
5. Determination of Z - Y parameters of Two-port network
6. Determination of ABCD Parameters & Inverse ABCD Parameters of Two-port network.
7. Determination of Hybrid Parameters & Inverse Hybrid Parameters of Two-port network.
8. Determination of Self and Mutual inductance and coefficient of coupling for coupled circuits.
10. Analysis of circuits using P-SPICE
# Scheme of Instruction and Evaluation

## II Semester of II Year of 4-Year B.Tech. Degree Programme

### Electrical & Electronics Engineering

<table>
<thead>
<tr>
<th>Course number</th>
<th>Course</th>
<th>Lectures</th>
<th>Tutorials</th>
<th>Drawing / Practicals</th>
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MH- 221 MATHEMATICS-III

Class: II Year B.Tech. II Semester
Branch: Mech, Civil, E&I, EEE, CSE, IT, ECE
Duration of University Examination: 3 Hrs

Lectures: 3 Tutorial: 1
University Examination: 100 Marks
Sessionals: 50 Marks

UNIT I

1. MATRICES: Rank of matrix-Solution of system of linear equations-linear dependence and independence of vectors-Characteristic roots and characteristic vectors of a matrix-Caley Hamilton ´s Theorem (without proof)-Reduction of a matrix to diagonal form and normal form-Reduction of a quadratic form to canonical form.

UNIT II


UNIT III

3. NUMERICAL ANALYSIS: Interpolation-Forward and Backward differences interpolation-Newton’s and Lagrange’s formulae.
4. NUMERICAL DIFFERENTIATION AND INTEGRATION: First and Second derivatives using forward and backward interpolation- Numerical integration-Trapezoidal and Simpson’s rule.

UNIT IV

5. SOLUTION TO SYSTEM OF LINEAR EQUATIONS: Jacobi, Gauss Siedel iteration method-Solution of algebraic and transcendental equations – Bisection method, Regula- Falsi method and Newton Raphson’s method.

TEXT BOOK:

REFERENCES BOOKS:
EE 222 ELECTRICAL MACHINES – I

Class: II/IV B.Tech. II Semester Lectures:3, Tutorials:1
Branch: EEE University Examination: 100 marks
Duration of University Examination: 3 hours Sessionals: 50 marks

UNIT – I
1. **1. Basic Principles of Rotating Electrical machines:** Principles of Electromechanical Energy Conversion, singly and doubly excited systems – Basic constructional features of rotating Electrical machines.

2. **2. DC Generators:** Principle of operation, Armature windings, Simplex and Multiplex lap and wave windings, Types of DC Generators, emf equation. (9+3)

UNIT – II

UNIT – III
4. **4. D.C. Motors:** Principle of operation-Back emf- Torque Equation- Classification of DC motors-Speed Control- Starters- Losses and Efficiency - Testing of DC machines, Brake Test- Swinburne’s Test - Hopkinsan’s Test- Retardation Test- Field’s Test -separation of Stray losses- characteristics and applications of DC motors. (9+3)

UNIT – IV
5. **5. Transformers, Single Phase Transformers:** Constructional features, principle of operation, emf equation, operation on no load and on load, Development of equivalent circuit, Determination of equivalent circuit parameters, phasor diagram, losses, ordinary efficiency and All day efficiency, Separation of circuit losses, regulation, approximation and rigorous expressions, predetermination of performance by OC and SC tests, Suppress test, Parallel operation, Load sharing.

6. **6. Auto Transformer:** principle of working, saving of copper as compared to two winding Transformer.

7. **7. Three Phase Transformers:** Types of connections, Relation between line and phase voltages and currents, Three winding Transformer,Use of tertiary winding, Scott connection of Transformers for phase conversion, Tap changing, Off load and On load, Induction Regulator. (9+3)

TEXT BOOK:

REFERENCE BOOKS:
2. Claytons Hancock “PERFORMANCE of DC MACHINES”
3. M.G. Say, “PERFORMANCE of AC MACHINES”
4. Nagrath and Kotari “ELECTRICAL MACHINES” TMH
EE-223 ELECTRICAL MEASUREMENTS

Class: II/IV B.Tech. II Semester
Branch: EEE
Duration of University Examination: 3 hours

Lectures: 3, Tutorials: 1
University Examination: 100 marks
Sessionals: 50 marks

UNIT – I


UNIT – II


UNIT – III


MAGNETIC INSTRUMENTS: Measurement of Magnetic field - Types of instruments and their principle of working – Ballistic Galvanometer, Flux meter - B-H loop plotting (9+3)

UNIT – IV


TEXT BOOKS:
1. Electrical Measurement in Measuring Instruments. Goldwing E.W. and Widdies
2. Electrical and Electronics Measurement and Instrumentation Sahwany A.K.

REFERENCE BOOKS:
UNIT – I
Static Electric Fields: Coulomb's law - Electric field intensity - Field due to different charge configurations - Electric flux- Electric flux density - Gauss law and its Applications- Divergence theorem - Relation between D and E - Work done in moving a unit positive charge - Electric potential-Absolute potential-Potential difference between two points and it is independent of path of integration- Potentials caused by different types of charge configurations - Relation between E and V- Potential and electric field at a point due to electric dipole - Torque on electric dipole when placed in Electric field - Electro static energy-Energy density. (9+3)

UNIT – II

UNIT – III

UNIT – IV

TEXT BOOKS:
1. W.H. Hayt (Jr.) “ENGINEERING ELECTROMAGNETICS” TMH

REFERENCES:
2. 2.K.A.Gangadhar “FIELD THEORY” Khanna publishers
UNIT-I
SMALL SIGNAL LOW FREQUENCY TRANSISTOR AMPLIFIER CIRCUITS:
Analysis of Single Stage transistor amplifier circuits using $h$-parameters, RC coupled amplifier – Frequency response analysis, cascaded amplifiers.

HIGH FREQUENCY TRANSISTOR AMPLIFIER CIRCUITS:
High frequency model of a transistor $\alpha$ and $\beta$ cut-off frequencies, single Stage and Multistage amplifiers at High frequencies Calculation of Band Width of single and multistage amplifiers.

UNIT-II
DC AMPLIFIERS:
DC amplifiers, drift compensation techniques, differential amplifiers.
FET AMPLIFIERS:
FET Low frequency and High Frequency models; Low and High frequency response of amplifier circuits, Analysis of Single and Multistage amplifier circuits.

UNIT-III
FEED BACK AMPLIFIERS:
Concept of feedback, Classification of feedback amplifiers, general characteristics of negative feedback amplifiers, effect of feedback on amplifier characteristics.
OSCILLATORS:
Condition for Oscillations, RC and LC type oscillators, crystal oscillators, frequency and amplitude stability of Oscillations.

UNIT-IV
POWER AMPLIFIERS:
Class A,B and AB power amplifiers: Push-Pull and Complementary push-pull amplifiers, design of heat sinks, power o/p efficiency, cross – over and Harmonic Distortion.
TUNED AMPLIFIERS:
Single tuned and Double tuned voltage amplifiers, Inter stage design, stability considerations, class B and Class C tuned Power amplifiers.

TEXT BOOKS:

REFERENCE BOOKS:
EC -225 SIGNALS & SYSTEMS

Class: II/IV B.Tech. II Semester. Lectures:3, Tutorials:1
Branch: ECE, EIE, EEE University Examination: 100 marks
Duration of University Examination: 3 hours Sessionals: 50 marks

UNIT – I

Signals – Signals and their representation, classification of signals, singularity functions – Impulse, step, ramp functions, representation of signals with singularity functions, exponential functions.

Systems: Definition, Classification of Systems, Convolution integral, graphical convolution.

Signal Approximation – Approximation of a function by a set of mutually orthogonal functions, mean square error, complete set of orthogonal functions orthogonality in complex functions, Trigonometric and exponential Fourier series, representation of periodic functions by Fourier series, complex Fourier spectrum.

UNIT – II

Fourier Transforms and their applications to systems – Fourier transform definition, properties of F.Ts, energy spectral density, Parseval’s theorem, power spectral density, Hilbert transforms and properties.

Linear Systems – impulse response, response of a linear system, linear time invariant system, linear time variant system, transfer function of LTI system.

UNIT – III

Random Variables & Processes – Probability, Joint Probability, Statistical independence, Random Variables, cumulative distribution function, probability density function, relation between probability & probability density, joint commutative distribution, average value of random variables, variance of a random variable, Chebycheff’s inequality, the Gaussian probability density, the error function, Rayleigh probability density, mean & variance of the sum of random variables, correlation between random variables, central limit theorem.

UNIT – IV

Discrete Time Signals & Systems: Discrete time signals, representation, operations on sequences, Discrete time systems and classification, LTI systems, Linear Convolution, Difference equations.

Z-Transforms: ROC, properties of Z-Transforms Inverse Z-Transforms, Causality and stability.


TEXT BOOKS:

2. Zeimer, Signals & Systems, PHI.

REFERENCE BOOKS:

1. Oppenheim, Willsky & Young; Signals and Systems PHI, EEE, New Delhi.
3. B.P. Lathi, Signals & Systems and Communication – BSP.
LIST OF EXPERIMENTS

1. Measurement of resistance using Kelvin's double bridge.
6. Measurement of displacement using LVDT.
7. Measurement of strain using strain gauge.
9. Measurement of frequency using CRO.
15. Extension of meter ranges.
EI- 2210 ELECTRONIC CIRCUITS- LAB

Class: II/IV B.Tech. II Semester  
Practicals: 2 Hrs

Branch: EEE  
University Examination: 50 Marks

Duration of University Examination: 2 Hrs  
Sessionals: 25 Marks

LIST OF EXPERIMENTS

1. Characteristics of: PN Diode, Zener Diode, SCR, UJT

2. Static Characteristics of: BJT(CE), FET(CS)

3. Half wave & Full wave Rectifiers: Without & with Filters.


5. BJT Biasing Circuits: Fixed Bias, Collector to Base Bias, Self Bias

6. BJT Switch, Amplifier.

7. Emitter Follower.

8. Cascade Amplifier (Two Stage).

9. FET Amplifier.


13. Class -B Power Amplifier.

## SCHEME OF INSTRUCTION AND EVALUATION
### I SEMESTER OF III YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

### ELECTRICAL & ELECTRONICS ENGINEERING

<table>
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<th>Course</th>
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## ECONOMICS

**UNIT – I**

**Economics:** Meaning, Definition, Scope: Micro and Macro, Assumptions and Methods, Usefulness. (2 Periods)


## MANAGEMENT

**UNIT – II**

**Management:** Meaning and Definition. Scope of Management- Principles of Management. Scientific Management: Definition, Characteristics and Criticism. (4 Periods)


**UNIT – III**

**Staffing:** Meaning and Functions of Personnel Management. Coordination: Definition, how to Achieve Effective Coordination. Controlling: Definition and Process. (4 Periods)

## ACCOUNTANCY

**UNIT – IV**

**Double Entry Book-Keeping:** Definition. Journalization of Transactions. Ledger Posting and Balancing. Preparation of Trial Balance. (10 Periods)

**Preparation of Final Accounts:** Trading Account, Profit And Loss Account and Balance sheet (With Simple Adjustments) (7 Periods)

## REFERENCE BOOKS:

2. Principles and Practice of Management By L.M.Prasad.
3. Introduction To Accountancy BY T.S. Grewal.
EE 313 ELECTRICAL MACHINES – II

Class: III/IV B.Tech. I Semester
Branch: EEE.
Duration of University Examination: 3 hours

