

1. Elements of electric circuits:

The resistor: Practical engineering devices. Solid & wire frame of common resistive materials, carbon film and metal film resistors. Heat dissipating area (wattage), tolerance and temperature stability of resistors. Mathematical models, the capacitor: Comparison of properties of different traditional & modern dielectric materials (e.g. paper, ceramic, polystyrene, polycarbonates etc.) Short description of electrolytic capacitor- wet & solid dielectrics, solid tantalum & aluminum capacitors, Mathematical models, the inductors: Mutual inductance, Properties of core materials.

Brief studies of iron & ferrite cores, Mathematical models (only assignments).

2. Network theorems:

Millman's theorem, Reciprocity theorem, Compensation & Tellegen's theorem, Millers theorem etc. Analysis of coupled circuits. The dot rule & equivalent conductivity coupled forms of magnetically coupled circuits.

3. Methods for the solution of circuit equations:

Analysis of electrical network with – independent/dependent ideal, practical voltage and current sources – both of DC and AC. Solution of network equations by matrix methods.

4. Network topology:

Elementary graph theory as applied to electrical networks. Matrices of graph: Incidence matrix, circuit matrix, cut set matrix etc, Advanced techniques of equation formulation for numerical solutions.

5. Transient phenomenon:

Forcing functions-impulse, step and ramp functions, Study and solution of simple circuits undergoing transient disturbances, A.C. transients, Time domain equations and solutions by Laplace transforms.

6. Two port Network:

General principles, ABCD, Z, Y and hybrid parameters, Analysis of networks in tandem. Transmission lines. Lumped and distributed models. Combination/ Interconnection of two ports network.

7. Introduction to Network Synthesis:

Realizability of networks, Positive Real Function (PRF) and its properties, Hurwitz Polynomial, Routh Hurwitz Array, Properties of various immittance functions (LC, RC, RL), Foster and Cauer forms of realization of networks for given driving point impedance/ admittance functions

BOOKS:

1. A user's guide to selecting Electronic components---Gerald L. Sinsoutg (John Wiley)
2. Engineering Circuit analysis---- W. H. Hayt Jr. & J.E. Kemmerly (Mcgraw hill)

3. Electric Circuit----J.A. Edminister. (Mcgraw hill)
4. Computer aided Network Design—Donald A. Calahan (Tata Mcgraw hill)
5. A course in Electric Circuit Analysis—Soni & Gupta