

Basic Electrical Engineering

Section A

DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws with their applications (Nodal and Mesh Analysis), analysis of simple circuits with dc excitation.

Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance.

Section B

Transformers

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, transformer tests regulation and efficiency. Auto-transformer and three-phase transformer connections.

Polyphase Circuits

Three phase balanced circuits, voltage and current relations in star and delta connections. Power

Measurement by two wattmeter method.

Section C

Electrical Machines

Generation of rotating magnetic fields, construction, working, starting and speed control of single-phase

induction motor. Construction and working of a three-phase induction motor. Construction, working, torque-speed characteristic and speed control of dc motor. Construction and working of synchronous generators.

Section D

Measuring Instruments

Construction, operating and uses of moving iron type and moving coil type, induction type voltmeter, Ammeter, watt meter, energy meter.

Electrical Installations

Components of LT Switchgear: Introduction to Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Text / Reference Books

1. E. Hughes, "Electrical and Electronics Technology", Pearson Education.
2. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3. S. K Sahdev, Basic of Electrical Engineering, Pearson Education, 2015.
4. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. V. D. Toro, "Electrical Engineering Fundamentals", Pearson Education.

Programming for Problem Solving

Unit 1

Introduction to computers and its functional units, Number System: Binary, Octal, Decimal, Hexadecimal and their inter conversion methods. Operations on number systems: Addition, Subtraction, Complement etc.

Unit 2

Introduction to Programming: Idea of Algorithm: steps to solve logical and numerical problems.

Representation of Algorithm: Flowchart/Pseudocode with examples.

C Programming: Keywords, variables, data types, header files, basic input and output functions and

statements, Compilation, Syntax and Logical Errors in compilation, object and executable code,

Arithmetic expressions and precedence.

Unit 3

Conditional statements, branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops.

Unit 4

Arrays (1-D, 2-D), Character arrays and Strings, Functions (including using built in libraries),

Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference.

Recursion, as a different way of solving problems. Example programs, such as Finding Factorial,

Fibonacci series, Ackerman function etc.

Suggested Text Books:

1. Satinder Bal Gupta & Amit Singla, Fundamental of Computers and Programming in C,

Shree Mahavir Book (Publishers), New Delhi

2. Ajay Mittal, Programming in C, 'A Practical Approach', Pearson Education.

3. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

4. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

5. Yashavant Kanetkar, Let Us C, BPB Publication.

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