Lectures: 3, Tutorials: 1
University Examination: 100 marks
Sessionals: 50 marks

UNIT – I
1. 3-Phase Induction Motors: Construction details, Types, Production of rotating magnetic
   field, Principle of operation, Equivalent circuit, Phasor diagram, torque equation, Slip torque
   characteristics, Effects & Change in supply voltage and supply frequency on torque and
   speed, Losses and efficiency, Testing, No load and Blocked Rotor test, Determination of
   equivalent circuit parameters, Pre determination of performance from equivalent circuit and
   circle diagrams
2. Methods of Starting, Direct on line, Star Delta, Autotransformer, Rotor resistance starters.
3. Methods of speed control: Pole changing, Cascading, Variable frequency Variable voltage,
   Rotor resistance, Rotor injected emf technique.
   characteristics and applications. (9+3)

UNIT – II
5. Synchronous Generators: Construction, Types, Winding factors, Production of emf –
   Harmonics, Armature reaction – Synchronous reactance – Phasor diagrams, Load
   characteristics OC and SC tests, Methods of predetermination of regulation by synchronous
   Impedance(EMF). MMF method, Potier(ZPF) and ASA methods, Simple theory of two
   reaction analysis and its application for the pre determination of regulation of alternator, Slip
   test, power angle characteristics, Synchronization and synchronizing power, parallel
   operation, Load sharing, operation on infinite bus bar, High frequency generation, Typical
   applications, short circuit transients in synchronous machines. (9+3)

UNIT – III
6. Synchronous Motors: Principle of operation, Phasor diagrams, variables of current and
   power factor with excitation, Hunting and its application, Determination and pre
   determination V and A curves, excitation circles and pane circles, methods of starting
   Synchro condenser, Applications. (9+3)

UNIT – IV
7. Single phase Induction Motors: Principle & operation, Starting methods, Double revolved
   fixed theory, Equivalent circuit, Determination equivalent circuit parameters
8. Special purpose machines: Constructional features, principle & working characteristics and
   applications of Stepper motor, Brushless DC motor, Scharage motor, Reluctance motor,
   Hystersis motor and Linear Induction motor. (9+3)

TEXT BOOKS:
2. P.S. Bhimbhra, “GENERALIZED THEORY OF ELECTRICAL MACHINES”, Khanna
   Publishers.
3. Mukhopadyaya, “ELECTRICAL MACHINES”.

EE 314 POWER SYSTEMS – I
UNIT – I


UNIT – II

**Non Conventional Energy Sources:** Tidal Power, Wind Power, Geo Thermal Power, Mangoa Hydro Dynamic Power, Solar Power. **Economics of Power Generation:** Definitions, Connected load, Maximum demand, Demand factor, Load factor, Diversity factor, Load duration curve, Number and size of generating units, Base load and peak load plants, cost of Electrical energy, Fixed cost, Running cost, Tariffs. (9+3)

UNIT – III

**Insulators:** Types, Potential distribution over a string of suspension insulators, Factors affecting the distribution of voltage along the string insulators, Methods of equalizing potential string efficiency, Stringing charts, Testing of insulators. **Corona:** Critical disruptive voltage, Corona loss, Line design based on corona, Disadvantage of corona, Radio interference, and Inductive interference between power and communication lines. (9+3)

UNIT – IV

**Distribution Lines:** Distribution Systems, D.C. two wire and three wire systems. Single phase and three phase 3 wire and 4 wire AC systems – Comparison of efficiency, Kelvin’s Law – Economic size of conductor. **Transmission Lines:** Electrical Power system components – Elementary ideas of layout – Resistance and capacitance of transmission lines, single phase; and 3 phase lines with symmetrical and asymmetrical spacing, composite conductors – Transposition, bundled conductors, Effect of earth on capacitance, Mechanical design of transmission lines. **Under Ground cables:** Electric stress in a cable-core cable-Grading of cables-cable capacitance-cable inductance-Dielectric loss and Heating. (9+3)

**TEXT BOOKS:**
5. Syed A Nasar” Electric Power Systems” McGRAW-HILL

**REFERENCE BOOKS:**
1. Soni, Gupta, Bhatnagar, “ELECTRICAL POWER”.Dhanpat rai & sons
UNIT – I

1. **Introduction:**
   Types of systems, Properties of systems, Linearity, Time-inverience, Stability, Causality.
   Open loop control system, Closed loop control system, Effect of Feedback on over all gain,
   Stability and Sensitivity.

2. **MATHEMATICAL MODES OF PHYSICAL SYSTEMS:**
   Electrical, Mechanical and Electromechanical systems, Transfer function of physical systems
   by Block diagram reduction techniques and signal flow graphs, Drawing a signal flow graph
   from a block diagram.

UNIT – II

3. **CONTROL SYSTEM COMPONENTS:**
   AC and DC servomotors, Synchros, Tacho generator and Potentiometer.

4. **TIME DOMAIN ANALYSIS:**
   Design specifications, Typical test signals, Time response of first order and of 2\textsuperscript{nd} order
   systems, Time domain specifications, Basic control actions like P, PI, PD, PID and derivative
   feedback, Steady State error and error constants, Routh Hurwitz Criterion, Concept of root
   locus and construction of root loci, Effects of adding poles and zeros.

UNIT – III

5. **FREQUENCY DOMAIN ANALYSIS:**
   Frequency response of closed loop systems, Specifications, Correlation between frequency
   and time domain specifications, Polar plots, Gain Margin and Phase Margin, Bode plots,

UNIT – IV

6. **STATE VARIABLE ANALYSIS OF CONTINUOUS SYSTEMS:**
   Concepts of state, State variables and state model, Derivation of state model from transfer
   function, Diagonolization, Derivation of transfer function from state model, Solution of state
   equations, State transition matrix, Concept of Controllability and Observability.

7. **COMPENSATION:** Elementary treatment of Compensation.

**TEXT BOOKS:**


**REFERENCES:**

EC 314 LINEAR INTEGRATED CIRCUITS

Class: III/IV B.Tech. I – Semester  
Branch: ECE, E&I, EEE  
Lectures: 3

University Examination: 100 marks
Duration of University Examination: 3 Hours  
Sessionals: 50 marks

UNIT-I


UNIT-II

Applications of Operational Amplifiers: Summing and difference amplifiers, Integrator and differentiator, current to voltage and voltage to current converters, Instrumentation amplifier, sample and Hold circuit.

Non-Linear Applications: Precision Rectifiers – Half wave and full wave, log and antilog amplifiers.

Comparators and wave form generators: OPAMP comparators, Regenerative (Schmitt Trigger), R.C. phase shift and wiens bridge oscillators, Astable Multivibrator (Square wave generator) and Monostable Multivibrator.

UNIT-III


UNIT-IV


Phase Locked Loops: Voltage controlled oscillator, Basic PLL operation, definitions related to PLL, Monolithic PLL and design considerations, transient response of PLL, typical PLL applications (FSK, AM detectors)

Analog multiplexers, DAC types (R-2R ladder weighted ladder and Inverted ladder), ADCs types (Successive Approximation, Dual-Slop, Flash types).

TEXT BOOKS:

2. Ramakant Gayakwad, Opamp and Linear Integrated Circuits, Pearson Education.

REFERENCE BOOKS:

EC 318 DIGITAL ELECTRONICS

Class: III/IV B.Tech. I –Semester  
Lectures: 3  

Branch: Common to CSE, IT, EEE)  
University Examination: 100 marks  

Duration of University Examination: 3 Hours  
Sessionals: 50 marks

UNIT – I

Number Systems and Codes : Introduction to Number systems, Base conversion among different Number Systems, Signed number representation, Binary arithmetic, Use of 1’s and 2’s complement representation in Binary Number system Introduction to Codes, Weighted and Non weighted codes, self complementing and reflecting codes, code conversion, Error detection and correction, Hamming codes.

Switching functions and minimization: Basic laws of Boolean algebra, logical gates (block diagram representation), Boolean expressions, SOP and POS forms, realization of Boolean expressions with logic gates, simplification of Boolean expressions, Karnaugh map methods, Tabulation method.  

UNIT – II

Half Adder, Full Adder, Serial Adder, Parallel Adder, Carry look ahead Adder, BCD Adder, Subtractor, 1’s and 2’s complement Adder / subtractor.  
Decoders, Seven segment LED displays, Encoders, Multiplexers, De MUX’s realization of Boolean expression using MUX’s and De MUX’s.

UNIT – III

Sequential circuits : RS, JK, D and T Flip Flops, use of direct inputs, shift registers, applications of shift registers, Ring counter, Johnson counter.

Ripple counters – Design of Mod-N ripple counters.

Synchronous sequential machines – state diagrams, state tables, design of synchronous sequential machines, design of Mod-N synchronous counters, Design of sequence detectors. 

UNIT – IV


TEXT BOOKS:

REFERENCE BOOKS:
EE 316 ELECTRICAL MACHINES – I LABORATORY

Class: III/IV B.Tech. I Semester
Branch: EEE
Duration of University Examination: 3 hours
Practicals: 3
University Examination: 50 marks
Sessionals: 25 marks

LIST OF EXPERIMENTS

1. Determination of the magnetization characteristics and speed versus voltage curve separately excited D.C. generators.
2. Determination of the load characteristics of a separately excited D.C. Generator.
3. Determination of the load characteristics of a D.C. shunt generator.
5. Retardation test on a D.C. shunt machine.
7. Performance characteristics of two identical transformers by conducting back to back test.
   (Sumpners test).
8. Performance test on a scot connected transformer.
EC 317  INTEGRATED CIRCUITS LAB

Class: III/IV B.Tech. I Semester  Practical: 3Hrs.
Branch: E&I, EEE, ECE.  Sessionals: 25 Marks
Duration of University Examination: 3 hours.  University Examination: 50 Marks

LIST OF EXPERIMENTS

PART A

1. Realization of Boolean functions, HALF Adder using NAND/NOR gates.
2. Bit ripple counter using JK/TFFS.
3. 4 BIT shift register using DFFS
4. 4 Bit Ring and Johnson Counters
5. Verification of function table of Decade counter IC7490 And displaying O/P using decoders and D 7 Segment display.
6. (a) design of 4:1 MUX using logic gates and verification of its function table
7. (b) Realization of Boolean expressions using 8:1 MUX.

PART B

1. Measurement of OP Amp parameters
   (i) Open Loop gain
   (ii) I/P bias and offset currents
   (iii) I/P offset voltage
   (iv) Slew Rate and
   (v) CMRR
2. Design and testing of OP Amp Integrator and Differentiator
3. Design and testing of precision rectifier
4. Design and testing of Astable multivibrator and monostable multivibrator using IC 555 timer
5. Design and testing of wien’s Bridge oscillatox for required frequency using IC74
## SCHEME OF INSTRUCTION AND EVALUATION
### II SEMESTER OF III YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME
### ELECTRICAL & ELECTRONICS ENGINEERING

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HS 311 MANAGEMENT ECONOMICS AND ACCOUNTANCY

Class: III/IV B.Tech. I Semester
Lectures: 3
Branch: Common to All Branches.
University Examination: 100 marks
Duration of University Examination: 3 hours
Sessionals: 50 marks

ECONOMICS

UNIT:I


MANAGEMENT

UNIT:II

Management: Meaning and Definition. Scope of Management- Principles of Management. Scientific Management: Definition, Characteristics and Criticism. (4 Periods)


UNIT:III


ACCOUNTANCY

UNIT:IV


Preparation of Final Accounts: Trading Account, Profit And Loss Account and Balance sheet(With Simple Adjustments) (7 Periods)

Reference Books:

2. Principles and Practice of Management By L.M.Prasad.
3. Introduction To Accountancy BY T.S. Grewal.

EE 313 ELECTRICAL MACHINES – II

Class: III/IV B.Tech. I Semester
Branch: EEE
Lectures:3, Tutorials:1
University Examination: 100 marks
Duration of University Examination: 3 hours
Sessionals: 50 marks

UNIT – I

1. 3-Phase Induction Motors: Construction details, Types, Production of rotating magnetic field, Principle of operation, Equivalent circuit, Phasor diagram, torque equation, Slip torque characteristics, Effects & Change in supply voltage and supply frequency on torque and speed, Losses and efficiency, Testing, No load and Blocked Rotor test, Determination of equivalent circuit parameters, Pre determination of performance from equivalent circuit and circle diagrams.

