

S. No.	Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
								Sessional	Final Exam	Max. Marks
4	ECE-303	Network Analysis and Synthesis	PCC	4	3	1	0	50	100	150

**Course Outcomes:**

At the end of the course the student will be able to:	
CO1	Gain the knowledge of various laws governing electrical circuit design and networks.
CO2	Acquire knowledge about the application of differential equation method and Laplace transform in electrical circuits.
CO3	Explain the concept of pole-zero configuration and determine parameters of two port networks.
CO4	Design of K and M derived filters and analyze their operations.
CO5	Apply the concept for synthesis of circuits using Foster and Cauer forms.

**Detailed Syllabus****Section-A**

**Unit 1:** Conventions for describing networks: Reference directions for currents and voltages, conventions for magnetically coupled circuits, circuit topology. First order differential equation: Differential equations as applied in solving networks, Application of initial conditions, evaluating initial conditions in networks.

**(8 Hrs)**

**Unit 2:** Laplace Transformations: Solution of network problems with Laplace transformation, Heaviside's Expansion theorem.

Waveform Analysis & Synthesis: The unit set up, ramp and impulse functions and their Laplace transforms, Initial and final value theorems, convolution integral, convolution as summation.

**(9 Hrs)**

**Unit 3:** Network Functions-poles and zeros : Ports or terminal pairs, Network functions for one port and two port networks (ladder and general networks), Poles and Zeros of network functions, Restriction on pole and Zero locations for driving point and transfer functions. Time domain behaviour from pole Zero plot.

**(9 Hrs)****Section-B**

**Unit 4:** Two port parameters: Admittance, impedance, transmission and hybrid parameters, Relationship between parameter sets, parallel series & Cascade connection of two port Networks, Characteristics impedance of two port networks. Filters: Filter fundamentals- pass and stop band, filter classification, constant K & m derived filters, Behaviour of characteristics impedance over pass & stop bands, design of filters.

**(10 Hrs)**

**Unit 5:** Network Synthesis: Synthesis problem formulation, properties of positive real functions. Hurwitz polynomials properties of RC, LC and RL driving point functions. Foster and Cauer synthesis of LC, RL and RC circuits.

**(8 Hrs)****Text Books**

S.No	Name of Books	Author	Publisher Name	Edition (Pub. Yr.)
1	Network Analysis & Synthesis	F.F. Kuo	Wiley	2 <sup>nd</sup> (2006)
2	Fundamentals of Network Analysis and Synthesis	Perikari	Jaico	1 <sup>st</sup> (2006)

**Reference Books**

S.No	Name of Books	Author	Publisher Name	Edition (Pub. year)
3	Network Theory & Filter Design	V. Atre	New Age International	3 <sup>rd</sup> (2014)
4	Network analysis and Synthesis	Sudhakar Shyam Mohan	McGraw-Hill	5 <sup>th</sup> (2017)