

Basic Electrical Engineering

ELE-E01T

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UNIT I

Introduction to DC circuits, Active and passive two terminal elements, Types of Voltage and Current Sources, Ohms law, Voltage-Current relations for resistor, inductor & capacitor, Kirchhoff's laws, Mesh analysis, Nodal analysis, current division, voltage division, Conventions for describing networks, Reference directions for currents and voltages.

UNIT II

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Application of network theorems in solving various circuits, Star-Delta Transformation.

UNIT III

Sinusoids, Generation of AC, Average and RMS values, Form and peak factors, concept of phasor representation, J operator, Analysis of R-L, R-C & R-L-C Circuits, Introduction to three phase systems - types of connections, relationship between line and phase values.

UNIT IV

Working principle, construction and applications of DC machines and AC machines (1 -phase transformers, single phase induction motors), introduction to alternator: Principle of operation and working.

UNIT V

Safety measures in electrical system- types of wiring- wiring accessories staircase, fluorescent lamps & corridor wiring- Basic principles of earthing –Types of earthing.

List of Experiments:

1. To study the color coding of resistors. Connection of Ammeters, voltmeters, Wattmeter's and Millimeters in DC and AC circuits and selection of their ranges, Use of LCRQ meter.
2. To study the series and parallel operation of resistors and verifying their effective values by LCRQ

meter.

b) Repeat the same for inductors.

c) Repeat the same for capacitors.

Experiments on D.C. Circuits:

3. To verify the KVL and KCL in D.C. circuits.
4. To verify the star delta transformation of networks.
5. To verify the superposition theorem.
6. To verify the maximum power transfer theorem.
7. To verify Norton's Theorem.
8. To verify Superposition Theorem.

Experiments on A.C. Circuits:

9. To measure electric power in single phase AC circuits with resistive load, RL load and RLC load.
10. To measure the power and power factor in three phase AC circuits.
11. To study the series resonance.
12. To study the parallel resonance.

Books Recommended

1. Engineering Circuit Analysis by William H Hayt, J E Kemmerly and Steven M Durbin, McGraw Hill.
2. Electrical Engineering fundamentals by Deltoro, Prentice Hall India (PHI).
3. Basic Electrical Engineering by D.P. Kothari. and I. J. Nagrath Tata McGraw - Hill.
4. Basic Electrical and Electronics Engineering by S.K. Bhattacharya Pearson Education.
5. Circuit Theory (Analysis & Synthesis) by A. Chakrabarti, DhanpatRai & Co.

Hydraulics & Hydraulic Machines

MEC-E02T

UNIT I

Fluid Statics: Physical properties of Fluids, Pressure Intensity, Pascal's law, pressure density height relationships, manometers, pressure on plain and curved surfaces, centre of pressure.

UNIT II

Kinematics of Fluid Flow: Types of flows, stream lines, streak lines and oath lines, continuity equation, Dynamics of fluid Flow: Euler's equation of motion along a stream line and its integration to yield Bernouli's equation flow measurement, pitot tube, prandtl tube, Venturimeter, orifice meter, orifices, Weirs and Notches.

UNIT III

Flow through Pipes: Hydraulic grade line, Darcey-weisbatchformulla, Design of pipes, Equivalent diameter of pipes, Transmission of power through pipes.

UNIT IV

Flow in open Channels: Chezy's formula, Manning's formula, Design of Cannels and Economic section.

UNIT V

Hydraulic Machines: Types of turbines, description and principles of Impulse and reaction turbines, unit quantities and specific speed, run a ay speed, turbine characteristics, selection of turbines, governing of turbines, Centrifugal pumps, specific speed, Power requirement, Reciprocating pumps, Layout of power House: General layout and arrangement of Hydropower units.

