

Electrical Networks [EN]

S.E. Sem. III [INST]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical and Oral Exam	–	–
Oral Exam	–	25
Term Work	–	25

SYLLABUS

1. Networks Theorems

Analysis of networks with dependent and independent sources, mesh analysis, nodal analysis, source transformation technique, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, solution of networks with AC sources. Analysis of coupled circuits (self inductance, mutual inductance, and dot convention)

2. Graph Theory

Introductory definition – Graph of a network, trees, co-trees, loops, Incidence matrix, loop matrix and cutset matrix. Network equilibrium equations, Duality.

3. Time and Frequency response of circuits

Voltage/current relations for R, L, C and their equations in time domain. Initial and final conditions, first and second order differential equations, steady state and transient response. Analysis of transient and steady state responses using Classical technique as well as by Laplace transforms. Steady state response to step, ramp, impulse and sinusoidal input functions.

4. Network Functions and Two-Port Network

Network functions – driving point and transfer functions. Poles and zeros, time domain behavior from pole zero plot. Concept of two port network. Open circuit impedance (Z) parameters, short circuit admittance (Y) parameters, transmission (ABCD) parameters, inverse transmission parameters, hybrid parameters. Interrelation of different parameters, Interconnection of two port networks, T and π representation. Terminated two-port networks.

5. Fundamentals of Network Synthesis.

Casuality and stability, Hurwitz polynomials, positive real functions, synthesis of one port networks with two kinds of elements. Properties and synthesis of L-C, R-C, R-L driving point impedances, synthesis of R-L-C functions.

Properties of transfer functions, zeros of transmission, synthesis of Y_{21} and Z_{21} with a 1-Ohm termination, synthesis of constant – resistance networks.

Reference :

1. Network analysis & synthesis (*Kuo Franklin F.*) Wiley Eastern Ltd., 1991.
2. Network analysis (*Van Valkenburg M.E.*) Eastern Economy Edition, 1983, (3rd Edition).
3. Network & systems (*roy Chaudhary D.*) Wiley Eastern Ltd., 1991.
4. Engineering Circuit Analysis (*Hayt William, Kemmerly Jr. Jack E.*) Tata McGraw Hill – New Delhi, 2002 (6th Edition).
5. Electric Circuits (*Edminister Joseph A., Nahvi Mohmood*) Tata McGraw Hill – New Delhi, 1999 (3rd Ed.).
6. Circuits & Networks Analysis & Synthesis (*Shyammoan Sudhakar*) Tata McGraw Hill, 2000 (13th Ed.).
7. Circuits (*Bruce Carsion A.*) Brooks/Cole Thomson Learning, 2009.
8. Linear Circuits Analysis (*Dav Artice M.*) PWS Publishing Co., 1998.
9. Fundamentals of Electric Circuits (*Alexander Charlesk, Mathew N.O., Sadlku*) McGraw Hill, 2000.

