Course Information Sheet

Programme: UG	**Degree:** B.Tech (Common for all Branches)	
Course Code:	**Course Title: Network Analysis**	
Year: I **Sem:** II **A.Y. :2025-26**	**Regulation: IS23** **College: ISTS (an Autonomous Institution)**	
L T/P/D C: 3/0/0/3	**Credits: 3**	**Contact Hrs: 5**
Mid Marks: 30	**External Marks: 70**	**Total Marks: 100**
Teaching Hrs:	**Exam Duration:** 3 hrs.	

Course Information:

Course Code	Course Name	Description	Year-Sem
	Network Analysis	• To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits • To impart knowledge on applying appropriate theorem for electrical circuit analysis • To explain transient behaviour of circuits in time and frequency domains • To teach concepts of resonance • To introduce open circuit, short circuit, transmission, hybrid parameters and their Interrelationship	I B.Tech (ECE) Semester -II

Program Outcomes (POs)

PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, **science**, engineering fundamentals, and an engineering specialization to the solution of complex engineeringproblems.
PO2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles ofmathematics, natural sciences, and engineering sciences.
PO3	**Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmentalconsiderations.
PO4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, andsynthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complexengineering activities with an understanding of the limitations.
PO6	**The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilitiesrelevant to the professional engineering practice.
PO7	**Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, andneed for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities andnorms of the engineering practice.
PO9	**Individual and Team Work:** Function effectively as an individual, and as a member orleader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and giveand receive clear instructions.
PO11	**Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a memberand leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technologicalchange.

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DEPARTMENT OF ELECTRONICS&COMMUNICATION ENGINEERING

Program educational objectives (PEO'S):

PEO 1: The graduates will utilize their expertise in Engineering to solve industry's Technologicalproblems.

PEO 2:Analyze real life problems, design appropriate system to provide solutions that are technically sound, economically feasible and socially acceptable.

PEO 3:Exhibit professionalism, ethical attitude, communication skills, team work in Their profession and adapt to current trends by engaging in lifelong learning.

Program Specific Outcomes (PSO's):

PSO1: To analyse, design and develop solutions for the real time problems and to apply The technical Knowledge for developing quality products for Electronics and Communication based Industry.

PSO2: To adapt to emerging Information and Communication technologies and to Develop innovative ideas and solutions in RF & Communication, Networking, Embedded Systems and VLSI.

PSO3: An ability to make use of acquired technical knowledge to get employed in the Field of Electronics and Communication and also to become successful Entrepreneur.

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Course Name**:** NA

Course Code**:** C112

Branch:ECE

Year – Sem:I – II

Regulation: IS23

Academic Year: 2025-26

SUBJECT : NETWORK ANALYSIS
CourseOutcomes
CO1: Understand basic electrical circuits with nodal and mesh analysis.
CO2: Analyse the circuit using network simplification theorems.
CO3: Find Transient response and Steady state response of a network.
CO4: Analyse electrical networks in the Laplace domain.
CO5: Compute the parameters of a two-port network.

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CO – PO MAPPING

Course Outcomes(CO's)	Program Outcomes (PO)												Program Specific Outcomes (PSO's)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	-	-	-	1	1	-	1	3	2
CO2	3	3	2	2	1	-	-	-	1	1	-	1	2	3
CO3	3	3	2	2	1	-	-	-	1	1	-	2	3	2
CO4	3	3	3	-	-	1	-	-	-	-		2	1	3
CO5	3	3	3	-	-	-	-	-				2	3	2

1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation

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CO-PO MAPPING JUSTIFICATION

Course Name**:** NA

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Mapped POs: PO1, PO2 and PO5,PO12

PO1:,Types of circuit components, Types of Sources and Source Transformations, Mesh Analysis and Nodal Analysis

PO2: Evaluating initial conditions procedure, second order differential equations, Homogeneous, non-homogenous, problem-solving using R-L-C elements with DC excitation And ACexcitation

PO5.Reciprocity, Superposition, Milliman’s Max Power Transfer theorem.