2. Methods of Starting, Direct on line, Star Delta, Autotransformer, Rotor resistance starters.


4. Double cage induction motor: Construction. Principle & operation, equivalent circuit characteristics and applications. (9+3)

UNIT – II

5. Synchronous Generators: Construction, Types, Winding factors, Production of emf – Harmonics, Armature reaction – Synchronous reactance – Phasor diagrams, Load characteristics OC and SC tests, Methods of predetermination of regulation by synchronous Impedance(EMF). MMF method, Potier(ZPF) and ASA methods, Simple theory of two reaction analysis and its application for the pre determination of regulation of alternator, Slip test, power angle characteristics, Synchronization and synchronizing power, parallel operation, Load sharing, operation on infinite bus bar, High frequency generation, Typical applications, short circuit transients in synchronous machines. (9+3)

UNIT – III

6. Synchronous Motors: Principle of operation, Phasor diagrams, variables of current and power factor with excitation, Hunting and its application, Determination and pre determination V and A curves, excitation circles and pane circles, methods of starting Synchro condenser, Applications. (9+3)

UNIT – IV

7. Single phase Induction Motors: Principle & operation, Starting methods, Double revolved fixed theory, Equivalent circuit, Determination equivalent circuit parameters

8. Special purpose machines: Constructional features, principle & working characteristics and applications of Stepper motor, Brushless DC motor, Scharage motor, Reluctance
motor, Hysteresis motor and Linear Induction motor (9+3)

**TEXT BOOKS:**

3. Mukhopadyaya, “ELECTRICAL MACHINES”.

EE 314 POWER SYSTEMS – I

Class: III/IV B.Tech. I Semester  Lectures: 3, Tutorials: 1
Branch: EEE  University Examination: 100 marks
Duration of University Examination: 3 hours  Sessionals: 50 marks

UNIT – I


   (9+3)

UNIT – II


3. **Economics of Power Generation**: Definitions, Connected load, Maximum demand, Demand factor, Load factor, Diversity factor, Load duration curve, Number and size of generating units, Base load and peak load plants, cost of Electrical energy, Fixed cost, Running cost, Tariffs. ...

   (9+3)

UNIT – III

4. **Insulators**: Types, Potential distribution over a string of suspension insulators, Factors affecting the distribution of voltage along the string insulators, Methods of equalizing potential string efficiency, Stringing charts, Testing of insulators.

5. **Corona**: Critical disruptive voltage, Corona loss, Line design based on corona, Disadvantage of corona, Radio interference, and Inductive interference between power and communication lines.

   (9+3)

UNIT – IV

7. **Transmission Lines:** Electrical Power system components – Elementary ideas of layout – Resistance and capacitance of transmission lines, single phase; and 3 phase lines with symmetrical and asymmetrical spacing, composite conductors – Transposition, bundled conductors, Effect of earth on capacitance, Mechanical design of transmission lines.

8. **Under Ground cables:** Electric stress in a cable-core cable-Grading of cables-cable capacitance-cable inductance-Dielectric loss and Heating

   (9+3)

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**TEXT BOOKS:**

5. SYED A NASAR” ELECTRIC POWER SYSTEMS” McGRAW-HILL

**REFERENCE BOOKS:**

1. Soni, Gupta, Bhatnagar, “ELECTRICAL POWER”.Dhanpat rai & sons
EE 319 CONTROL SYSTEM ENGINEERING

Class: III/IV B.Tech. I Semester
Branch: EEE, E&I, ECE
Lectures: 3, Tutorials: 1
University Examination: 100 marks
Duration of University Examination: 3 hours
Sessionals: 50 marks

UNIT – I
1. INTRODUCTION: (9+3)

2. MATHEMATICAL MODES OF PHYSICAL SYSTEMS:
Electrical, Mechanical and Electromechanical systems, Transfer function of physical systems by Block diagram reduction techniques and signal flow graphs, Drawing a signal flow graph from a block diagram.

UNIT – II
3. CONTROL SYSTEM COMPONENTS: (9+3)
AC and DC servomotors, Synchros, Tacho generator and Potentiometer.

4. TIME DOMAIN ANALYSIS:
Design specifications, Typical test signals, Time response of first order and of 2nd order systems, Time domain specifications, Basic control actions like P, PI, PD, PID and derivative feedback, Steady State error and error constants, Routh Hurwitz Criterion, Concept of root locus and construction of root loci, Effects of adding poles and zeros.

UNIT – III
5. FREQUENCY DOMAIN ANALYSIS: (9+3)
Frequency response of closed loop systems, Specifications, Correlation between frequency and time domain specifications, Polar plots, Gain Margin and Phase Margin, Bode plots, Nyquist stability criterion, Relative stability using Nyquist stability criterion

UNIT – IV
6. STATE VARIABLE ANALYSIS OF CONTINUOUS SYSTEMS: (9+3)
Concepts of state, State variables and state model, Derivation of state model from transfer function, Diagonalization, Derivation of transfer function from state model, Solution of state equations, State transition matrix, Concept of Controllability and Observability.

7. COMPENSATION:
Elementary treatment of Compensation.

TEXT BOOKS

REFERENCES
EC 314 LINEAR INTEGRATED CIRCUITS

Class:III/IV B.Tech. I –Semester  
Branch: ECE, E&I, EEE  
Lectures: 3  
Duration of University Examination: 3 Hours  
University Examination: 100 marks  
Sessionals: 50 marks

UNIT-I

UNIT-II
Applications of Operational Amplifiers: Summing and difference amplifiers, Integrator and differentiator, current to voltage and voltage to current converters, Instrumentation amplifier, sample and Hold circuit.
Non-Linear Applications: Precision Rectifiers – Half wave and full wave, log and antilog amplifiers.
Comparators and wave form generators: OPAMP comparators, Regenerative (Schmitt Trigger), R.C. phase shift and wiens bridge oscillators, Astable Multitvibrator (Square wave generator) and Monostable Multivibrator.

UNIT-III

UNIT-IV
Phase Locked Loops: Voltage controlled oscillator, Basic PLL operation, definitions related to PLL, Monolithic PLL and design considerations, transient response of PLL, typical PLL applications (FSK, AM detectors)
 Analog multiplexers, ADC types (R-2R ladder weighted ladder and Inverted ladder), ADCs types (Successive Approximation, Dual-Slop, Flash types).

TEXT BOOKS:
2. Ramakant Gayakwad, Opamp and Linear Integrated Circuits, Pearson Education.

REFERENCE BOOKS:
UNIT – I
Number Systems and Codes: Introduction to Number systems, Base conversion among different Number Systems, Signed number representation, Binary arithmetic, Use of 1’s and 2’s complement representation in Binary Number system
Introduction to Codes, Weighted and Non-weighted codes, self complementing and reflecting codes, code conversion, Error detection and correction, Hamming codes.
Switching functions and minimization:
Basic laws of Boolean algebra, logical gates (block diagram representation), Boolean expressions, SOP and POS forms, realization of Boolean expressions with logic gates, simplification of Boolean expressions, Karnaugh map methods, Tabulation method. (9+3)

UNIT – II
Half Adder, Full Adder, Serial Adder, Parallel Adder, Carry look ahead Adder, BCD Adder, Subtractor, 1’s and 2’s complement Adder/subtractor.
Decoders, Seven segment LED displays, Encoders, Multiplexers, De MUX’s realization of Boolean expression using MUX’s and De MUX’s. (9+3)

UNIT – III
Sequential circuits: RS, JK, D and T Flip Flops, use of direct inputs, shift registers, applications of shift registers, Ring counter, Johnson counter.
Ripple counters – Design of Mod-N ripple counters.
Synchronous sequential machines – state diagrams, state tables, design of synchronous sequential machines, design of Mod-N synchronous counters, Design of sequence detectors (9+3)

UNIT – IV
Logic Families: Introduction to logic families. Description of the terms – Fan in, Fan out, Noise margin, Propagation delay, current sourcing, current sinking.
Study of RTL, DCTL, DTL, HTL, TTL, ECL, MOS, CMOS families. (9+3)

TEXT BOOKS:
REFERENCE BOOKS:
EE 316 ELECTRICAL MACHINES – I LABORATORY

Class: III/IV B.Tech. I Semester  
Practicals: 3

Branch: EEE  
University Examination: 50 marks

Duration of University Examination: 3 hours  
Sessionals: 25 marks

LIST OF EXPERIMENTS

1. Determination of the magnetisation characteristics and speed versus voltage curve of a separately excited D.C. generators.

2. Determination of the load characteristics of a separately excited D.C. Generator.

3. Determination of the load characteristics of a D.C. shunt generator.


5. Retardation test on a D.C. shunt machine.


7. Performance characteristics of two identical transformers by conducting back to back test. (Sumpner's test).

8. Performance test on a scot connected transformer.


LIST OF EXPERIMENTS

PART A

1. Realization of Boolean functions, HALF Adder using NAND/NOR gates.
2. Bit ripple counter using JK/TFFS.
3. 4 BIT shift register using DFFS
4. 4 Bit Ring and Johnson Counters
5. Verification of function table of Decade counter IC7490 And displaying O/P using decaders and D 7 Segment display.
6. (a) design of 4:1 MUX using logic gates and verification of its function table
7. (b) Realization of Boolean expressions using 8:1 MUX.

PART B

1. Measurement of OP Amp parameters
   (i) Open Loop gain
   (ii) I/P bias and offset currents
   (iii) I/P offset voltage
   (iv) Slew Rate and
   (v) CMRR
2. Design and testing of OP Amp Integrator and Differentiator
3. Design and testing of precision rectifier
4. Design and testing of Astable multivibrator and monostable multivibrator using IC 555 timer
5. Design and testing of wien’s Bridge oscillatox for required frequency using IC74
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**Open Electives:**
- OE 321 A. Operations Research
- OE 321 B. Management Information Systems
- OE 321 C. Entrepreneurship Development
- OE 321 D. Forex & Foreign Trade
OE 321 (A) OPERATIONS RESEARCH

Course: B.Tech. III/IV II Semester
Branch: Common to all branches
External Examination: 3 Hours
Internal Examination: 2 Hours

Theory: 3 periods/week
External Evaluation: 100
Internal Evaluation: 50

UNIT-I (9)

UNIT-II (9)

UNIT-III (9)
Dynamic programming: Introduction, Multistage decision process, linear programming as a case of dynamic programming. Computational procedures in dynamic programming.
Special type of linear programming: Special type of linear programming problems - Transportation problems - balanced and unbalanced transportation, time transportation problem. Assignment problem - special case of transportation.

UNIT-IV (9)
Queuing Theory: Description of Queuing Models and applicability. Birth and Death Processes, Single server models with Poisson input and exponential service. Multiple service queuing models.

SUGGESTED TEXT / REFERENCE BOOKS:
2. Kanthiswaroop, etal, Opertions Research, S.Chand & Sons, New Delhi.
OE 321 (B) MANAGEMENT INFORMATION SYSTEMS

Course: III/IV B.Tech II Semester
Branch: Common to all branches
External Examination: 3 Hours
Internal Examination: 2 Hours

UNIT–I

Management Information Systems (MIS): MIS Concept, Definition, Role and Impact of MIS, MIS and Computer, MIS and Academics, MIS and the User.
Role and Importance of Management: Introduction and Approaches to Management, Functions of Manager, Managers and the Environment, Management as a Control System, Management by Exception, MIS – A Support to the Management.

UNIT–II


UNIT–III

Applications in Manufacturing Sector: Introduction, Personnel Management, Financial Management, Production Management, Materials Management, Marketing Management,
Corporate Overview.

