



NETWORK ANALYSIS

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PRE-REQUISITES : Basic Electrical Technology

INTENDED AUDIENCE : Electrical, Electronics & Communication & Instrumentation

INDUSTRIES APPLICABLE TO : Power utility services : CESC, State electricity boards, NTPC etc.

COURSE OUTLINE :

The course begins with description with circuit elements , sources. Understanding of various interesting network theorems applied to solve linear, time invariant network problems efficiently in time and s-domain. Steady and transient solution of network problems with various sources including impulse source, $\delta(t)$. Representing a circuit in s-domain (Laplace domain). Two-port networks. Graph, tree of networks and use them to solve large network problems using matrices.

ABOUT INSTRUCTOR :

Prof. Tapas Kumar Bhattacharya has over thirty years of teaching experience at IIT Kharagpur. He has taught signals and system core course at IIT Kharagpur several times. His area of research interest is in the field of electrical machines and special electrical machines and circuits.

COURSE PLAN :

Week 1: Introduction to Network, circuit elements & sources. KVL & KCL

Week 2: Solution of linear differential equation with different excitation.

Week 3: Deeper look into energy storing elements : inductor and capacitor.

Week 4: Ideal and practical voltage & current sources.

Week 5: Mesh and nodal analysis of networks.

Week 6: Transforming voltage to current source and vice-versa. Thevenin / Norton's equivalent circuit.

Week 7: Tellegen Theorem and its implication. Theory of reciprocity. Network function.

Week 8: Two-port network: Z-parameters, Y-parameters, h-parameters & ABCD parameters.

Week 9: Definition of graph & tree of a network. Cut-set matrix.

Week 10: [A],[B] & [Q] matrices : Relationship among them

Week 11: Tutorial -1

Week 12: Tutorial-2