MANIPAL UNIVERSITY JAIPUR

School of Electrical, Electronics & Communication Engineering (SEEC)

Department of Electronics & Communication Engineering
Course Hand-out

Network Analysis | EC 1302 | 4 Credits | 3 1 0 4

Session: July 14 – Dec 14 | Faculty: Mr Tejpal: Ms. Neetu Marwah | Class: Core Course

A. **Introduction:** This subject deals with various network theorems to analyse the dc circuits, ac circuits and various complex circuits in detail. Analysis is also made by mathematical tool such as Laplace technique and this technique provides the mathematical modelling of time domain circuits in complex frequency domain i.e. s domain. After analysis of so many complex and practical problems, synthesis part will come into picture to design the network corresponding transfer function by means of Foster forms and Cauer forms. One important method will be discussed in last that envisage the graph theory to model network in graphs and correspondingly solution and analysis part as well.

B. **Course Outcomes:** At the end of the course, students will be able to

[1307.1]. Implementation of basic circuital laws and various network theorems to analyse the circuit.

[1307.2]. Analysing and/or synthesizing of the network by means of mathematical tool and find out the parameters to characterize the system and acquire the skills to apply them to diverse engineering problems.

[1307.3] Student will be able to understand the basic property of basic element, network and evaluate transient response, steady state response of given circuit and acquire the skills to apply them to diverse engineering problems.

[1307.4] Student will be able to study complex circuits and they will be able to plot data of the network in matrix form and solve it by graph theory concept and/or two port network concept.

C. SYLLABUS

Network equations: Nodal and loop analysis of networks, source transformation, star delta transformations; **Laplace transformation and its application**; Definition, Basic theorems in Laplace transformation, properties of Laplace transforms, inverse Laplace transforms, partial fraction expansion, initial and final value theorems, Shifting theorems, step, ramp and delayed functions. Solution of RL, RC, RLC networks using Laplace transformation method, Laplace transform of periodic and non periodic signal; **Network Theorems**: Superposition, Reciprocity, Millman's theorems, Thevinin's and Norton's theorems, Maximum Power transfer theorem, Tellegan's Theorem and Millers Theorem; **First order and higher order differential equations:** General and particular solutions of RL, RC and RLC circuits; **Transient behavior and Initial conditions in networks:** Behaviour of circuit elements under switching condition and their representation. Evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations; **linear wave shaping**: Response of RC & RL circuits to step, pulse, square wave, ramp and exponential inputs, compensated attenuators; **Two port network** and **Network functions**, Network Topology.

D. TEXT BOOKS

1. Franklin F. Kuo, "Network Analysis and Synthesis", Wiley India Pvt Ltd, 2006.
2. Ghosh & Chakraborty, "Network Analysis and Synthesis", Tata McGraw Hill Education Private Ltd, 2000.
3. Ravish R Singh, "Network Analysis and Synthesis," Tata McGraw Hill Education Private Ltd, 2013.

E. REFERENCE BOOKS

1. M. E. Van Valkenberg, "Network Analysis", Prentice Hall of India Ltd, 2000.