

AMPL06 ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT-1 ELEMENTARY CONCEPTS OF ELECTRIC CIRCUITS

- 1.1 Elementary concepts of DC electric circuits:
- 1.2 Basic Terminology including voltage, current, power, resistance, emf;
- 1.3 Resistances in series and parallel; Current and Voltage Division Rules;
- 1.4 Capacitors & Inductors: V-I relations and energy stored. Ohms Law and Kirchhoff's laws-
- 1.5 Problems; Star-delta conversion (resistive networks only-derivation not required)-problems.
- 1.6 Analysis of DC electric circuits: Mesh current method - Matrix representation

UNIT-2 ELEMENTARY CONCEPTS OF MAGNETIC CIRCUITS, ELECTROMAGNETIC INDUCTION AND AC FUNDAMENTALS

- 2.1 Magnetic Circuits: Basic Terminology: MMF, field strength, flux density, reluctance - comparison between electric and magnetic circuits- Series and parallel magnetic circuits with composite materials, numerical problems.
- 2.2 Electromagnetic Induction: Faraday's laws, problems, Lenz's law- statically induced and dynamically induced emfs - Self-inductance and mutual inductance, coefficient of coupling
Alternating Current fundamentals:

UNIT-3 INTRODUCTION TO SEMICONDUCTOR DEVICES:

- 3.1 Evolution of electronics- Vacuum tubes to nano electronics. Resistors, Capacitors and Inductors (constructional features not required): types, specifications. Standard values, color coding.
- 3.2 PN Junction diode: Principle of operation, V-I characteristics, principle of avalanche breakdown.
- 3.3 Bipolar Junction Transistors: PNP and NPN structures, Principle of operation, relation between current gains in CE, CB and CC, input and output characteristics of common emitter configuration.

UNIT-4 BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION:

- 4.1 Rectifiers and power supplies: Block diagram description of a dc power supply, Working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator.
- 4.2 Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response, Concept of voltage divider biasing.
- 4.3 Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT-5 MAGNETIC CIRCUITS: BASIC TERMINOLOGY:

- 5.1 MMF, field strength, flux density, reluctance - comparison between electric and magnetic circuits Series and parallel magnetic circuits with composite materials, numerical problems.
- 5.2 Electromagnetic Induction: Faraday's laws, problems, Lenz's law statically induced and dynamically induced emfs - Self-inductance and mutual inductance, coefficient of coupling

5.3 Alternating Current fundamentals: Generation of alternating voltages Representation of sinusoidal waveforms: frequency, period, Average, RMS values and form factor of waveforms-Numerical Problems.

UNIT-6 AC CIRCUITS

6.1 AC Circuits: Phasor representation of sinusoidal quantities. Trigonometric, Rectangular, Polar and complex forms. Analysis of simple AC circuits: Purely resistive, inductive & capacitive circuits; Inductive and capacitive reactance, concept of impedance. Average Power, Power factor. Analysis of RL, RC and RLC series circuits-active, reactive and apparent power. Simple numerical problems.

6.2 Three phase AC systems: Generation of three phase voltages; advantages of three phase systems, star and delta connections (balanced only), relation between line and phase voltages, line and phase currents- Numerical problems. 2

UNIT-7 INTRODUCTION TO COMMUNICATION SYSTEMS

7.1 Evolution of communication systems- Telegraphy to 5G

7.2 Radio communication: principle of AM & FM, frequency bands used for various communication systems, block diagram of super heterodyne receiver,

7.3 Principle of antenna – radiation from accelerated charge

7.4 Mobile communication: basic principles of cellular communications, principle and block diagram of GSM.

Reference books:

1. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition
2. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics, and Computer Engineering”, Tata McGraw Hill, Second Edition, (2006).
3. Industrial Electronics by G.K. Mittal, PHI
4. Nagsarkar T K and Sukhija MS, “Basics of Electrical Engineering”, Oxford Press (2005).
5. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group