Suggested Books:

1. Fluid Mechanics & Fluid Power Engineering; Dr D. S. Kumar
2. A textbook of Fluid & Hydraulic Machines; Dr R.K Bansal

Network Analysis

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Pre-requisite: Basic understanding of Electrical Circuits

UNIT I

First order differential equation: Differential equations as applied in solving networks, Application of initial conditions, Evaluating initial conditions in networks, Laplace Transformation properties, Solution of Network problems with Laplace transformation, The unit step, ramp and impulse functions and their Laplace transforms, Initial and final value of $f(t)$ from $f(s)$.

UNIT II

Network theorems and impedance functions: Complex frequency, transform impedance and transform circuits, series and parallel combinations of elements, Network Functions-poles and zeros, Network functions for one port and two port networks, Poles and zeros of network functions.

UNIT III

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

UNIT IV

Network synthesis- Synthesis problem formulation, properties of positive real functions, Hurwitz polynomials, properties of RC, LC and RL driving point functions, Foster and Cauer synthesis of LC and RC circuits.

UNIT V

Filter fundamentals – pass and stop band, filter classification, constant K & m derived filters, behaviour of characteristic impedance over pass & stop bands, design of filters.

Books Recommended

1. Network Analysis by Van Valkenberg.
2. Network Analysis & Synthesis by F. Kuo.

LINEAR ALGEBRA

ELE - E03T

L - P

4 - 0

UNIT I

Fields, Vector spaces, Subspaces, Linear combinations and subspaces, Linear dependence and independence, Spanning Set and Basis, Finite dimensional spaces, Dimension.

UNIT II

Gaussian elimination, Solving $Ax = b$ for square systems by elimination, pivots, multipliers, back substitution, invertibility of A , Null Space and Range, Rank and nullity, Consistency conditions in terms of rank, General Solution of a linear system, Elementary Row and Column operations, Row Reduced Form, LU Factorization, Important Subspaces associated with a matrix.

UNIT III

Inner product, Norm, Orthogonality, Orthonormalization by Gram-Schmidt (QR factorization), orthonormal basis, Properties of determinants, cofactor formula, applications to finding $\text{inv}(A)$.

UNIT IV

Eigenvalues and Eigenvectors, characteristic equation, Cayley-Hamilton theorem, computing powers A^k and matrix exponentials to solve difference and differential equations.

UNIT V

Symmetric matrices, positive definite matrices, real eigenvalues and orthogonal eigenvectors, Linear transformations and change of basis, Singular Value Decomposition, orthonormal bases for diagonalisation.

Books Recommended:

1. Introduction to Linear Algebra by Gilbert Strang.

Basic Mechanical Engineering

MEC-E01

UNIT I

Thermodynamics: System and Surroundings, Zeroth Law, Temperature Scales, Equation of the state, First Law, Steady flow, Isochoric, Isobaric, isothermal, adiabatic and polytropic processes, Properties of steam.

UNIT II

Second Law of Thermodynamics & power cycles: Second law, Entropy change, Reversible Irreversible processes, Carnot's Cycle, Ranking Cycle, Modified Rankine Cycle, Flow through nozzle.

UNIT III

Steam Turbine: Impulse turbine, velocity and pressure compounding, work output, Losses and efficiency, Reaction turbine, work output, losses and efficiency, degree of reaction, Modern steam power cycles, Regenerative and Reheat cycles, Governing of Steam Turbines, Fields of Application.

UNIT IV

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

UNIT V

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

Books Recommended:

1. Engineering Thermodynamics by D.S Kumar.
2. Steam Turbine Performance and Economics by Bartlett, McGraw Hill.
3. Steam Turbine Theory and Practice by Kearton Pitman CBS.

Power Plant Engineering

MEC-E03

Unit I

Fuels and Combustion: Thermodynamic cycle of steam flow: Rankine cycle, Actual Rankine cycle, Reheat cycle, Carnot cycle, heat rate, Classification of fuels, calorific value and its determination.