**Applications in Service Sector:** Introduction to the Service Sector, Creating a Distinctive Service, MIS Applications in Service Industry, MIS: Service Industry.

**UNIT-IV**

(9)

**Decision Support Systems:** Concept and Philosophy, DSS: Deterministic Systems, Artificial Intelligence (AI) System, Knowledge Based Expert System (KBES), MIS and the Role of DSS.


Overview of Database Management Systems, Object Oriented Technologies, Client-Server Architecture, Networks.

Case Studies in MIS.

**SUGGESTED TEXT / REFERENCE BOOKS:**

**ENTREPRENEURSHIP DEVELOPMENT**

Course: III/IV B.Tech II Semester  
Theory: 3 Periods/week  
Branch: Common to all branches  
External Examination: 3 Hours  
Internal Examination: 2 Hours

**UNIT-I**  
(9)

**Entrepreneurship:** definition, Significance of Entrepreneurship. Role of Entrepreneurship in development advantages and limitations characteristics of a person to become an entrepreneur, human factor in Entrepreneurship, Motivation, Leadership qualities and the essential skills of communication etc., Role of women entrepreneurship, Agencies dealing with entrepreneurship and small scale Industries. Case studies of successful entrepreneurs. Identification of a variable business opportunity, Various methods.  
**Activity:** Inputs from DIC, SFC, IIC & Nationalized Banks.

**UNIT-II**  
(9)

**Activity:** Visit to a small scale industry.

**UNIT-III**  
(9)

**Project planning:** Product planning and development process, Definition of a project, Sequential steps in executing the project, principles of layouts, Types of layouts, Factors influencing layouts. choosing an optimum layout suitable to the venture. Tenders, Call for quotations, Purchase orders, Procurement and installation of machinery and equipment, Utilities etc. Fundamentals of Production Management, PPC-Concepts, Functions, Long & short run problems. Marketing Management: Definition, Functions and Segments. Financial Management: Objectives & Functions  
**Activity:** Interaction with Entrepreneurs in the field.

**UNIT-IV**  
(9)

**Personal and Human resource management:** Introduction, Definitions, Importance, Factors effecting Major functions of enterprise management. Selection, recruitment, training, placement, development, performance appraisal systems. Legal issues in Entrepreneurship, Intellectual property rights, Issues in setting up the organization.  
**Activity:** Preparation of project report for variable business venture
SUGGESTED TEXT / REFERENCE BOOKS:

2. David H. Holt, Entrepreneurship New venture creation prentice hall of India.
OE 321 (D) FOREX AND FOREIGN TRADE

Course: III/IV B.Tech. II Semester  Theory: 3 Periods/week
Branch: Common to all Branches  
External Examination: 3 Hours  External Evaluation: 100
Internal Examination: 2 Hours  Internal Evaluation: 50

UNIT-I


UNIT-II


UNIT-III

**Foreign Exchange:** Meaning and Importance of Exchange Rate. Methods of Foreign Payments. The Demand And Supply of Foreign Exchange. The Equilibrium Rate of Foreign Exchange. Functions of Foreign Exchange Market. Determination of Foreign Exchange Rate Under Different Monetary Systems: Mint Policy Theory, Balance of Payment Theory. (9)

UNIT-IV


SUGGESTED TEXT / REFERENCE BOOKS:

EE 322 POWER ELECTRONICS

Class: III/IV B.Tech. II Semester
Lectures: 3, Tutorials: 1

Branch: EEE
University Examination: 100 marks

Duration of University Examination: 3 hours
Sessionals: 50 marks

UNIT – I


2. Gate Triggering circuits, Resistance, Resistance – capacitance Trigger circuits, UJT as relaxation oscillator, series and parallel operation of SCRs, String efficiency, Different methods of forced communication Techniques.

UNIT – II


UNIT – III

4. Choppers: Basic circuit, step-up step-down, classification of choppers on the basis of various quadrants, chopper commutation, Jones and Morgan chopper.

5. Inverters: Series inverter, parallel inverter, voltage source inverters, and current source inverters, 1-phase and 3-Phase bridge inverters.

UNIT – IV

6. AC Voltage Controllers: Single Phase AC Controllers with R and RL loads, Three Phase AC Voltage Controllers with Star and Delta connected loads.

Cyclo converters: Principle and operation of Single phase to single phase, single phase to 3-phase, 3-phase to 1-phase Cyclo converters.

7. Industrial Applications: Battery charger, Uninterruptible power supply, Switched mode power supply.

TEXT BOOK:

REFERENCE BOOKS:
EE 324 POWER SYSTEMS – II

Class: III/IV B.Tech. II Semester
Branch: EEE

Lectures: 3, Tutorials: 1
University Examination: 100 marks
Sessionals: 50 marks

UNIT – I
1. **Performance of transmission line**: Representation of transmission lines, Short transmission lines, Medium length lines, Nominal “T” and “[” representation, Long transmission lines, Equivalent circuit representation of a long line; A,B,C,D constants, long lines, series (Tandam) and parallel networks, skin effect, proximity effect and Ferranti effect, Suge impedance loading, Power flow through transmission lines, Power circle diagrams. (9+3)

UNIT – II
2. **Voltage control**: Introduction, Methods of voltage control, Shunt, series compensation, tap changing transformers, Booster transformers, Synchronous phase modifiers, Determination of their capacities, analytical methods.
3. **Representation of Power systems**: Single line diagram, Impedance and reactance diagrams, per unit quantities, advantages of per unit systems. (9+3)

UNIT – III
4. **Symmetrical Components and fault calculations**: Significance of positive, negative, zero sequence components, Average 3-phase power in terms of symmetrical components. Sequence impedances and sequence networks for fault calculations, single line to ground (LG) fault, LL fault, LLG fault, LLLG fault, reactors and their location, short circuit capacity of a bus. (9+3)

UNIT – IV
5. **Traveling waves on transmission line**: Production of travelling waves, open circuited line, short circuited line, Line terminated through a resistance, line connected to a cable, reflection and refraction coefficients at a T-junction, Line terminated through a capacitance, attenuators of travelling waves.

TEXT BOOKS:

REFERENCE BOOK:
2. 2.THE Miller “Reactive power control in Electric systems”by John wiley &sons
EC 326 DIGITAL SIGNAL PROCESSING

Class: III/IV B.Tech. II–Semester  Lectures: 3
Branch: ECE, E&I, EEE  University Examination: 100 marks
Duration of University Examination: 3 Hours  Sessionals: 50 marks

UNIT-I
Basic Elements of Digital Signal Processing, Discrete Time Fourier Transform (DTFT):
Definition of DTFT, Properties of DTFT, Magnitude and phase transfer function, steady state
response of LTI System to a sinusoidal input,
Discrete Fourier Transform (DFT): Definition of DFT, Properties of DFT, Inverse Discrete
Fourier Transform (IDFT), Relation between DTFT, DFT and z-transform.
Fast Fourier Transform (FFT): Computational Complexity of DFT, Introduction to FFT,
Radix-2 FFT Algorithms, Decimation-in-time FFT Algorithm, Decimation-in-Frequency FFT
algorithm,

UNIT-II
Infinite Impulse Response (IIR) Filters: Reliability of Ideal Filter, Introduction to IIR Filters,
Methods of converting analog transfer function H(s) to its digital equivalent, Necessity of Filter
Approximation, IIR Digital filter design using Butterworth Approximation, IIR Digital Filter
Design using chebyshev approximation, comparison of Butterworth and Chebyshev filters.

UNIT-III
Finite Impulse Response (FIR) Filters: Introduction to FIR filters, Inherent stability of FIR
filters, Linear phase in FIR filters, Design of linear phase FIR filters using windows, Rectangular
window, Triangular window, Hamming window, Hanning window and Kaiser window. Design
of Linear phase FIR filter using frequency sampling method. Comparison of IIR and FIR filters.

UNIT-IV
DSP Architecture: Introduction to Programmable Digital Signal Processors; MAC, Bus
structures and memory access schemes, multiported memory, multiple access memory, VLIW
architecture, Pipelining, addressing modes, on-chip peripherals.
Architecture of TMS320C5X: Introduction, Bus Structure, Central Arithmetic Logic unit,
registers, flags, on-chip memory and peripherals, assembly language instructions.

TEXT BOOKS:
   Applications (PHI)
2. A.V.Oppenheim & R.W.Schaffer, Discrete-Time Signal Processing (Pearson education,
   PHI)

REFERENCE BOOKS:
2. Lyons, Understanding DSP (Pearson Education)
3. Adreas Antonio, Digital filter Analysis and Design (TMH)
   Processing.(PHI).
EI 323 MICROPROCESSORS & MICRCONTROLLERS

Class: III/IV B.Tech. II – Semester  
Lectures: 3

Branch: ECE, E&I, EEE  
University Examination: 100 marks

Duration of University Examination: 3 Hours  
Sessionals: 50 marks

UNIT – I
Evolution of Microprocessors, 8085 MPU Architecture, Concept of Memory Segmentation. 

8086 Family Architecture: Organization of 8086 CPU, Segments registers, physical and logical addressing, Instruction set, Addressing Modes.  

(9+3)

UNIT – II
Assembly Language Programming: Assembler directives, simple Programming of 8086 Implementation of structures – If – Then, If-Then-else, while do, repea until time delays, strings, procedures, macros, pin configuration, Min/Max modes, timing diagrams.  

(8+3)

UNIT – III
Interfacing with 8086: ADC, DAC interfacing, Interfacing of switches, Keyboards, LEDs, Stepper motor; CRT interface, interfacing through devices like 8255, 8257 and 8253. Interrupts & Priority interrupt controller 8259.  

(9+3)

UNIT – IV

(10+3)

TEXTBOOKS:
2. Yuchangliu, Glen A.Gibson, Microcomputer Systems. The 8086/8088 family, architecture, programming and design, Prentice Hall of India, New Delhi.

REFERENCE BOOKS:
LIST OF EXPERIMENTS

1. Pre Determination of Voltage regulation of an alternator by synchronous impedance method and magneto-motive force method.
2. Pre Determination of Voltage regulation of an alternator by zero power factor method.
3. Determination of direct and quadrature axis of synchronous reactance of a synchronous machine.
4. Load test on an alternator.
5. Load sharing by two alternators running in parallel.
8. Performance characteristics of a stepper motor.
9. Speed Control of induction motor by pole changing method.
12. Performance characteristics of a squirrel cage induction motor at different frequencies.
LIST OF EXPERIMENTS

Assembly Language Programming on 8086 Microprocessor

1. Study of 8086 kits
2. Finding Sum, Average, Multiplication.
3. Sorting (a) Ascending (b) Descending.
4. Transfer of bytes from DS to ES
5. Code Conversions (i) BCD to Binary (ii) Binary to BCD (iii) Binary to ASCII
6. String Comparison
7. Generation of time Delays – counters
   Interfacing with 8086
8. Wave form Generation using DAC modules (i) Square wave (ii) Sawtooth (iii) Triangular.
9. Stepper Motor interfacing
10. ADC interfacing
11. LED/LCD interfacing.
12. Traffic Controller
   ALP on 8031/51 Micro Controllers.
13. Study of Micro Controller kits, Assembly Language Programming
14. Multiplication, Division
15. Sorting
16. Code Conversion
17. Time delays – Counters

TEXT BOOKS:

EE 329 CONTROL SYSTEM LABORATORY

Class: III / IV B.Tech. II Semester
Branch: E.E.E.
Duration of University Exam: 3 Hrs.