PO12:.Tellegens - problem solving using dependent sources

CO1:Understand basic electrical circuits with nodal and mesh analysis.

C112.1		
C112.1-P01	3	Types of circuit components, Types of Sources and Source Transformations, Mesh analysis and NodalAnalysis
C112.1-P02	3	Problem solving with resistances only including dependent sources also. Principal of Duality with examples.
C112.1-P012	3	Impedance concept, phase angle, series R-L, R-C, R- L-C circuits

CO2:Analyse the circuit using network simplification theorems.

C112.2		
C112.2-P01	3	Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit withDC excitation
C112.2-P02	2	Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem-solving using R-L-C elements with DC excitation and ACexcitation
C112.2-P012	2	Laplace transform: introduction, Laplace transformation, basic theorems, problem solving using Laplace transform

CO3: Find Transient response and Steady state response of a network.

C112.3		
C112.3-P01	3	Network Theorems: mesh and nodal analysis, Star-Delta conversion, Thevenin's, Norton's.
C112.3-P02	3	Reciprocity, Superposition, Milliman's Max Power Transfer theorem.

C112.3-P012	3	Tellegens - problem solving using dependent sources

CO4:Analyse electrical networks in the Laplace domain.

C112.4		
C112.4-P01	3	Resonance: Introduction, Definition of Q, Series resonance
C112.4-P02	2	Bandwidth of series resonance, Parallel resonance
C112.4-P012	2	General case-resistance present in both branches, anti-resonance at all frequencies.

CO5:Compute the parameters of a two-port network.

C112.5		
C112.5-P01	3	Two-port Networks: Relationship of two port networks
C112.5-P02	2	Z-parameters, Y-parameters, Transmission line parameters
C112.5-P03	2	h- parameters, Relationships Between parameter Sets

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Lesson plan

Course Name**:** NA Course Code**:** C112

Branch:(ECE&ALLIED BRACHES) Year – Sem: I – II

Regulation: IS23 Academic Year: 2025-26

LESSON PLAN

CourseOutcomes (Along with Knowledge Level): After going through this course Students will be able to

Code	Description	Knowledge Levels
1	Solvetheelectricalnetworkusingmeshandnodalanalysis.	K3
2	Applynetworktheoremstoanalyzetheelectriccircuits.	K3
3	Describethesteadystateanalysisof RLCcircuits.	K2
4	AnalyzetheResonanceCircuits.	K4
5	Solvethetwoportnetworkparameters.	K3
6	ExplainRLCtransientcircuitsandFilters.	K2

LESSON PLAN:

S. No	COx, Kx	IntendedLearning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours Required	Pedagogy	Teaching aids
		Explain CourseOutcomes		1	Lecture	Chalkand Board
Introduction to Electrical Circuits						
1.	I	Classificationof Network elements	K2	1	Lecture& Discussion	Chalkand Board
2.		ExplainElectricchargeand current,Electricenergyand potential.	K2	1	Lecture &Discussion	Chalkand Board
3.		SolveequivalentResistance forseriesandparallel combination	K2	2	Lecture &Discussion	Chalkand Board
4.		SolveequivalentInductance parameter – series and parallelcombination	K2	1	Lecture &Discussion	Chalkand Board
5.		Solve equivalent Capacitanceparameter– series and parallel combination	K2	1	Lecture &Discussion	Chalkand Board
6.		Findthe Source transformationof circuits.	K2	1	Lecture& Discussion	Chalkand Board
7.		Apply Kirchhoff's laws to analyzecircuitsusingMesh analysis	K3	2	Lecture &Discussion	Chalkand Board
8.		ApplyKirchhoff'slawsto analyzecircuitsusingNodal analysis	K3	2	Lecture &Discussion	Chalkand Board
			Total	**11**		
Network Theorems						
1.	II	ApplyThevenin'sTheorem to solve electric circuits problems.	K3	3	Lecture &Discussion	Chalkand Board
2.		ApplyNorton'sTheoremto solve electric circuits problems.	K3	3	Lecture and peer–peer Discussion	Chalkand Board
3.		Apply Milliman's &ReciprocityTheorems to solveelectriccircuits problems.	K3	2	Lectureand peer –peer Discussion	Chalkand Board

