3. J.Cathey, 2000 Solved Problems in Electronics, Schaum"s outline Series, Tata Mc Graw Hill (1991).

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE COURSE – 2 (DSC-2): Basic Circuit theory (INDSC1B)

Credit distribution, Eligibility and Prerequisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Basic Circuit theory (INDSC1B)	04	03	-	01	Course Admission Eligibility	Nil

Learning Objectives

The Learning Objectives of this course are as follows:

- To develop an understanding of the fundamental laws and elements of electric circuits.
- To learn the energy properties of electric elements and techniques to measure current and voltage.
- To develop the ability to apply circuit analysis to AC and DC circuits.
- To understand signals, waveforms and transient & steady state responses of RLC circuits.

Learning outcomes

The Learning Outcomes of this course are as follows:

- Understand the current-voltage characteristics of basic fundamental elements
- Design and analyze the electronic circuits using various network theorems
- Understand frequency response and behavior of ac circuits
- Understand the concept of two port network and overall response for interconnection of two port networks

SYLLABUS OF DSC- 2

UNIT – I **(12 Hours)**

Basic Circuit Concepts: Voltage and Current Sources including their types, Resistors: types and color coding, Capacitor: types and color coding, Inductor: types and color coding, star-delta conversion & delta-star conversion. Sinusoidal voltage and current: Definition of instantaneous, peak to peak, average and rms value.

UNIT – II **(12 Hours)**

Concepts of Circuit Analysis: Ohms Law, Kirchhoff's Current Law (KCL), Kirchhoff's
Concepts of Circuit Analysis: Ohms Law, Kirchhoff's Current Law (KCL), Kirchhoff's
Voltage Law (KVL), Node Analysis, Mesh Analysis.
Network Theorem (DC Circuits): Principal of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem. Voltage Law (KVL), Node Analysis, Mesh Analysis.
Network Theorem (DC Circuits): Principal of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem.

UNIT – III **(12 Hours)**

DC Transient Analysis: Time Constant, Response of RC, RL and RLC circuit to dc source(s), Response of source free RC, RL and RLC circuit.
AC Circuit Analysis: Voltage-Current relationship in Resistor, Inductor and Capacitor, Phasor, Complex Impedance. Mesh Analysis, Node Analysis and Network Theorems for AC Circuits. Frequency Response of Series and Parallel RLC Circuits, Resonance, Quality (Q) Factor and Bandwidth. Fundamentals of passive Filters: Low Pass, High Pass, Band Pass and Band Stop.

UNIT – IV **(9 Hours)**

Power in AC Circuits: Instantaneous Power, Average Power, Reactive Power, Complex Power and Power Triangle, Power Factor.
Two Port Networks: Introduction to two port networks, Impedance (Z) Parameters, Admittance (Y) Parameters, hybrid (h) parameters and Transmission (ABCD) Parameters.

Practical component- **(30 Hours)**

1. Verification of Kirchoff's Law.
2. Verification of Norton's Theorem.
3. Verification of Thevenin's Theorem.
4. Verification of Reciprocity Theorem.
5. Verification of Superposition Theorem.
6. Verification of the Maximum Power Transfer Theorem.
7. Designing of RC Integrator circuit.
8. Designing of RC differentiator circuit.
9. Designing of a RC Low Pass Filter and study of its Frequency Response.
10. Designing of a RC High Pass Filter and study of its Frequency Response.

Essential/recommended readings

1. S. A. Nasar, Electric Circuits, Schaum"s outline series, Tata McGraw Hill (2004).
2. Electrical Circuits, M. Nahvi and J. Edminister, Schaum"s Outline Series, Tata McGraw-Hill (2005).
3. Robert L. Boylestad, Essentials of Circuit Analysis, Pearson Education (2004).

Suggestive readings: Nil

1. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, Tata McGraw Hill (2005).
2. Alexander and M. Sadiku, Fundamentals of Electric Circuits, McGraw Hill (2008).