Practicals: 3 Hrs
University Exam: 50 Marks
Sessionals: 25 Marks

LIST OF EXPERIMENTS

1. Study of speed-torque characteristics of d.c servomotor.
2. Study of speed-torque characteristics of 2-Φ a.c servomotor.
3. Study of pid controller.
5. Study of synchro transmitter and receiver
7. Closed loop & open loop control of d.c motor
8. Study of second order system response.
9. State space model for classical transfer
10. Function using matlab package
11. Obtaining the root locus and bode plots using matlab package
## SCHEME OF INSTRUCTION AND EVALUATION
### I SEMESTER OF IV YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

### ELECTRICAL & ELECTRONICS ENGINEERING

<table>
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**Professional Elective – I:**
- **EE-414(A)** - Neural Networks & Fuzzy Logic
- **EE-414(B)** – High Voltage Engineering
- **EE-414(C)** – Unified Theory of Electrical Machines
- **EE-414(D)** - FACTS
- **EE-414(E)** – Advanced Control Systems
UNIT – I
1. **Load flow studies**: Introduction, Bus classification, Nodal admittance matrix, Load flow equations, Interactive methods – Gauss, Gauss Seidel and Newton Raphson methods. Newton decoupled and Fast decoupled. Merits and Demerits of these methods, system data for load flow study. (9+3)

UNIT – II

3. **Economic Operation of Power Systems**: Distribution of load between units with in a plant, transmission loss as a function of plant generation, calculation of loss coefficients, distribution of load between plants. Unit commitment- Introduction , constraints in unit commitment problems. (9+3)

UNIT – III
4. **Load Frequency control**: Introduction, Load frequency problem, Megawatt frequency (or P-F) control channel, Megavar voltage (or Q – V) control channel. Dynamic interaction between P-F and Q-V loops, Mathematical model of speed governing system, turbine models division of power system into control areas, P-F control of single control area (the uncontrolled and controlled cases) P-F control of two area systems (the uncontrolled and controlled cases). (9+3)

UNIT – IV

TEXT BOOKS:
1. W.D. Stevenson, “ELEMENTS OF POWER SYSTEMS ANALYSIS”.TMH

REFERENCE BOOKS:
2. Generation operation and control of power system by Allen wood & Woolen berg.TMH
EE 412 UTILIZATION OF ELECTRICAL ENERGY

Class: IV/IV B.Tech. I Semester

Branch: EEE

Lectures: 3, Tutorials: 1

University Examination: 100 marks

Sessionals: 50 marks

Duration of University Examination: 3 hours

UNIT – I

Electric Traction: Systems of electric traction, Transmission of drive, Mechanics of train movement, Speed-time curves, Effect of speed, Acceleration and distance and schedule, Power and energy output from driving axles, Specific energy output, series-parallel method of speed control, shunt-bridge transition, collection of current, third rail over head wires, part two graph collections, different types of electric braking, reverse current, rheostat and regenerative braking, counter current braking of AC and DC motors. (9+3)

UNIT – II

Industrial Utilization: Introduction, Factors governing selection of Electric Motors, Nature of electric supply, Types of drives, Nature of loads, Standard Ratings of Motors, Choice of ratings of Motors, Types of Motors used in industrial Drives, Motors for particular service. (9+3)

UNIT – III

Electric Heating: Elementary principle of heat transfer, Stefan’s law, electric furnaces, Resistance furnace, design of heating, losses and efficiency – construction and working of different types of induction furnaces – Dielectric heating Arc furnaces, control equipment.

Welding: Types of welding, Resistance, Gas and Arc welding, Characteristics of Carson and metallic Arc welding, Comparison (Excluding electronics controls) (9+3)

UNIT – IV

Illumination: Introduction, Laws of Illumination, Light production by excitation, Gas discharge lamps, Fluorescent lamps, ultra violet lamps, Arc lamps, Filament lamps, Polar curves, Effect of voltage variation, Basic principles of Light control, Types and design of Lighting schemes, lighting calculations, flood lighting and street lighting, Factory lighting.

Power factor correction: Introduction, Disadvantages of a low Power factor, Causes of low power factor, Power factor improvement, Power factor correction by Static Capacitors, Economics of PF improvement, Most economical Power factor when K W demand is constant, Most economical Power factor when KVA demand is constant. (9+3)

TEXT BOOKS:

3. J.B.Gupta “A COURSE IN ELECTRIC POWER” S.K.Kataria & Sons

REFERENCE BOOKS:

1. T.Starr,”GENERAL TRANSMISSION & UTILIZATION”
EE 413 POWER SEMICONDUCTOR DRIVES

Class: IV/IV B.Tech. I Semester
Branch: EEE
Lectures: 3, Tutorials: 1
University Examination: 100 marks
Duration of University Examination: 3 hours
Sessionals: 50 marks

UNIT – I

1. **Fundamentals of Electric Drives**: Electric Drives, advantages of electric drives, parts of electric drives, choice of electric drives, status of D.C. drives and A.C. drives, starting, Braking, speed control of AC and DC motors

2. **Dynamics of Electric drives**: Fundamental torque equations, types of load, Quadrant diagram of speed-Torque characteristics, Dynamics of load torque combinality, steady state stability and Transient stability of an Electric drives. Load equalization. Calculation of time and energy loss in Transient operation, Drive specifications. (9+3)

UNIT – II

**Control of D.C. Drives**

3. **Rectifier control of dc drives**: Controlled rectifier circuits, braking operation of rectifier controlled separately excited dc motor, single phase and three phase half and fully controlled rectifier fed separately excited dc motor, multi quadrant operation of fully controlled rectifier fed separately excited dc motor.

4. **Chopper control of dc drives**: chopper control of separately excited and series dc motors, multi quadrant control of chopper fed motors (9+3)

UNIT – III

**Control of Induction Motor Drives**

5. **AC Voltage Controllers**: control of induction motor by AC voltage controllers.

6. **Frequency controlled Induction motor drives**: control of Induction motor by Voltage Source Inverter (VSI), Current Source Inverter (CSI), Current controlled PWM inverters and cyclo converters.

7. **Slip power controlled wound-rotor induction motor drives**: static rotor resistance control, static scherbius drives, krammer drives. (9+3)

UNIT – IV

**Control of Synchronous Motor Drives**

8. Operation of cylindrical rotor synchronous motor from VSI and CSI, self controlled Synchronous Motor Drives using cyclo converters. (9+3)

**TEXT BOOKS:**


**REFERENCE BOOKS:**

UNIT – I

Biological Neural Networks: Neuron Physiology, Neuronal Diversity, Specifications of the brain, They Eye’s Neural Network.

Concepts of Artificial Neural Networks: Neural Attributes, Modeling, Basic Model of Neuron, Learning in Artificial Neural Networks, Characteristics of ANNs, ANN Parameters, ANN Topologies, ANN adaptability, The stability Plasticity Dilemma.

UNIT – II


UNIT – III


UNIT – IV


TEXT BOOK:
2. Simon Haykin “Neural Networks a Comprehensive foundation”. Pearson .edu

REFERENCE BOOKS:
UNIT – I

1. **Breakdown Mechanism of Solids and Liquids**: Introduction, Intrinsic Breakdown, Electro Mechanical Breakdown, Thermal Breakdown, Breakdown of Solid dielectrics in practice, Chemical and Electro Chemical Deterioration and Breakdown, Breakdown due to Treeing and Tracking, Breakdown due to Internal discharges, Breakdown in composite dielectrics.

2. Break down of liquids as Insulators, Pure Liquids and commercial liquids, Conduction and Breakdown in commercial liquids – Suspended particle theory, cavitation and the Bubble theory, Thermal mechanism of the Breakdown, Stressed volume theory.

3. **Mechanism of Breakdown of Gases**, Townsend’s First Ionization coefficient, Cathode processor, Secondary effects, Townsend’s Second Ionization coefficient, Townsend’s Breakdown Mechanism, Experimental Determination of coefficients $\alpha$ and $\gamma$ Breakdown in Electronegative Gases, Steamer or Kanal Mechanism of Breakdown, Paschen’s Law, Penning Effect, Breakdown in Non uniform fields and Corona Discharges, Time – Lag, Practical considerations in using Gases for Insulation purposes, Vacuum Insulation.

UNIT – II


5. **Definition of Impulse currents & voltages**: Impulse voltage Generator circuits any two type, Marx’s multi stage voltage generator, tripping control of impulse voltage generator, Generation of switching surges, definition of impulse current wave forms, impulse current generator.

UNIT – III


UNIT – IV


**TEXT BOOKS:**


**REFERENCE BOOKS:**

1. Kuffel & Abdulla, “HIGH VOLTAGE ENGINEERING”
2. Zangel & Kuffel, “HIGH VOLTAGE ENGINEERING”
UNIT – I

1. **Theory of Transformation**: Basic Machine, Conventional, the basic two pole machine, voltage and torque equation of the basic electrical machine, Vector and matrix power, Matrix form of performance equation, Concept of equivalence of mmf invariance of power, Active linear transformation, Orthogonality, Passive transformations, Concept of equivalent circuit and vector diagram. (9+3)

UNIT – II

3. **Phase Transformation of Synchronous Motor**: Reference phase transformation of synchronous motor, rotor reference frame, Equations in State variable form. (9+3)

UNIT – III

4. **DC Machines**: Mathematical model for DC separately excited motor, DC series motor, DC compound motor, Transferfunction approach for these motors. (9+3)

UNIT – IV

5. 1-Phase Commutated motors, series motors, repulsion motor, 1-Phase motors.
6. Steady State balance operation induction motor voltage equation, equivalent circuit, steady state torque analysis, symmetrical component transformation and application to induction motor, unbalanced operation. (9+3)

TEXT BOOKS:

2. P.S. Bhinbra, “GENERALIZED CIRCUIT THEORY OF ELECTRICAL MACHINES”
3. Vedam Subramaniam, “THYRISTOR CONTROL OF ELECTRIC DRIVES”

REFERENCE BOOKS:

1. AdKINS, “GENERALISED MACHINE THEORY”
2. Kimbark, “POWER SYSTEM STABILITY VOL-III”
EE 414 (D) FLEXIBLE AC TRANSMISSION SYSTEMS

Class: IV / IV B.Tech. I Semester
Branch: EEE
Duration of University Examination: 3 hours
Lectures: 3,
University Examination: 100 marks
Sessionals: 50 marks

UNIT – I

POWER TRANSMISSION CONTROL: Introduction, Fundamentals of ac power transmission, Transmission problems and needs, FACTS controllers, FACTS control considerations, Basic functions of power electronics. Power semiconductor devices for high power converters, Static power converters, AC controlled-based structures (9)

UNIT – II

SHUNT COMPENSATION: SVC AND STATCOM:- Introduction, STATCOM configuration, control, applications. Introduction, Principles of operation, configuration and control of SVC. (9)

UNIT – III

SERIES COMPENSATION: Introduction, principles of operation, applications of TCSC for damping of electromechanical oscillations. Applications of TCSC, TCSC Layout and protection, Principles of operation of SSSC. (9)

UNIT – IV

PHASE SHIFTER: Introduction, principles of operation of a phase shifter, applications.
UNIFIED POWER FLOW CONTROLLER:-Introduction, Basic operating principles and characteristics, control and dynamic performance. (9)

TEXT BOOKS:

EE 414E  ADVANCED CONTROL SYSTEMS

Class: IV/IV B.Tech. I Semester  Lectures: 3
Branch: EEE  University Examination: 100 marks
Duration of University Examination: 3 hours  Sessionals: 50 marks

UNIT – I

Controllability and observability: Tests for continuous time systems for controllability and observability-time varying case, minimum energy control, time invariant case, principle of duality, controllability and observability from Jordan canonical form and other canonical forms.


