SCHEME OF COURSE WORK

Course Details:

Course Title	**: NETWORK ANALYSIS AND SYNTHESIS**		
Course Code	**:13EE1104**	**L T P C**	**: 4 1 0 3**
Program:	**: B. Tech.**		
Specialization:	**: ELECTRICAL AND ELECTRONICS ENGINEERING**		
Semester	**: III SEM**		
Prerequisites	**: MATHEMATICS-I, II AND BASIC NETWORK ANALYSIS**		
Courses to which it is a prerequisite	**: ----------**		

Course Outcomes (COs): At the end of the course students will be able to:

1	Solve the Network problems using Graph theory; acquire the knowledge of Network Topology and Duality in Electrical Networks.
2	Analyze the Networks using Differential Equation Approach and acquire the knowledge of RLC- Series & Parallel circuits, for different Excitations.
3	Evaluate the Networks using Laplace Transforms Approach.
4	Analyze the Network functions, Two Port Networks and Ladder Networks.
5	Design and Evaluate the LC, RC & RL Networks using Foster's and Cauer Forms.

Program Outcomes (POs): The graduate of Electrical and Electronics Engineering will be able to:

1	Be on par with those from any advanced institution.
2	Take up any job either in the core industry (or) in allied disciplines.
3	Fit to write any competitive examinations for getting selected either for M.S. program (or) to undertake relevant career at a high end.
4	Develop a techno ethical personality that makes him serve the people in general & Electrical & Electronics Engineering in particular.
5	Enable the students adopt themselves in any socio-technological situation.
6	Develop communication and leadership skills so that the candidates in their future become leaders in the industry & academia.
7	Make students do projects either of fundamental nature (or) of the ones useful to industry such that in either case they enter the frontiers of research.
8	Have a basic capability to analyze and /or design an electrical &electronics system and be useful to the community in general.
9	Function effectively as an individual and also as a member and leader in diverse teams.
10	Communicate effectively problems of his discipline to the experts of other disciplines.
11	Have sufficient working knowledge in IT tools for him to correctly model the system and predict the solution.
12	Prepare for a life-long learning in the broadest context of technological changes.

Course Outcome versus **Program Outcomes:**

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	S	S	S	S	M	M	S	S	M	M	-	M
CO-2	S	S	S	S	M	M	S	S	M	M	-	M
CO-3	S	S	S	S	M	M	S	S	M	M	-	M
CO-4	S	S	S	S	M	M	S	S	M	M	-	M
CO-5	S	S	S	S	M	M	S	S	M	M	-	M

S - Strongly correlated, *M - Moderately* correlated, *Blank - No correlation*

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	**Unit I: NETWORK TOPOLOGY** Introduction to Network Topology, Linear Graphs in Electrical Networks, Basic Definitions, Incidence, Loop and cut-set matrices.	CO1	Explain how Network Topology is useful in Network Analysis? Take any Electrical Network and determine the Loop and Cut set Matrices by Network Topology?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test 1 (Week 8) Seminar (Week 1)
2	Fundamental Loop and Fundamental Cut-Set Matrices, Graph Theoretic version of KCL and KVL.	CO1	Explain how to draw the Fundamental Loop and Fundamental Cut set matrices? Take any Electrical Network and determine the Fundamental Loop and Fundamental Cut set Matrices by Network Topology?	▫ Lecture ▫ Discussion ▫ Problem solving	Mid-Test 1 (Week 8) Seminar (Week 2)
3	Loop Impedance and Node Admittance Matrices, Duality in Electrical Networks.	CO1	Take any Electrical Network and determine the Loop and Node Admittance Matrices? Take any Electrical Network and Draw the Duality of the Network?	▫ Lecture ▫ Discussion ▫ Problem solving	Mid-Test 1 (Week 8) Seminar (Week 3)
4	**UNIT II: NETWORK ANALYSIS - I (Differential Equation Approach)** Network elements, Initial and final conditions (Constant flux linkage and Charge theorems),	CO2	State and prove the constant flux linkage Theorem? State and prove the constant charge Theorem?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test 1 (Week 8) Seminar (Week 4)
5	Step and Impulse response of RC & RL Circuits (Concept of time constant), Solution of RLC- Series & Parallel circuits for the step and impulse excitations	CO2	Determine the Step Response of RLC series circuit? Determine the Step Response of RLC parallel circuit?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test 1 (Week 8) Seminar (Week 5)
6	Analysis of Transformer (Mutual Inductance).	CO2	Explain what is the Necessity for the Transformer? Explain how to Analyze the Transformer?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test 1 (Week 8) Seminar (Week 6)
7	**UNIT III: NETWORK ANALYSIS USING LAPLACE TRANSFORMS** The Transformed Circuit, Thevenin's and Norton's Theorems,	CO3	Draw and Explain the Thevenin's Transformed circuit? Draw and Explain the Nortan's Transformed circuit?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test 1 (Week 8) Seminar (Week-7)
8	**Mid-Test 1**		**UNIT I, II AND HALF PAT IN III.**		
9	The system function (with poles and zeros), the step and impulse responses,	CO3	Determine the step response of RL and RC circuits? Determine the impulse Response of RL and RC circuits?	▫ Lecture ▫ Discussion ▫ Problem solving	Mid-Test (Week 17) Seminar (Week-9)
10	The convolution Integral, The Duhamel Superposition Integral.	CO3	State and Explain the convolution theorem?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test (Week 17) Seminar (Week-10)
11	**UNIT IV: NETWORK ANALYSIS – II (Two- Ports)** Network functions, Two port Networks: Z, Y, H and T (ABCD) Parameters.	CO4	Write the importance of network functions? Draw the equivalent circuit of Z, Y, H Parameters?	▫ Lecture ▫ Discussion Problem Solving	Mid-Test (Week 17) Seminar (Week-11)

12	Relationship between Two Port parameters, Transfer function using two port parameters.	CO4	Explain the inter relationship between Two port Networks? Determine the transfer function of Two Port Networks?	▫ Lecture ▫ Discussion ▫ Problem solving	Mid-Test (Week 17) Seminar (Week-17)
13	Inter connection of two port networks, Analysis of Ladder networks.	CO4	Derive the Expression for Series and Parallel connection of Two Port Networks? Derive the Cascade connection of Two Ports Network?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test (Week 17) Seminar (Week-13)
14	**UNIT V: SYNTHESIS OF NETWORKS** Causality and stability, Hurwitz polynomials, Positive Real Functions, Elementary Synthesis procedure,	CO5	Write the properties of Hurwitz polynomials? Write the properties of Positive Real Function?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test (Week 17) Seminar (Week-14)
15	Properties of LC Immittance functions, Synthesis of LC driving point function by Foster's and Cauer Forms.	CO5	Write the properties of LC Immittance function? Find the first, second Foster Form's and First and second Cauer forms for the given LC function?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test (Week 17) Seminar (Week-15)
16	Properties of RC & RL driving Point Function, Synthesis of RC & RL functions Foster's and Cauer Forms.	CO5	Write the properties of RL and RC Immittance function? Find the first, second Foster Form's and First and second Cauer forms for the given RC and RL functions?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test (Week 17) Seminar (Week-16)
17.	**Mid-Test 2**		**HALF PART III UNIT, IV, V UNITS.**		
18.	**Preparation and Practical Examination**				
19,20	**END EXAM**		**UNIT I, II, III, IV, V.**		Assessment will be on all topics at END EXAM