

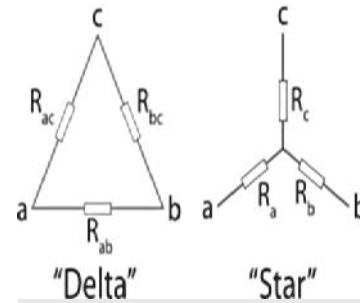
# 19EC101 NETWORK THEORY

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	15	-	10	30	-	10	-	-



SOURCE :

[https://upload.wikimedia.org/wikipedia/commons/thumb/1/18/Delta-Star\\_Transformation.svg/400px-Delta-Star\\_Transformation.svg.png](https://upload.wikimedia.org/wikipedia/commons/thumb/1/18/Delta-Star_Transformation.svg/400px-Delta-Star_Transformation.svg.png)

## COURSE DESCRIPTION AND OBJECTIVES:

The aim of this course is to make the student understand transient responses of RC, RL and RLC circuits, steady state response of circuits to sinusoidal excitation in time domain, application of phasors to circuit analysis and graph theory to analyze circuits, which will help in analyzing the circuits.

## COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

COs	Course Outcomes	POs
1	Apply Kirchhoff's voltage & current laws and theorems to linear circuits.	1, 2
2	Analyze the transient response of networks for different inputs.	1, 2
3	Investigate steady state analysis and design of filters.	1, 2 3, 4
4	Synthesize the response of R, L, C series and parallel combination circuits to sinusoidal excitation and compute the two port network parameters.	1, 2 4

## SKILLS:

- ✓ Find currents flowing through and voltage across any branch.
- ✓ Analyze the transient and steady state response of electric/electronic circuits for various inputs.
- ✓ Design filters for given specifications.

**ACTIVITIES:**

- o *Measure the Resistance of any resistive Electrical Appliance like water heater, incandescent bulb.*
- o *Design of smallsize house wiring system.*
- o *Design circuits with suitable load to get maximum power from source.*
- o *Determination of RLC values for given resonant frequency connected series/parallel combination.*
- o *Design resonant circuit for oscillator and filter applications.*
- o *Design of Power bank for mobile charger circuit.*
- o *Determination of Voltage and current characteristics of given Black box.*
- o *Verify duality for a given Network.*

**UNIT - I****L-9**

**INTRODUCTION TO CIRCUIT ELEMENTS:** Ideal, Practical and dependent sources and their V-I characteristics, Source transformation, Voltage and current division, V-I characteristics of passive elements and their series / parallel combination, Energy stored in Inductors and capacitors, Kirchoff's voltage law and Kirchoff's current law, Mesh and nodal analysis, Star and delta conversions.

**UNIT - II****L-9**

**SINUSOIDAL STEADY STATE ANALYSIS AND RESONANCE:** Instantaneous, Peak, Average, RMS values, Crest factor and form factor of periodic waveforms, Notation and concept of phasors, Response of R, L, C series and parallel combination circuits to sinusoidal excitation, Calculation of active and reactive powers, Resonance - Series and parallel resonance circuits, Concept of bandwidth and Q factor; Filters - Introduction to Low pass, High pass, Band pass and band reject filters.

**UNIT - III****L-9**

**NETWORK TRANSIENT ANALYSIS:** Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for D.C and sinusoidal excitations, Initial conditions, Time domain and Laplace transform methods of solutions.

**UNIT - IV****L-9**

**NETWORK THEOREMS:** Superposition, Thevenin's, Norton's, Reciprocity, Compensation, Maximum power transfer and Millman theorems, Application of theorems to DC and AC circuits, Duality and dual networks.

**UNIT - V****L-9**

**TWO PORT NETWORK PARAMETERS:** Introduction to Two port networks, Open circuit impedance and short circuit admittance (Y), Transmission and inverse transmission, Hybrid and inverse hybrid parameters, Relation between parameter sets, Interconnection of two port networks, Graph theory - Definitions, Graph, Tree, Basic tie-set and basic cut set matrices for planar networks; Network synthesis - Driving point and transfer functions, Poles and Zeros of immittance function, Their properties, Sinusoidal response from pole-zero locations.

**TEXT BOOKS:**

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis", 7<sup>th</sup> edition, Tata McGraw-Hill, 2007.
2. A Sudhakar and Shyammoan S Palli, "Circuits & Networks: Analysis and Synthesis", 5<sup>th</sup> edition, Tata McGraw-Hill, 2007.

**REFERENCE BOOKS:**

1. Syed A. Nasar, "Electric Circuits", Tata McGraw-Hill, Schaum's Series, 1988.
2. Franklin F.Kuo, "Network Analysis and Synthesis", 2<sup>nd</sup> Edition, John Wiley and Sons, 2003.
3. Mahmood Nahvi and Joseph Edminister, "Electric Circuits", 4<sup>th</sup> edition, Schaum's Outline series, Tata McGraw-Hill, 2004.
4. Chakrabati A, "Circuits Theory (Analysis and synthesis)", Dhanpath Rai & Sons, New Delhi, 1999.
5. M E Van Valkenburg, "Network Analysis", Prentice-Hall of India Pvt Ltd, New Delhi, 2015.