UNIT – II


UNIT – III


UNIT – IV


TEXT BOOKS:

2. Distributed Computer Control Systems by S.S.Lamba and V.P.Singh.

REFERENCE BOOKS:

UNIT – I

1. **Switch Gear and Circuit Breakers**: Introduction, principle of circuit Interruption, short circuit studies in power systems, circuit breakers, types and characteristics, circuit breaker rating, Restriking voltage, transient, characteristics of restriking voltage, circuit breaker operating mechanism, Air-break, circuit breakers, oil circuit breakers, Air-blast circuit breaker, Vacuum circuit breakers, SF₆ circuit breakers Modification of circuit breaker duty by shunt resistors, HVDC circuit breaking, Design of circuit breakers, Selection of circuit breaker, Types of switch gear, AC indoor switch gear, Medium voltage a.c. switch gear, medium voltage AC H.R.C. fuses applications. (9+3)

UNIT – II

2. **Protection Relays**: Basic ideas of relay protection, Need for protection relaying in power systems, Basic requirements of protective relaying. Principles and characteristics of protective relaying, Classification of relays, Theory of application of relays, principal types of Electro magnetic relays, Theory of Induction relay torque, General equations of Comparators, over current relays, Instantaneous over current relay, Directional relays, Distance relays, differential relay. (9+3)

UNIT – III

3. **Static Relays**: Basis for Static relay development, classification of static relays, basic components of static relay, comparators, Amplitude comparators, Phase comparators. Co-incidence type phase comparator, Over current relay, differential protection, and static distance protection. (9+3)

UNIT – IV

4. **Protection**: Protection of transmission line with distance relays, over current and differential relays, Unit protection of transmission, Bus protection, Generation protection with differential relays, Earth fault relays, Miscellaneous faults and protection. Transformer protection with differential relays, earth fault relays, Buchlog relay.Horngaps, surge divertors, Rod gaps, Ground rods, Ground wires. (9+3)

**TEXT BOOKS:**

2. C.L. Wadhwa, “POWER SYSTEM ANALYSIS”
3. B.R. Gupta, “POWER SYSTEM ANALYSIS”

**REFERENCE BOOKS:**

LIST OF EXPERIMENTS

1. Determination of static characteristics of a SCR, MOSFET, IGBT.
2. Determination of characteristics of UJT, Design of UJT oscillator circuit and UJT verification of its properties.
3. Determination of Edc and Idc of half wave and full wave rectifiers with R and RL loads.
5. Design of a SCR circuit for DC motor control.
10. Measurement of transfer function using TFA.
11. Determination of speed – torque characteristics of AC servo meter
LIST OF EXPERIMENTS

(Experiments are to be conducted in the areas of POWER SYSTEMS, POWER ELECTRONIC CIRCUITS & MACHINES using Software like MATLAB, VHDL / View Logic, PSPICE/PSIM/MIPOWER etc.)

POWER SYSTEMS:

1. SIMULATION OF
   1.1 Load flow analysis
   1.2 Short Circuit Study
   1.3 Transient stability
   1.4 Relay Co-Ordination
   1.5 Long term Demand forecast.

POWER ELECTRONICS:

2. SIMULATION OF
   2.1 Motor Drive Module for adjustable drives & Motion Control
   2.2 Digital Control Module for Z-domain Digital Control System.
   2.3 Simcoupler Module for Co-Simulation with MAT LAB/Simulink.

PSPICE:

3. SIMULATION OF :
   3.1 RC, RL, RLC Circuit
   3.2 Rectifiers
      3.1 Half wave
      3.2 Full wave
   3.3 Simulation of 1-Φ inverter circuits.
   3.4 Simulation of step up & step down choppers.

MATLAB:

4. SIMULATION OF :
   4.1 Simulation of PI,PID,PID Controllers
   4.2 Load frequency Control
   4.3 Frequency Response
   4.4 Pole Zero Plots
### SCHEME OF INSTRUCTION AND EVALUATION
**II SEMESTER OF IV YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME**

### ELECTRICAL & ELECTRONICS ENGINEERING

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**Professional Elective – I:**
- EE-414(A) - Neural Networks & Fuzzy Logic
- EE-414(B) – High Voltage Engineering
- EE-414(C) – Unified Theory of Electrical Machines
- EE-414(D) -- FACTS
- EE-414(E) – Advanced Control Systems
EE 411 POWER SYSTEM OPERATION AND CONTROL

Class: IV/IV B.Tech. I Semester  
Lectures: 3, Tutorials: 1
Branch: EEE  
University Examination: 100 marks
Duration of University Examination: 3 hours  
Sessionals: 50 marks

UNIT – I

1. **Load flow studies**: Introduction, Bus classification, Nodal admittance matrix, Load flow equations, Interactive methods – Gauss, Gauss seidel and Newton Raphson methods. Newton decoupled and Fast decoupled. Merits and Demerits of these methods, system data for load flow study. (9+3)

UNIT – II

2. **P - Q Control**: Effect of Synchronous machine excitation, Power angle of synchronous machines, Specifications of Voltages, capacitor banks, control by transformers, Introduction to static VAR compensators.

3. **Economic Operation of Power Systems**: Distribution of load between units with in a plant, transmission loss as a function of plant generation, calculation of loss coefficients, distribution of load between plants. Unit commitment-Introduction, constraints in unit commitment problems. (9+3)

UNIT – III

4. **Load Frequency control**: Introduction, Load frequency problem, Megawatt frequency (or P-F) control channel, Megavar voltage (or Q – V) control channel. Dynamic interaction between P-F and Q-V loops, Mathematical model of speed governing system, turbine models division of power system into control areas, P-F control of single control area (the uncontrolled and controlled cases) P-F control of two area systems (the uncontrolled and controlled cases). (9)

UNIT – IV


**TEXT BOOKS**:
1. W.D. Stevenson, “ELEMENTS OF POWER SYSTEMS ANALYSIS”.TMH

**REFERENCE BOOKS**:
2. Generation operation and control of power system by Allen wood & Woolen berg.TMH

EE 412 UTILIZATION OF ELECTRICAL ENERGY
UNIT – I

**Electric Traction:** Systems of electric traction, Transmission of drive, Mechanics of train movement, Speed-time curves, Effect of speed, Acceleration and distance and schedule, Power and energy output from driving axles, Specific energy output, series-parallel method of speed control, shunt-bridge transition, collection of current, third rail over head wires, part two graph collections, different types of electric braking, reverse current, rheostat and regenerative braking, counter current braking of AC and DC motors. (9+3)

UNIT – II

**Industrial Utilization:** Introduction, Factors governing selection of Electric Motors, Nature of electric supply, Types of drives, Nature of loads, Standard Ratings of Motors, Choice of ratings of Motors, Types of Motors used in industrial Drives, Motors for particular service. (9+3)

UNIT –III

**Electric Heating:** Elementary principle of heat transfer, Stefan’s law, electric furnaces, Resistance furnace, design of heating, losses and efficiency – construction and working of different types of induction furnaces – Dielectric heating Arc furnaces, control equipment.

**Welding:** Types of welding, Resistance, Gas and Arc welding, Characteristics of Carson and metallic Arc welding, Comparison (Excluding electronics controls) (9+3)

UNIT – IV

**Illumination:** Introduction, Laws of Illumination, Light production by excitation, Gas discharge lamps, Fluorescent lamps, ultra violet lamps, Arc lamps, Filament lamps, Polar curves, Effect of voltage variation, Basic principles of Light control, Types and design of Lighting schemes, lighting calculations, flood lighting and street lighting, Factory lighting.

**Power factor correction:** Introduction, Disadvantages of a low Power factor, Causes of low power factor, Power factor improvement, Power factor correction by Static Capacitors, Economics of PF improvement, Most economical Power factor when K W demand is constant, Most economical Power factor when KVA demand is constant. (9+3)

**TEXT BOOKS:**

3. J.B.Gupta “A COURSE IN ELECTRIC POWER” S.K.Kataria & Sons

**REFERENCE BOOKS:**

1. T.Starr,”GENERAL TRANSMISSION & UTILIZATION”
EE 413 POWER SEMICONDUCTOR DRIVES

Class: IV/IV B.Tech. I Semester             Lectures: 3, Tutorials: 1
Branch: EEE                               University Examination: 100 marks
Duration of University Examination: 3 hours Sessionals: 50 marks

UNIT – I

Fundamentals of Electric Drives: Electric Drives, advantages of electric drives, parts of electric
drives, choice of electric drives, status of D.C. drives and A.C. drives, starting, Braking, speed
control of AC and DC motors

Dynamics of Electric Drives: Fundamental torque equations, types of load, Quadrant diagram of
speed-Torque characteristics, Dynamics of load torque combinability, steady state stability and
Transient stability of an Electric drives. Load equalization. Calculation of time and energy loss in
Transient operation, Drive specifications. (9+3)

UNIT – II

Control of D.C. Drives

Rectifier control of DC drives: Controlled rectifier circuits, braking operation of rectifier
controlled separately excited DC motor, single phase and three phase half and fully controlled
rectifier fed, separately excited DC motor, multi quadrant operation of fully controlled rectifier
fed, separately excited DC motor.

Chopper control of DC drives: chopper control of separately excited and series DC motors,
multi quadrant control of chopper fed motors (9+3)

UNIT – III

Control of Induction Motor Drives

AC Voltage Controllers: control of induction motor by AC voltage controllers.

Frequency controlled Induction motor drives: control of Induction motor by Voltage Source
Inverter (VSI), Current Source Inverter (CSI), Current controlled PWM inverters and cyclo
converters.

Slip power controlled wound-rotor induction motor drives: static rotor resistance control,
static Scherbius drives, Kramer drives. (9+3)

UNIT – IV

Control of Synchronous Motor Drives

Operation of cylindrical rotor synchronous motor from VSI and CSI, self controlled
Synchronous Motor Drives using cyclo converters. (9+3)

TEXT BOOKS:

REFERENCE BOOKS:
2. B.K. Bose “Modern Power Electronics & A.C Drives’ Pearson .edu
3. 3.P.S.Bimbhra “ POWER ELECTRONICS” Khanna publishers.
UNIT – I

Biological Neural Networks: Neuron Physiology, Neuronal Diversity, Specifications of the brain, They Eye’s Neural Network.

Concepts of Artificial Neural Networks: Neural Attributes, Modeling, Basic Model of Neuron, Learning in Artificial Neural Networks, Characteristics of ANNs, ANN Parameters, ANN Topologies, ANN adaptability, The stability Plasticity Dilemma. (9)

UNIT – II


UNIT – III

Fuzzy Logic: Propositional Logic, The Membership function, Fuzzy logic, Fuzzy Rule Generation, Defuzzification of Fuzzy Logic, Time – Dependent Fuzzy Logic, Crisp logics, Temporal Fuzzy logic (TFL), Time Invariant Membership function, Time-variant Membership function, Intervals, Semilarge Intervals, Interval operators, Temporal Fuzzy logic syntax, Applying Temporal Fuzzy operators, Defuzzification of Temporal Fuzzy logic, Applicability of TFL in communication systems (9)

UNIT – IV

Fuzzy Neural Networks: Fuzzy Artificial Neural Network (FANN), Fuzzy Neural Example, Neuro-Fuzzy control, Traditional control, Neural control, Fuzzy control, Fuzzy – Neural control. Applications: Signal Processing, Image Data Processing, Hand written characteristics Recognition, Visual Image Recognition, Communication systems, Call processing, Switching, Traffic control Intelligent control, Optimization techniques. (9)

TEXT BOOK:
2. Simon Haykin “Neural Networks a Comprehensive foundation”. Pearson .edu

REFERENCE BOOKS:
3. Kosko, Neural Networks and Fuzzy Systems, Prentice Hall of India, New Delhi
Class: IV/IV B.Tech. I Semester  
Lectures: 3  
Branch: EEE.  
University Examination: 100 marks  
Duration of University Examination: 3 hours  
Sessionals: 50 marks  

UNIT – I  
**Breakdown Mechanism of Solids and Liquids:** Introduction, Intrinsic Breakdown, Electro Mechanical Breakdown, Thermal Breakdown, Breakdown of Solid dielectrics in practice, Chemical and Electro Chemical Deterioration and Breakdown, Breakdown due to Treeing and Tracking, Breakdown due to Internal discharges, Breakdown in composite dielectrics, Break down of liquids as Insulators, Pure Liquids and commercial liquids, Conduction and Breakdown in commercial liquids – Suspended particle theory, cavitation and the Bubble theory, Thermal mechanism of the Breakdown, Stressed volume theory.  

