	DPG Institute of Technology and Management **Sector 34, Gurugram HR 122004**
	Lesson Plan
	Course Name: Network Theory
	Faculty Name: Dr. Sonu Rana

No. of Lectures Hours/Week	**3**	**Exam Hours**	**3**
Total No of lectures	**37**	**Exam Marks**	**75**
Course Code	**PCC-ECE-211G**		

Course Objectives:

1. To develop fundamental knowledge in the analysis of electric networks and circuit theorems.
2. To analyze single-phase and three-phase (star and delta) circuits effectively.
3. To compare and apply tie-set and cut-set methods for circuit analysis.
4. To design different types of filters and understand two-port network parameters and their transformations.

Lecture No.	Topics to be Covered	Teaching Methodology/Pedagogy	Class Activity	Remarks
Section-A, Unit-1, CO-C204.1				
1	Subject Introduction, importance and applications of Network Theory	Simple talk and examples	Group discussion on practical uses	
2	Basic circuit elements (R, L, C) and their voltage-current relations	Board explanation with waveforms	Solve basic problems	

3	Ohm's Law, Kirchhoff's Voltage and Current Laws	Derivation and examples	Numerical exercises	
4	Source transformation and source conversion	Step-by-step derivation	Solve examples	
5	Star–Delta and Delta–Star conversion	Diagram and formula method	Class problem solving	
6	Mesh and Nodal analysis	Board and step explanation	Solve simple network problems	
7	Superposition theorem	Numerical examples	Group activity	
8	Thevenin's and Norton's theorems	Derivation with circuit diagrams	Solve questions in pairs	
9	Maximum Power Transfer theorem	Board work and derivation	Class exercise	
10	Test and revision	Quiz/discussion	Worksheet	
Section-B, Unit-2, CO-C204.2				
10	Concept of Transient and Steady-State Response	Simple explanation with examples	Q&A session	
11	Transient response of RL circuit with DC excitation	Step-by-step derivation	Solve simple problems	
12	Transient response of RC circuit with DC excitation	Board work and graphs	Numerical worksheet	
13	Transient response of RLC circuit	Analytical derivation	Practice exercise	
14	Time constant and natural response	Explain using waveform	Short quiz	
15	Sinusoidal steady-state analysis in RLC circuits	Diagram and example	Solve examples	

16	Average and RMS values, form factor, peak factor	Tabular explanation	Numerical worksheet	
17	Unit Test and Discussion	Recap of concepts	Oral test and worksheet	
Section-C, Unit-3, CO-C204.3				
18	Series resonance in RLC circuits	Derivation with waveform explanation	Solve numerical problems	
19	Resonant frequency, bandwidth, and quality factor (Q)	Board explanation with examples	Calculate Q-factor for given data	
20	Parallel resonance and its conditions	Diagram explanation and derivation	Solve circuit examples	
21	Selectivity and practical importance of resonance	Real-life applications and charts	Group discussion on uses	
22	Introduction to coupled circuits	Simple explanation with examples	Identify coupled coil examples	
23	Coefficient of coupling and mutual inductance	Diagram and formula-based explanation	Solve basic problems	
24	Dot convention and polarity rules	Diagram explanation	Label dots and polarities on circuit	
25	Equivalent circuit of coupled coils	Analytical and step-by-step method	Draw equivalent diagrams	
26	Energy stored in coupled coils	Formula explanation with examples	Solve energy calculation question	
27	Unit Test and Revision	Recap and Q&A discussion	Worksheet and short quiz	
Section-D, Unit-4, CO-C204.4				

28	Introduction to two-port networks and their applications	Simple explanation with examples	Group discussion	
29	Impedance (Z) parameters – Definition and equations	Board explanation with circuit examples	Solve for Z-parameters	
30	Admittance (Y) parameters – Definition and equations	Derivation and tabular comparison	Write equations for Y-parameters	
31	Hybrid (h) parameters – Definition and conversion	Chart explanation with examples	Practice conversion problems	
32	Transmission parameters and their significance	Block diagram method	Derive ABCD equations	
33	Relationship between different parameters	Step-by-step derivation	Tabulate conversions	
34	Symmetrical and reciprocal conditions of two-port networks	Analytical discussion with examples	Identify conditions in problems	
35	Interconnection of two-port networks	Diagram explanation	Solve example problems	
36	Practical examples and applications of two-port networks	Real-life circuit demonstration	Write case-based notes	
37	Unit Test and Revision	Recap with question-answer session	Worksheet / Quiz	

Text Books:

1. Van, Valkenburg.; "Network Analysis", 3rd Edition, Pearson Education, 2015.
2. Sudhakar A. Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi, 1994
3. A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education
4. S.K Bhattacharya & Manpreet Singh, Network Analysis and Synthesis, Pearson Education, 2015.

Reference Books:

1. Network Theory by U.A Bakshi, V.A Bakshi, Technical Publications

2. "Fundamentals of Electric Circuit" by C.K Alexander and Sadiku.
3. A.V. Oppenheim, A.S. Willsky, with S. Nawaab "Signals & Systems"2nd Edition, Pearson Education, 2015.

Course Outcomes:

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
3. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions and appreciate the frequency domain techniques.

CO–PO & PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2									1	3	2	
CO2	3	3	2									1	3	2	
CO3	3	2	2										3	2	
CO4	3	2	3	2								1	3	3	2

3 = Strong correlation
2 = Moderate correlation
1 = Low correlation
Blank = No correlation

Signature of Staff In charge Signature of HoD