4.		Apply Compensation& Substitution Theorems to solve electriccircuits problems.	K3	2	Lecture and peer –peer Discussion	Chalk and Board
5.		Apply Superposition& Max Power Transfer Theorems to solve electric circuits problems.	K3	2	Lecture and peer –peer Discussion	Chalk and Board
			Total	12		
Steady State Analysis of A.C Circuits						
1.	III	Find the Response to sinusoidalexcitationfor pure resistance	K2	1	Lecture &Discussion	Chalkand Board
1.		Find the Response to sinusoidalexcitationfor pure inductance,	K2	1	Lecturewith Assignment	Chalkand Board
3.		Find the Response to sinusoidalexcitationfor pure capacitance	K2	1	Lecture &Discussion	Chalkand Board
4.		Explain the impedance concept,phaseanglefor series R-L, R-C, R-L-C circuits.	K2	2	Lecture &Discussion	Chalkand Board
5.		Explain the Complex impedance and phasor notationforR-L,R-C,R-L- C	K2	2	Lecture &Discussion	Chalkand Board
6.		solveproblems usingmesh andnodalanalysis	K2	2	Lecture& Discussion	Chalkand Board
			Total	**10**		
Resonance						
1.	IV	AnalyzeSeries resonance RLCcircuit.	K4	3	Lecturewith assignment	Chalkand Board
2.		Explainthecurrentinanti-resonance	K2	1	Lecture& Discussion	Chalkand Board
3.		AnalyzetheparallelRLC circuitresonance	K4	3	Lecturewith assignment	Chalkand Board
4.		Explainantiresonanceatall frequencies	K2	2	Lecture& Discussion	Chalkand Board
			Total	**9**		
Two-port networks						

1.	V	FindZ-parametersfortwo port networks.	K2	2	Lecture& Discussion	Chalkand Board
2.		Relationship of two port networks	K2	2	Lecture and Discussion	Chalk and Board
3.		Find Y-parameters for two port networks.	K2	2	Lecture & Discussion	Chalk and Board
4.		Find Transmission parameters, h-parameters for two port networks.	K2	2	Lecture and Discussion	Chalk and Board
5.		Find the Relationship between parameter sets	K2	2	Lecture and Discussion	Chalk and Board
6.		Describe series connection, Parallel connection& Cascade connection of two port networks	K2	2	Lecture and Discussion	Chalk and Board
			Total	12		
Transients						
1	VI	FindtheresponseforR-L andR-CcircuitswithDC excitation	K2	3	Lecture &Discussion	Chalkand Board & PPT
2		Solvingtheproblemsusing R-L-C elements with DC excitation	K2	3	Lecture &Discussion	Chalkand Board & PPT
3		Find the Solutions using Laplacetransformmethod	K2	2	Lecture &Discussion	Chalkand Board&PPT
			Total	**8**		
1		AnalyzetheCircuitsusing OpenSourceSimulation Software	K4	2	Lecture and peer–peer Discussion	Chalkand Board&PPT
			Total	2		
			Total classesAll together	**64**		

Total Number of Hours: 64

Text books

2. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.

3. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020.

3. Network lines and Fields by John. D. Ryder 2nd Edition, PHI

Reference Books:

1. D. Roy Choudhury, Networks and Systems, New Age International Publications, 2013.
2. Joseph Edminister and Mahmood Nahvi, Electric Circuits, Schaum's Outline Series, 7th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017
3. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N. O. Sadiku, McGraw-Hill

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Web References	
W1	https://www.loc.gov/rr/scitech/selected-internet/NA.html

ASSESSMENT METHODOLOGIES-DIRECT

☑ASSIGNMENTS	☑ STUD. SEMINARS	☑TESTS/MODEL EXAMS	☑UNIV. EXAMINATION
☐ STUD. LAB PRACTICES	☐ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

☑ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	☑ STUDENT FEEDBACK ON FACULTY (TWICE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Prepared by

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