

**Nirma University**  
**School of Technology, Institute of Technology**  
**Electronics & Instrumentation Engineering**

**B. TECH. SEMESTER -III**

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3	0	2	4

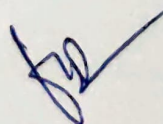
<b>Course Code</b>	<b>2EI304</b>
<b>Course Title</b>	<b>Circuit Theory</b>

**Course Learning Outcome:**

At the end of the course, students will be able to -

1. develop an understanding of the fundamental principles & theorems of electrical networks
2. analyze the performance of two port networks
3. synthesize electrical networks

<b>Syllabus</b>	<b>Teaching Hours</b>
<b>UNIT 1: Basics of Electrical circuits</b>	<b>4</b>
Electrical components, Classification of Networks, Sources of Energy	
<b>UNIT 2: Techniques of Network Analysis</b>	<b>6</b>
Kirchhoff's Laws, The number of Network Equations, Mesh Analysis, Nodal Analysis, Source Transformation, Duality.	
<b>UNIT 3: Network Theorems</b>	<b>8</b>
Superposition Theorem, Thevenin's Theorem, Norton Theorems, Maximum Power Transfer Theorem, Reciprocity Theorem, Millman's Theorem, Substitution Theorem, Compensation Theorem	
<b>UNIT 4: Two-Port Network Parameters</b>	<b>7</b>
Two-Port Network, Open Circuit Impedance Parameters, Short Circuit Admittance Parameters, Transmission Parameters, Hybrid Parameters, Relationship between parameters, Interconnection of Two-Port Networks.	



**UNIT 5 : Initial conditions and Transient Analysis**

5

Initial Conditions in Elements, Solution of a First order and Second order differential equations, Transients in R-L and R-C Circuits, Transients in RLC Circuits.

**UNIT 6: Sinusoidal Steady State Analysis**

3

Characteristics of Sinusoidals, Forced response to Sinusoidal Functions, The Complex Forcing Function, Phasor Diagram.

**UNIT 7: Transform Impedance and Transform Circuits**

4

Representation of Electrical components in S-domain, Transform Methods in Network Analysis

**UNIT 8: Network Functions**

4

Terminal Pairs of Ports, Network Functions for Two-Port Networks, Poles and Zeros of the Network Functions, Time-Domain behavior from the Pole-Zero Plot.

**UNIT 9: Network Synthesis**

4

Impedance and admittance functions of R-C, R-L and L-C Circuits. Representation of Transfer Functions in Foster and Cauer forms.

**Self Study:**

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

**References:**

- (1) William H. Hayt, Jr , Jack E. Kemmerly, Steven M. Durbin, Engineering Circuit Analysis, Mc Graw Hill
- (2) U. A. Patel, Circuits and Networks, Mahajan Publication
- (3) K.M. Soni, Circuit Analysis and Synthesis, S.K. Kataria & Sons