**Mechanism of Breakdown of Gases,** Townsend’s First Ionization coefficient, Cathode processor, Secondary effects, Townsend’s Second Ionization coefficient, Townsend’s Breakdown Mechanism, Experimental Determination of coefficients \( \alpha \) and \( \gamma \) Breakdown in Electronegative Gases, Steamer or Kanal Mechanism of Breakdown, Paschen’s Law, Penning Effect, Breakdown in Non uniform fields and Corona Discharges, Time – Lag, Practical considerations in using Gases for Insulation purposes, Vacuum Insulation.  

UNIT – II  
**Generation of High D.C.&A.C, Voltages and Currents:** Halfwave rectifier circuit, Voltage doubler circuits, Cockroft-Walton Voltage multiplier circuit, Electrostatic Generator, VandeGraff Generator, Generation of High AC voltages, Cascaded Transformers, Resonant Transformer, Generation of High frequency AC High voltages, Generation of Rectangular current pulses, Tripping control of Impulse Generator.  

**Definition of Impulse currents & voltages:** Impulse voltage Generator circuits any two type, Marx’s multi stage voltage generator, tripping control of impulse voltage generator, Generation of switching surges, definition of impulse current wave forms, impulse current generator.  

UNIT – III  
**Measurement of High Voltage DC, AC and Impulse Currents & Voltages:** Measurement of High D.C. voltages – High ohm series Resistance, Resistance potential Divider, R-C capacitive voltage divider, Generating Voltmeter  

UNIT – IV  
TEXT BOOKS:


REFERENCE BOOKS:

1. Kuffel & Abdulla, “HIGH VOLTAGE ENGINEERING”
2. Zangel & Kuffel, “HIGH VOLTAGE ENGINEERING”
EE 414(C) UNIFIED THEORY OF ELECTRICAL MACHINES
(EE 414 Professional Elective – I)

Class: IV/IV B.Tech. I Semester Lectures: 3, Tutorials: 1
Branch: EEE University Examination: 100 marks
Duration of University Examination: 3 hours Sessionals: 50 marks

UNIT – I
1. **Theory of Transformation**: Basic Machine, Conventional, the basic two pole machine, voltage and torque equation of the basic electrical machine, Vector and matrix power, Matrix form of performance equation, Concept of equivalence of mmf invariance of power, Active linear transformation, Orthogonality, Passive transformations, Concept of equivalent circuit and vector diagram. (9+3)

UNIT – II
3. **Phase Transformation of Synchronous Motor**: Reference phase transformation of synchronous motor, rotor reference frame, Equations in State variable form. (9+3)

UNIT – III
4. **DC Machines**: Mathematical model for DC separately excited motor, DC series motor, DC compound motor, Transferfunction approach for these motors. (9+3)

UNIT – IV
5. 1-Phase Commutated motors, series motors, repulsion motor, 1-Phase motors.
6. Steady State balance operation induction motor voltage equation, equivalent circuit, steady state torque analysis, symmetrical component transformation and application to induction motor, un balanced operation. (9+3)

TEXT BOOKS:
2. P.S. Bhinbra, “GENERALIZED CIRCUIT THEOTY OF ELECTRICAL MACHINES”
3. Vedam Subramaniam, “THYRISTOR CONTROL OF ELECTRIC DRIVES”

REFERENCE BOOKS:
1. AdKINS, “GENERALISED MACHINE THEORY”
2. Kimbark, “POWER SYSTEM STABILITY VOL-III”.
EE 414 (D) FLEXIBLE AC TRANSMISSION SYSTEMS

Class: IV / IV B.Tech. I Semester  Lectures: 3,
Branch: EEE  University Examination: 100 marks
Duration of University Examination: 3 hours  Sessionals: 50 marks

UNIT-I

POWER TRANSMISSION CONTROL: Introduction, Fundamentals of ac power transmission, Transmission problems and needs, FACTS controllers, FACTS control considerations, Basic functions of power electronics, Power semiconductor devices for high power converters, Static power converters, AC controlled-based structures (9)

UNIT-II

SHUNT COMPENSATION: SVC AND STATCOM: Introduction, STATCOM configuration, control, applications. Introduction, Principles of operation, configuration and control of SVC. (9)

UNIT-III

SERIES COMPENSATION: Introduction, principles of operation, applications of TCSC for damping of electromechanical oscillations. Applications of TCSC, TCSC Layout and protection, Principles of operation of SSSC. (9)

UNIT-IV

PHASE SHIFTER: Introduction, principles of operation of a phase shifter, applications
UNIFIED POWER FLOW CONTROLLER: Introduction, Basic operating principles and characteristics, control and dynamic performance’. (9)

TEXT BOOKS:

1. FLEXIBLE AC TRANSMISSION SYSTEMS :IEE POWER AND ENERGY SERIES
2. UNDERSTANDING FACTS CONCEPTS: HINGORANI,NARAIN G,IEEE PRESS
UNIT – I

Controllability and observability: Tests for continuous time systems for controllability and observability-time varying case, minimum energy control, time invariant case, principle of duality, controllability and observability from Jordan canonical form and other canonical forms.


UNIT – II


UNIT – III


UNIT – IV


TEXT BOOKS:

2. Distributed Computer Control Systems by S.S.Lamba and V.P.Singh.

REFERENCE BOOKS:

EE 415 SWITCH GEAR & PROTECTION

Class: IV/IV B.Tech. I Semester
Branch: EEE
Lectures: 3, Tutorials: 1
University Examination: 100 marks
Duration of University Examination: 3 hours
Sessionals: 50 marks

UNIT – I

1. **Switch Gear and Circuit Breakers**: Introduction, principle of circuit Interruption, short circuit studies in power systems, circuit breakers, types and characteristics, circuit breaker rating, Restriking voltage, transient, characteristics of restriking voltage, circuit breaker operating mechanism, Air-break, circuit breakers, oil circuit breakers, Air-blast circuit breaker, Vacuum circuit breakers, SF6 circuit breakers Modification of circuit breaker duty by shunt resistors, HVDC circuit breaking, Design of circuit breakers, Testing of circuit breakers, Selection of circuit breaker, Types of switch gear, AC indoor switch gear, Medium voltage a.c. switch gear, medium voltage AC H.R.C. fuses applications. (9+3)

UNIT – II

2. **Protection Relays**: Basic ideas of relay protection, Need for protection relaying in power systems, Basic requirements of protective relaying. Principles and characteristics of protective relaying, Classification of relays, Theory of application of relays, principal types of Electro magnetic relays, Theory of Induction relay torque, General equations of Comparators, over current relays, Instantaneous over current relay, Directional relays, Distance relays, differential relay. (9+3)

UNIT – III

3. **Static Relays**: Basis for Static relay development, classification of static relays, basic components of static relay, comparators, Amplitude comparators, Phase comparators. Coincidence type phase comparator, Over current relay, differential protection, and static distance protection. (9+3)

UNIT – IV

4. **Protection**: Protection of transmission line with distance relays, over current and differential relays, Unit protection of transmission, Bus protection, Generation protection with differential relays, Earth fault relays, Miscellaneous faults and protection. Transformer protection with differential relays, earth fault relays, Buchlog relay. Horngaps, surge divertors, Rod gaps, Ground rods, Ground wires. (9+3)

**TEXT BOOKS:**
2. C.L. Wadhwa, “POWER SYSTEM ANALYSIS”
3. B.R. Gupta, “POWER SYSTEM ANALYSIS”

**REFERENCE BOOKS:**
EE 416 POWER ELECTRONICS & DRIVES LABORATORY

Class: IV/IV B.Tech. I Semester        Practicals: 3
Branch: EEE     University Examination: 50 marks
Duration of University Examination: 3 hours     Sessionals: 25 marks

LIST OF EXPERIMENTS

1. Determination of static characteristics of a SCR, MOSFET, IGBT.
2. Determination of characteristics of UJT, Design of UJT oscillator circuit and UJT verification of its properties.
3. Determination of Edc and Idc of half wave and full wave rectifiers with R and RL loads.
5. Design of a SCR circuit for DC motor control.
10. Measurement of transfer function using TFA.
11. Determination of speed – torque characteristics of AC servo meter
LIST OF EXPERIMENTS

(Experiments are to be conducted in the areas of POWER SYSTEMS, POWER ELECTRONIC CIRCUITS & MACHINES using Software like MATLAB, VHDL / View Logic, PSPICE/PSIM/MIPOWER etc.)

POWER SYSTEMS

1. SIMULATION OF:

1.1 Load flow analysis
1.2 Short Circuit Study
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1.5 Long term Demand forecast.

POWER ELECTRONICS

2. SIMULATION OF:

2.1 Motor Drive Module for adjustable drives & Motion Control
2.2 Digital Control Module for Z-domain Digital Control System.
2.3 Simcoupler Module for Co-Simulation with MAT LAB/Simulink.

PSPICE:

3. SIMULATION OF:

3.1 RC, RL, RLC Circuit
3.2 Rectifiers
   3.1 Half wave
   3.2 Full wave
   3.3 Simulation of 1-Φ inverter circuits.
3.4 Simulation of step up & step down choppers.

MATLAB

4. SIMULATION OF:

4.1 Simulation of PI,PID,PID Controllers
4.2 Load frequency Control
4.3 Frequency Response
4.4 Pole Zero Plots
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**Professional Elective II**
- EE-422(A) Data Structures
- EE-422(B) Computer Organization
- EE-422(C) VLSI Design
- EE-422(D) Advanced Digital Signal Processing
- EE-422 (D) Digital Control Systems

**Professional Elective III**
- EE-423(A) Reliability Engineering
- EE-423(B) HVDC Transmission
- EE-423(C) Non-Conventional Energy Sources
- EE-423(D) Design of Electrical Machines
- EE-423(E) EHV AC Transmission
UNIT – I

1. **Network Modeling**: Impedance and admittance matrices, Graphs, Element to node incidence matrix A, Bus incidence Matrix A, Primitive network, Network matrix, Y bus and Z bus, formulation of network matrices, inversion of matrix using partial inversion technique, Algorithm approach of building 3-phase balance network, representation of off nominal transformers. (9+3)

UNIT – II


UNIT – III


UNIT – IV

4. **Power System State Estimation Techniques**: Introduction, weighted least square techniques and weighted least square for DC state estimation (9+3)

**TEXT BOOKS:**
1. Stagg and E.L.Abaid, “COMPUTER METHODS IN POWER SYSTEM ANALYSIS”.
2. Allenwood

**REFERENCE BOOKS:**
1. R.N.Dhar, “COMPUTER AIDED POWER SYSTEM OPERATION & ANALYSIS”.
2. M.A. Pai, “COMPUTER TECHNIQES IN POWER SYSTEM ANALYSIS”
EE422 A - DATA STRUCTURES

Class: IV/IV B.Tech. II Semester  
Lectures: 3  
Branch: EEE  
University Exam: 100 Marks  
Duration of University Exam: 3 Hrs.  
Sessionals: 50 Marks

UNIT-I
Introduction: Algorithms, Program, Data Structures Definitions, Design and Analysis steps, Time and Storage Analysis. 
Arrays: Ordered Lists, Sparse matrices, representation of arrays. 
Stacks and Queues: Fundamentals, Evaluation of expression Multiple stacks and Queues 9

UNIT – II
Linked Lists: Singly linked lists – Stacks and Queues, Polynomial addition equivalent relations – Sparse matrices – Doubly linked lists – Dynamic storage, Management Generalized lists – Garbage collection and compaction. 9

UNIT – III
Graphs: Terminology and representations. Traversals. Connected components and spanning tress, Shortest paths 9

UNIT – IV

Table Processing: Static and Dynamic tree tables – Height Balanced trees. Balanced factor. It’s Definition, Hash tables – Hashing function, Overflow handling. 9

(All above topics with intuitive notion of complexity of algorithm)

TEXT BOOKS:

REFERENCE BOOKS:
4. Allen M.Weiss, Data Structures in C.
UNIT-I
1. Basic Structure of Computer Hardware and Software:
Functional units – Basic operational concepts – Bus structures – Software performance –
Distributed computing – Historical perspective.
2. Addressing methods and machine program sequencing:
Basic concepts – Main memory operations – Instructions – Instruction sequencing –
Addressing modes – Assembly language – Basic input output operations – Stacks and
queues – Subroutines.
3. THE PROCESSING UNIT: Basic concepts – Execution of a complete instruction –
Hard wired control – Microprogrammed control.

