ECE - I Year II Semester

22EC102 NETWORK THEORY

Hours Per Week :

L	Т	Ρ	С	
3	2	0	4	

PREREQUISITE KNOWLEDGE: Knowledge on Algebra, calculus, and vectors.

COURSE DESCRIPTION AND OBJECTIVES:

This is a basic course for electronic engineers and provides foundation for electronic circuit analysis. It helps the students to understand basic passive elements, circuit analysis using different theorems, transient responses of RC, RL and RLC circuits, steady state response of circuits to sinusoidal excitation in time domain, and two-port network analysis.

MODULE-1

12L+8T+0P=20 Hours

INTRODUCTION TO CIRCUIT ELEMENTS:

Source transformation, Voltage and current division, V-I characteristics of passive elements and their series / parallel combination, Energy stored in Inductors and capacitors, Kirchhoff's voltage law and Kirchhoff's current law, Mesh and nodal analysis, Star and delta conversions.

UNIT-2

UNIT-1

NETWORK THEOREMS:

Superposition, Thevenin's, and Norton's, Maximum power transfer, Reciprocity, Compensation, and Duality-dual networks.

PRACTICES:

- Apply KVL and KCL
- Analyse different networks with dependent and independent sources
- Apply mesh analysis
- Apply nodal analysis
- Superposition Theorem
- Thevenin's theorem
- Norton's theorem
- Maximum power transfer theorem
- Dual networks

MODULE-2

UNIT-1

TRANSIENTS AND TWO-PORT NETWORKS:

Network Transient Analysis: Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for D.C excitation.

Two Port Network Parameters: Introduction to Two port networks, Open circuit impedance (Z) and short circuit admittance (Y), Transmission (ABCD), and Hybrid parameters (h), Relation between parameter sets.

c A	c
R _{ac} R _{bc}	∏R _c
a R _{ab} b	a R _a R _b
"Delta"	"Star"
Source- https://	

en.m.wikipedia. org/wiki/ File:Delta-Star

Transformation.

sva



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SKILLS:

- ✓ Understand different components and their characteristics.
- Able to analyze/ find responses using theorems.
- ✓ The behavior of RL/RC/RLC can be evaluated for different inputs.
- Able to analyze regulated power supply.

UNIT-2

SINUSOIDAL STEADY STATE ANALYSIS AND RESONANCE:

Instantaneous, Peak, Average, RMS values, Crest factor and form factor of periodic waveforms, Response of R, L, C series and parallel combination circuits to sinusoidal excitation, Resonance-Series and parallel resonance circuits, Concept of bandwidth and Q-factor.

PRACTICES:

- Transient response of RC with different inputs
- Transient response of RL with different inputs
- Transient response of RLC with different inputs
- Two port network parameters and inter relation
- Solving different two-port networks using Z,Y and ABCD parameters
- Find the different parameters of different waveforms
- Find the response of the network for sinusoidal excitation
- Series RLC network
- Parallel RLC network

COURSE OUTCOMES:

Upon successful completion of this course, students will have to ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply Kirchhoff's laws and theorems to linear circuits.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Analyze current and voltage behaviour for the given circuit under transient conditions.	Analyze	2	1, 2, 3, 5, 9, 10
3	Analyze the given network using specified two port network parameter like Z or Y or T or h.	Analyze	2	1, 2, 3, 5, 9, 10
4	Evaluate the steady state analysis of RL, RC and RLC circuits and resonance.	Evaluate	2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

- 1. A Sudhakar and Shyammohan S Palli, "Circuits & Networks: Analysis and Synthesis", 5th edition, Tata McGraw-Hill,2015.
- 2. M.E. Van Valkenburg and TS Rathore "Network analysis", Prentice India Education Services Pvt.Ltd, 3rd edition, 2019.

REFERENCE BOOKS:

- 1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis", 7th edition, Tata McGraw-Hill, 2007.
- 2. Franklin F.Kuo, "Network Analysis and Synthesis", 2nd Edition, John Wiley and Sons, 2003.
- 3. A Chakrabarthy, Electric Circuitsll, Dhanpat Rai & Sons, 6th Edition, 2010.
- 4. Mahmood Nahvi and Joseph Edminister, "Electric Circuits", 4th edition, Schaum's Outline series, Tata McGraw-Hill, 2004.