Printed Page:- 04 **Subject Code:- BCSBS0102**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: I - THEORY EXAMINATION (2024- 2025)

Subject: Principles of Electrical Engineering

Time: 2 Hours **Max. Marks: 50**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 15

1. Attempt all parts:-

1-a. The loop which does not contain any other inner loop is known as _____ (CO1,K1). 1

(a) A node
(b) A mesh
(c) A branch
(d) A super mesh

1-b. Which of the following theorems is applicable for both linear and nonlinear circuits? (CO2,K1) 1

(a) Superposition
(b) Thevenin
(c) Norton
(d) None of these

1-c. Average value of a sinusoidal alternating signal is ————for a full cycle.(CO3,K1). 1

(a) Infinite
(b) Maximum
(c) Minimum
(d) Zero

1-d. What does the electric field strength (E) at a point in space depend on?(CO4,K1). 1

(a) Only the magnitude of the test charge placed at that point.

(b) Only the magnitude of the source charge creating the field.

(c) Both the magnitude of the test charge and the distance from the source charge.

(d) Only the distance from the source charge.

1-e. _____ helps in current measurement by placing it in _____ with the circuit element.(CO5,K1). 1

(a) Voltmeter, Parallel

(b) Ammeter, series

(c) Voltmeter, series

(d) Ammeter, parallel

2. Attempt all parts:-

2.a. What do you mean by active and passive elements? (CO1,K1) 2

2.b. Why do you short circuit the voltage source and open the current source when you find Thevenins resistance of a Network?(CO2,K2) 2

2.c. What is the BW of a circuit in which the half-power points occur at 150 kHz and 180 kHz? (CO3,K2) 2

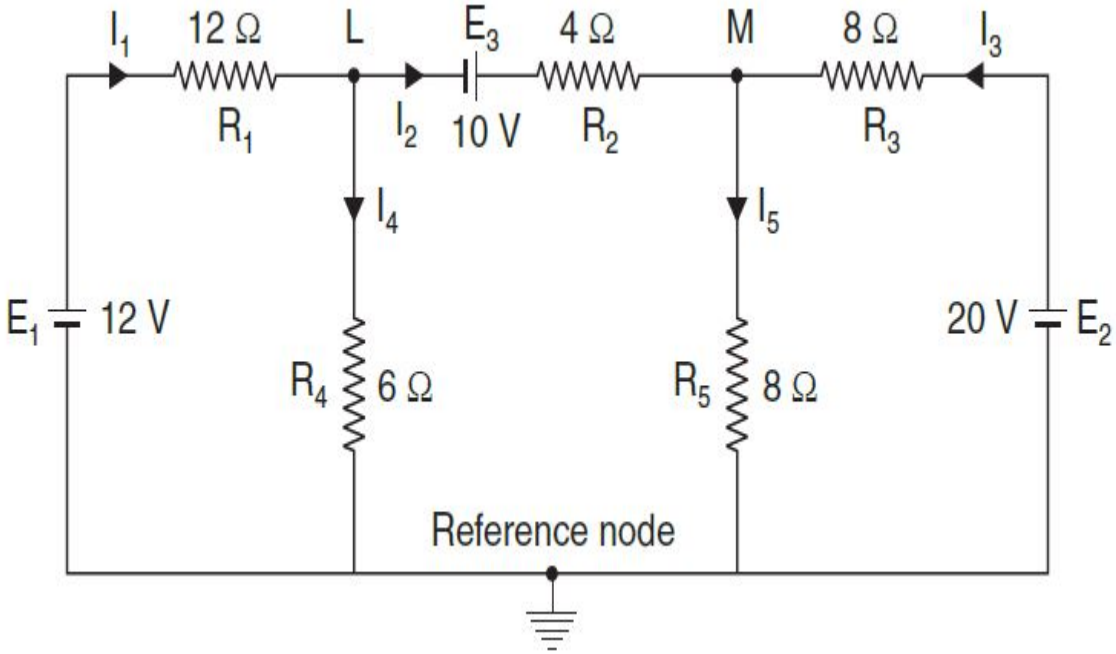
2.d. Write down the formula for a combination of capacitors connected in series.(CO4,K1) 2