UNIT – II
4. INPUT-OUTPUT ORGANISATION: Accessing I/O devices – Interrupts – Direct
Memo Access – Programmed I/O.
5. THE MEMORY: Basic concepts – Semiconductor RAM memories –ROM – Speed,
8i and Cost – Cache memory – addressing mapping- virtual memories/

UNIT –III
6. ARITHMETIC: Number representation – Adding of positive numbers – Fast
address Signed addition and Subtraction – Arithmetic and branching conditions –
Multiplication of positive numbers – Signed operand multiplication –Integer division –
Floating point numbers at operations.

UNIT-IV
7. COMPUTER PERIPHERALS: I/O devices – Online storage – System performance
considerations.
8. Introduction to CISC, RISC – Motorola and Power PC processor families.

TEXT BOOKS:

REFERENCE BOOKS:
EE 422 (C) VLSI DESIGN  
(Professional Elective-I)

Class: IV/IV B.Tech. II Semester  
Lectures: 3  Tutorials: 1

Branch: E.E.E.  
University Exam.: 100 marks

Duration of University Examination: 3 hours.  
Sessionals: 50 marks

UNIT – I
1. Introduction to MOS Technology: MOS and related VLSI Technology, Basic MOS transistors, enhancement and Depletion mode transistor action n MOS fabrication, CMOS fabrication, Bi CMOS Technology.

2. Basic Electrical properties of MOS AND Bi CMOS circuits. MOS and Bi CMOS circuit design processor.  

UNIT – II

UNIT – III
4. Sub System Design & Layout: Architectural issues, Switch logic, Gate logic, The inverter, Examples of structured design, clocked sequential circuits, sub system design process

UNIT – IV
5. Illustration of Design Process: Computational elements, Memory, register, timing considerations, Introduction to GaAs technology, Introduction to various HDLS.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT – I

1. Multirate Digital Signal Processing: Multirate Signal processing, Decimation, Interpolation, Time domain and frequency domain characterization of sampling rate alteration devices, Fractional sampling rate conversion, Direct-form FIR structures, Polyphase filter structures, Time-variant filter structures, Multistage implementation of sampling rate conversion, Design of Phase shifters, Interfacing of digital system with different sampling rates, Implementation of Narrow band low pass filters, Implementation of digital filter banks, sub band coding of speech signals, Quadrature mirror filters, Transmultiplexers, oversampling ADCs and DACs.

UNIT – II

2. Power Spectrum Estimation: Cross correlation and Auto correlation of discrete – time signals, power spectral density, periodogram, use of DFT in power spectrum estimation, non parametric methods for power spectrum estimation – Bartlett method, Welch method, Blackman & Tukey method; Parametric methods for power spectrum estimation – Autoregressive (AR), Moving average (MA) and Auto regressive – Moving average (ARMA) models, Yule-Walker method, Burg method, Unconstrained least squares method.

UNIT – III


UNIT – IV

TEXT BOOKS:

REFERENCE BOOKS:
UNIT-I
Introduction to Discrete Control Systems: Introduction, Discrete time control, Continuous time control, Comparison, Block diagram of digital control.
Z-Transforms: Z-Transforms of elementary functions, Properties, Inverse Z-transforms, Z-transform method for solving difference equations

UNIT – II
Discrete type control system in Z-plane Analysis: Introduction, Impulse sampling and data hold, Z-transform by convolution Integral method. Reconstruction of original signal from sampled signal pulse transfer function, Realization of Digital Controllers and Digital filters

UNIT – III

UNIT – IV

TEXT BOOKS:
1. Ogats, Discrete-Time Control System, Pearson Education.

REFERENCE BOOKS:
UNIT - I
1. Fundamental concepts in Reliability Engineering: Introduction, General reliability function, General concepts, Hazard rate, reliability function, Bath tub Hazard rate curve, Mean time failure.
2. System reliability: Series configuration, Parallel configuration, Mixed configuration, application to specific hazard models, Mean time to failure of systems, Logic diagrams, Marker models, Marker graphs.

UNIT – II
3. Failure Data Analysis: Failure data, Mean failure rate, Mean time to failure, Mean time between failures, Graphical plots, MTTF in terms of failure density, Reliability in terms of Hazard rate and failure.

UNIT – III
5. Reliability Improvement: Improvement of components, redundancy, element redundancy, Unit redundancy, Standby redundancy, Optimization, Reliability cost trade off.
6. Maintainability and Availability: Maintainability, availability, System down time, Instantaneous repair rate, Mean time to repair, Reliability and availability functions.

UNIT – IV

TEXT BOOKS:
1. L.S. Srinath, “RELIABILITY ENGINEERING”.
2. Ranganth, “RELIABILITY ENGINEERING”.

REFERENCE BOOK:
1. Billington, & Alan, “RELIABILITY ENGINEERING”.

Class: IV/IV B.Tech. II Semester  Lectures: 3
Branch: EEE  University Examination: 100 marks
Duration of University Examination: 3 hours  Sessionals: 50 marks
UNIT-I

1. **Introduction**: Choice of HVDC Transmission system, types of HVDC systems, configuration and parts of HVDC system, Economic comparison of HVDC with EHVAC systems, merits of HVDC system interconnection.

2. **Fundamental equations** of HVDC power flow, steady state Vd Vs Id characteristics of converters, Reversal of power through HVDC link.

3. **Converter connections**, rectifier and inverter wave forms – Single phase bridge connection, three phase six pulse bridge, Three phase twelve pulse bridge connection, inversion, commutation and commutating reactance, analysis of voltage waveforms with overlap angle.

UNIT-II

4. **Equations of Voltage and current on DC side and AC side of converter** - no load without phase control, no load with phase control, rectifier mode, with phase control and load current / overlap angle rectifier mode, equivalent circuit of rectifier, Equations for Inverter, equivalent circuit of inverter, complete equivalent circuit of HVDC link.

5. **Harmonic filters**: Introduction, terms and definitions, shunt filters, series filters, configuration of AC harmonic filters harmonics in DC voltage, DC harmonic filters, damping circuit and DC surge capacitors, configuration of DC filters

UNIT-III


7. **HVDC System Control**: Review of Control requirements, alternative principles for HVDC control – terms and definitions, hybrid control current control, converter unit control tap changing valve unit firing control, individual phase control equidistant firing control.

UNIT-IV

8. **Reactive Power Compensation in HVDC Systems** – Reactive power requirements, compensation practice, reactive power balance, equations for active and reactive power on AC & DC side, power factor and reactive power requirements of rectifier and inverter equivalent circuit of AC network and converter.

TEXT BOOK:


REFERENCE BOOK:

UNIT-I

1. INTRODUCTION: Distinction between conventional and non-conventional sources of energy – Brief Description of different sources

   Introduction Prospects of SPV systems. Principle of a PV Cell. Large scale SPV systems. Economic considerations of SPV systems. PV sell technology. Merits and Limits of SPV systems. Applications of SPV systems- Street lighting, domestic lighting, Battery charging, SPV pumping systems. Concept of satellite solar power systems (SSPS)

UNIT-II

3. WIND ENERGY
Brief history of wind power- Principles of wind power- Operation of a wind turbine- Site Characteristics.

4. GEOTHERMAL ENERGY:
Origin and types of geothermal energy- Operational Difficulties- Vapor dominated systems-Liquid dominated systems- Petro- thermal systems- Hybrid geo thermal systems.

UNIT-III

5. ENERGY FROM OCEANS:
   Ocean temperature differences- the open and closed cycle analysis- Modification of the Open cycle Analysis- Closed or the Anderson cycle Analysis- Ocean waves- Wave motions and tides- Energy from the waves.

UNIT-IV


7. MAGNETO-HYDRO DYNAMIC (MHD) POWER GENERATION: MHD system- Open and Closed systems- MHD design problems and developments- Advantages of MHD systems.
TEXT BOOKS:

REFERENCE BOOKS:
UNIT-I
1. **Basic Principles of design of electrical machines:** Main Dimensions, Loading, Output equation, size of machine, choice of magnetic loading, choice of electric loading, effect of increasing linear dimensions in electrical machines. 9

UNIT – II
2. **Transformer:** Core, Windings, Output equation, Copper and iron lesson-optimum design, designs for minimum cost, Effect of change in frequency, Thermal rating, heating time constant of transformer, design of tank, testing of transformer, cooling of transformer, powers transformers, current transformer. Formulation of design problem, variables required, flow chart, evaluation of main dimensions. 9

UNIT – III
3. **D.C.Machines:** Output equation, number of poles, relation between length and diameter of armature, armature conductor ampere turns of magnetic circuit, design of commutator, interpoles, Design problem formulation, choice variables of performance, flow chart, objective and constraint functions, main dimensions.
4. **Induction Motor:** Output equation, main dimensions, stator windings, slot insulation, rotor design, air gap length number of rotor slots, slot winding, skewing, temperature rise and losses stator winding design, rotor winding design. Design principles. Operation with variable frequency, non sinusoidal supply, torque pulsations, flow chart, min. dimensions. 9

UNIT – IV
5. **Synchronous Machines:** Salient pole alternators, turbo alternators, output equation design of salient pole machine, armature design, stator design, field winding design, damper winding, cylindrical rotor design. 9

TEXT BOOKS:

REFERENCE BOOKS:
EE 423 (E) EHV AC TRANSMISSION
(Professional Elective –III)

Class: IV/IV B.Tech. II Semester
Branch: E.E.E.
Duration of University Exam: 3 Hrs.

Lectures: 3
University Exam: 100 Marks
Sessionals: 50 Marks

UNIT-I

UNIT-II
Voltage gradient of conductors: Electrostatics- Field sphere gap-field of line charges and properties- charge- potential relations for multi conductors- surface voltage gradient on conductors- Distribution of voltage gradient on sub conductors of bundle.

UNIT-III
Electro static Field: Calculation of Electro static field of EHV lines, Effect on human, animals and plants- electrostatic induction in unexercised circuit of double circuit line.

UNIT-IV
Voltage Control: Voltage control using synchronous condensers- cascade connection of shunt and series compensation- Sub synchronous resonance in series compensator lines- Static, Reactive compensation system.

TEXT BOOKS:
1. EHV AC Transmission Engineering by R.D. Bega mudre- New Age International PVT ltd.

REFERENCE BOOKS:
2. HVDC Transmission by E.W. Kimbark- John Wiley and Sons Publications.
LIST OF EXPERIMENTS

1. Performance characteristics of long artificial transmission line.
2. Reactive power characteristics of long artificial transmission lined
3. Steady state power limit of normal T and \( \Pi \) transmission lines
4. Reactive power control by tap changing transformers.
5. Testing IDMT over current relay.
7. Sequence reactance of power system components.
8. Active and Reactive power control of synchronous machine.
10. Measurement of sequence impedance for 3-phase 2-winding and 3-winding transformer.