Unit II

Combustion chemistry: Bomb calorimeter, Boy's gas calorimeter, combustion equation, stoichiometric air fuel ratio, excess air requirement, actual air fuel ratio, flue gas analysis, pulverized coal firing system, fluidized bed combustion.

Unit III

Thermal Power Plants: Types of boilers, Feed water and its treatment, Steam turbine and alternators, Site selection, Main parts and its working, Fuel Handling, delivery of load, unloading, preparation, transfer, outdoor (dead) storage, indoor (live) storage, In plant Handling, Coal weighing, Ash disposal and dust collection: Draught systems, electrostatic precipitator Prospectus and development of thermal plants in India.

Unit I

Hydro Power Plant: Site selection, Hydrology, storage and poundage, general arrangements and operation of hydro power plant, Hydraulic turbines, turbine size, Pelton wheel turbine, Francis and Kaplan turbines, selection of turbines, Dams, Spillways, gates, intake and out take works, canals and layout of penstocks.

Unit IV

Nuclear power plant: Introduction, atomic physics, nuclear reaction, materials, site selection, nuclear reactors and working of each part, classification of nuclear reactor, , nuclear waste disposal, plant layout, Prospectus and development of nuclear plants in India Diesel Power Plants: Introduction, Site selection, Main components and its working, Diesel plant efficiency and heat balance, choice and characteristic of diesel power plant.

Text Books Recommended:

1. Power Plant Engineering by P. K. Nag.
2. Power Plant Engineering by Dr. P. C. Sharma.
3. Power Plant Engineering by R.K. Rajput.
4. Power Plant Engineering by J B Gupta.

Signals and Systems

ECE –E15 T

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Unit I

Representation of signals: Continuous and discrete time signals: Classification of Signals, complex exponential and sinusoidal signal, properties of discrete time complex exponential unit impulse – unit step impulse functions, Determination of Fourier series representation of continuous time and discrete time periodic signals, Explanation of properties of continuous time and discrete time Fourier series

Unit II

Analysis of continuous time signals and systems: Continuous time Fourier Transform and Laplace Transform analysis with examples, properties of the Continuous time Fourier Transform and Laplace Transform basic properties, convolution in time and frequency domains, Basic properties of continuous time systems: Linearity, Causality, time invariance, stability, magnitude and Phase representations of frequency response of LTI systems Analysis and characterization of LTI systems using Laplace transform.

Unit III

Sampling theorem and z-transforms: Representation of continuous time signals by its sample - Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals, Basic principles of z-transform - z-transform definition – region of convergence – properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform, Relationship between z-transform and Fourier transform.

Unit IV

Discrete time systems: Computation of Impulse and response and Transfer function using Z Transform. DTFT Properties and examples – LTI-DT systems -Characterization using difference equation – Block diagram representation – Properties of convolution and the interconnection of LTI Systems – Causality and stability of LTI Systems.

Unit V

Systems with finite and infinite duration impulse response: Systems with finite duration and infinite duration impulse response – recursive and non-recursive discrete time system – realization structures – direct form – I, direct form – II, Transpose, cascade and parallel forms

Books Recommended:

1. Signals & Systems by Alan V. Oppenheim, Alan S. Willsky with S. Hamid Nawab, PHI.
2. Signals and systems by Simon Haykins and Barry Van Veen, John Wiley
3. Signals and Systems Analysis using Transform method and MATLAB by M.J. Roberts, TMH.
4. Signals and Systems by K. Lindner, McGraw Hill International.

Data Structure

CSE-E28T/P

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3 - 2

UNIT I

Introduction to data structures, classification of Data Structures, Primitive vs Non Primitive, Linear vs Non Linear, Structure & Problem Solving, Primitive Data Structures Operations, Recursion Function & its Examples.

UNIT II

Singly & Doubly – Linked Lists, Circular Linked List, their Implementation & Comparison, Concept of Stack & Queue, Array Based & Linked List Based Implementation of Stack & Queue & their Applications.

