Electrical Network Analysis and Synthesis

S.E. Sem. III [ETRX]

EVALUATION SYSTEM

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

SYLLABUS

1. **Circuit Analysis (AC and DC)**
   Kirchoff's law, Loop variable analysis, Node variable analysis, Source transformations, Reference directions for current and voltage, Active element conventions, dot convention for coupled circuits. Linearity, Superposition, Thevenin's and Norton's, Maximum power for AC source and dependent source.

2. **Linear Graphs**
   Introductory definitions, The incidence matrix A, the loop matrix B, relationship between sub-matrix of A and B, Cut-sets and cut-set matrix, Fundamental cut-sets and fundamental tie-sets, Planer graphs, A and B matrices, Loop, node, node pair equations, duality.

3. **Laplace Transforms**
   Properties of Laplace transforms, Basic Theorems, Laplace transform of gate function, impulse function and periodic functions, convolution integral, inverse Laplace transform, application of Laplace transforms to solution of Network problems.

4. **Transient and Frequency Analysis**
   Transient response of R-L, R-C, R-L-C circuits (Series combinations only) for DC and sinusoidal excitations – Initial conditions – Solution using differential equation approach and Laplace transform methods of solutions. Transfer function. Concept of poles and zeros. Concept of Frequency response of a system.

5. **Two Port Networks**
   Concept of two port networks. Driving point and Transfer functions, Open circuit and short circuit parameters, transmission and inverse transmission parameters, hybrid parameters, inter-relationship of different parameters, inter-connection of two port networks, T and pi representation, terminated tow port networks.

6. **Fundamentals of Network Synthesis**
   Realizability concept, Hurwitz property, positive realness, properties of positive real functions, testing positive real functions, Synthesis of R-L, R-C and L-C driving point functions – Foster and Cauer forms.

Reference :

1. Network analysis and synthesis (*Franklin F. Kuo*) – PHI.
2. Network analysis (*M. E. Vanvalkenberg*) – PHI, third edition.
3. Engineering Circuit analysis (*William Hayt and Jack Kemmerly*) – TMH.
4. Circuits and Networks – Analysis and Synthesis (*A. Sudhakar and S. P. Shyam Mohan*)
5. Networks and Systems (*D. Roy Choudhury*) – New Age International Pubs.

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