MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act,1956

EMPOWERING THROUGH INNOVATIONS
MLRS

COURSE CONTENT

ELECTRICAL CIRCUITS-II							
II Semester: EEE							
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
2520222	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	40	60	100
Contact Classes:45	**Tutorial Classes: Nil**	**Practical Classes: Nil**			**Total Classes:45**		
Prerequisites: Matrices and Calculus and Electrical Circuits - I							

Course Overview:

This course focuses on advanced electrical circuit analysis, covering transient behavior of RLC circuits, analysis using Laplace transforms, and network topology concepts. Students study two-port network parameters and interconnections and gain an introduction to filter design, including low-pass, high-pass, band-pass, and band-elimination filters. The course builds analytical skills required for modeling, analysis, and design of electrical and electronic networks.

Course Objectives:

1. To understand the transient behavior of R, L, and C elements and analyze series and parallel circuits using integro-differential methods.
2. To apply the Laplace Transform technique to solve transient responses for different input signals.
3. To develop knowledge of network topology and use matrix methods for efficient network analysis.
4. To understand and analyze two-port networks using different parameters and their interrelationships.
5. To classify and analyze filters, focusing on constant-k and m-derived filter designs for frequency selection.

Course Outcomes: After Completion of the Course, Students should be able to

1. Analyze transient responses of RL, RC and RLC circuits under DC and AC excitations.
2. Determine transient behavior of circuits using the Laplace Transform method for various inputs.
3. Apply graph theory and use Tie-set and Cut-set matrices for network analysis.
4. Analyze two-port networks using Z, Y, h and ABCD parameters.
5. Evaluate low pass, high pass, band pass and band elimination filters—using constant-k and m-derived techniques.

UNIT - I: Transient analysis:
Significance of Initial conditions of R, L and C elements Transient response of series RL, RC and RLC circuits using integro-differential approach for DC and Sinusoidal excitations. Transient response of parallel RL, RC and RLC circuits using integro-differential approach for DC and Sinusoidal excitations.

UNIT - II: Electrical circuit Analysis using Laplace Transforms:
Laplace Transforms of step, ramp, exponential, impulse functions (inputs) Transient response of series RL, RC and RLC circuits using Laplace Transforms approach for DC and Sinusoidal

excitations. Transient response of parallel RL, RC and RLC circuits using Laplace Transforms approach for DC and Sinusoidal excitations.

UNIT - III: Network Topology
Graph, tree, chord, Tie-set, cut-set, incident matrices, Problems on Tie-set and cut-set matrices.

UNIT - IV: Two port network parameters: Open circuit impedance, short-circuit admittance, Transmission, Hybrid parameters & inter-relationships, Series, parallel and cascade connection of two port networks.

UNIT - V: Filters: Classification of filters – Low pass, High pass, Band pass and Band Elimination, Elementary treatment of Constant-k and M-derived filters-Low pass and High pass Filters, Band pass and Band elimination filters.

TEXT BOOKS:
1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGraw Hill, 2nd Edition, 2019.

REFERENCE BOOKS:
1. B. Subramanyam, "Electric Circuit Analysis", Dream tech Press & Wiley, 2021.
2. James W.Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGraw Hill, 5thEdition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3rd Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", Mc Graw Hill,6th Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

ELECTRONIC RESOURCES:

1. https://nptel.ac.in/courses/108/104/108104139/
2. https://nptel.ac.in/courses/108/106/108106172/
3. https://www.digimat.in/nptel/courses/video/108105159/L01.html
4. https://www.digimat.in/nptel/courses/video/108102042/L01.htm

MATERIALS ON LINE:
1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper–I
8. Model question paper–II
9. Lecture notes
10. E-Learning Readiness Videos (ELRV)