UNIT III

Searching: Sequential & Binary Search on Array-based Ordered Lists, Binary Trees, their Implementation & Traversal, Binary Search Trees.

UNIT IV

Graphs: Definition, Terminology & Representation using Adjacency Matrix & Linked List. Graph Traversals: BFS & DFS algorithms & their Implementations, Spanning Tree, Algorithms for computing minimal Spanning Tree, Shortest Path Algorithms & their Implementations.

UNIT V

Sorting Techniques: Insertion Sort, Selection Sort, Merge Sort, Quick Sort,

List Of Particles:

1. Programs on Recursion.
2. Implementation of single and doubly linked list and various operations on them.
3. Applications of Linked List Polynomial Manipulation.
4. Circular Linked List.
5. Implementation of stack and queue using Array and linked list.
6. Applications of stack like Tower of Hanoi , Conversion of Infix Expression to polish notation, Conversion of Polish Expression to Code.
7. BST and its implementation.
8. BFS and DFS of Graph.
9. Sorting techniques-, Selection Sort ,Insertion Sort, Merge Sort, Quick Sort,

BOOKS RECOMMENDED:

1. Data Structures by Shams outline series.
2. Data Structures using C and C++ by Langsam Augenstein Tenenbaum

Internet & Web Design

CSE-E29 T/P

L - P
2 - 2

UNIT I

HTML for structure, CSS for layout and JavaScript for client-side programming, Suggestions for learning, Web Site Basics: Dreamweaver, HTML: Elements, Attributes and Values, HTML Tables: Table, heading, row, data elements and attributes, Table structure not for page layout, Links and server-side includes: HTML links and anchors, Linking to external files to modularize html, build script libraries, or share styles, Server-side Includes, Standards: W3C, the World Wide Web Consortium: W3C recommendations as standards. HTML rules: Extensible markup languages

UNIT II

Frames: A glance at a common but deprecated element; advantages and disadvantages; frame and frameset properties. Images: Image types (JPG, GIF, PNG), Inline, embedded, and external styles, Writing Style Rules: Writing CSS selectors and rules to tie style attributes and values to html elements. The cascade: Inheritance, specificity, and the cascade. CSS positioning: Static, relative, and absolute positioning.

UNIT III

Client-side programming for browsers, Event Handlers, JavaScript Overview: Language characteristics, Variables, Assignment and comparison operators; expressions, HTML Forms: The form element and inputs: textbox, radio buttons, checkbox, textarea.

UNIT IV

HTML Form Basics, JavaScript, JavaScript Functions: Writing blocks of separate, reusable code, Getting started with developing simple functions for form validators, Form Validation: JavaScript for Simple Form Validation,

UNIT V

The DOM and JavaScript Object Models: The W3C Document Object Model; using nodes; DHTML: JavaScript + CSS = Dynamic HTML, Advanced form validation: Javascript's innerHTML and dynamic CSS for advanced form validation.

List of Experiments:

1. Develop and demonstrate an HTML document using HTML tags.
2. Working with lists and tables.
3. Working with images, multimedia.
4. Working with frames and forms.
5. Develop and demonstrate an HTML that illustrates the use of style sheet, ordered list, table, borders, padding, colour and <spam> tag, navigation bar, page layout

6. Develop an HTML file that includes JAVA script code.
7. Develop an HTML file that includes JAVA script working with event handlers, forms, forms array.
8. To write functions in HTML, validate using regular expressions.
9. Installing and web hosting using popular web servers, IIS, Apache
10. Creating the Web Site

Books Recommended:

1. Internet & Web Designing by Dietel & Dietel.
1. Fundamentals of Internet and www by R. Greenlaw and E. Hepp.
2. Internet and Web Page / WebSite Design by B. Underdahle and K.Underdahle, IDG Books India (P) Ltd.
3. The Internet Book by D. Comer, Prentice Hall of India.