2.e. What is the difference between sensors and transducers?(CO5,K1) 2

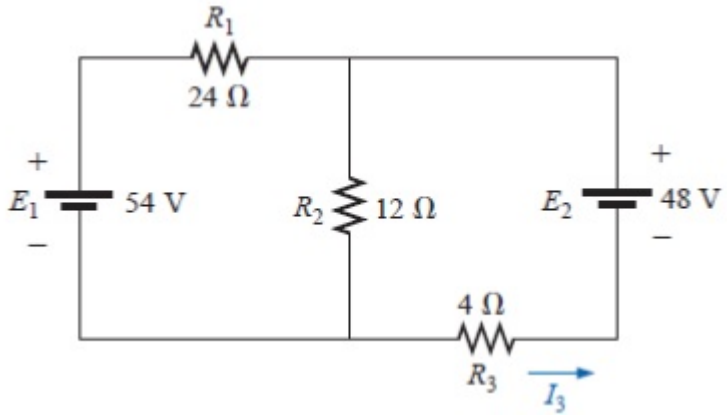
SECTION-B 15

3. Answer any three of the following:-

3-a. Find the branch currents in the circuit shown in figure by nodal analysis. (CO1,K3) 5



3-b. Using superposition, determine the current through the 4Ω resistor. (CO2, K3) 5

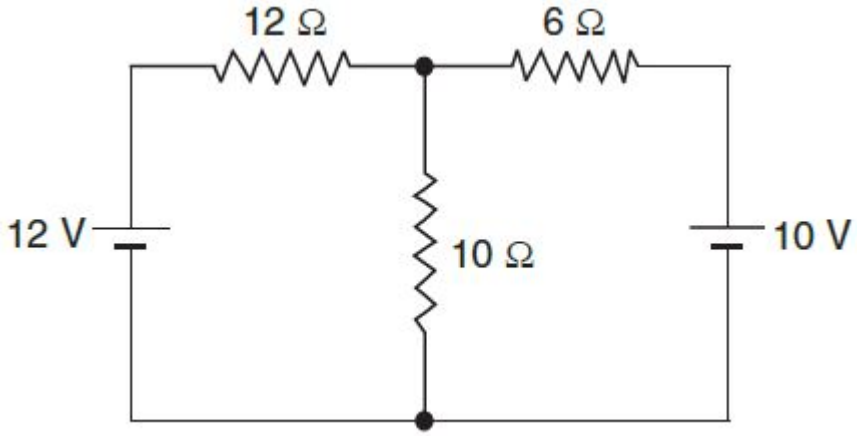


3.c.	An alternating voltage is expressed as v = 100 sin (314t). Find:(a) Frequency (b) RMS Value (c) Average Value (d)Voltage after 3m sec (e) Time taken by the voltage to reach 100V for the first time after crossing through zero. (CO3, K3)	5
3.d.	How a capacitor charged and discharged? Explain (CO4, K1)	5
3.e.	What is electrical earthing? What are the different types of electrical earthing?(CO5, K1)	5

SECTION-C 20

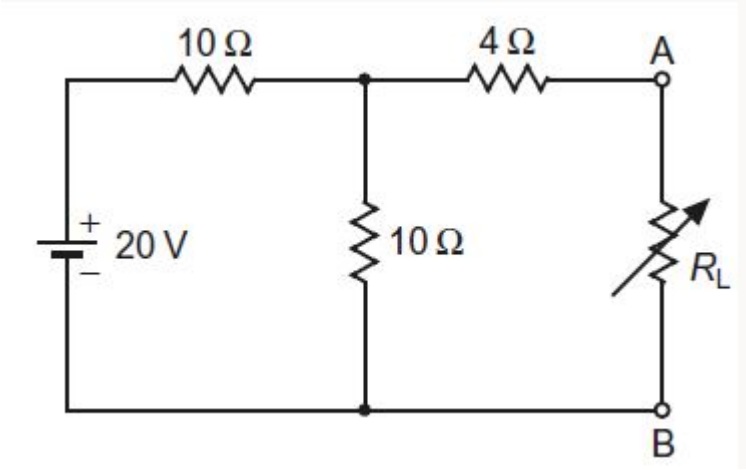
4. Answer any one of the following:-

4-a.	Define source transformation. Convert a voltage source of 24 V having a series internal resistance of 2 Ω into an equivalent current source.(CO1,K1)	4
4-b.	Using mesh analysis, find the current through and voltage drop across 10Ω resistor.(CO1, K2)	4



5. Answer any one of the following:-

5-a.	In the network shown in Figure, determine the value of load resistance to give maximum power transfer and the power delivered to the load.(CO2,K3)	4



5-b.	Define star-delta transformation. A delta circuit has each element of value R/2. Determine elements of the equivalent star circuit.(CO2,K2)	4
6.	Answer any <u>one</u> of the following:-	
6-a.	Three sinusoidal voltages acting in series are given by $V_1 = 10 \sin 440t$, $V_2 = 105 \sin (440t - 45^o)$ and $V_3 = 20 \cos 440t$. Find the expression of resultant voltage (V_r). Also calculate frequency (f) and RMS value (V_{rms}) of resultant voltage.(CO3,K3)	4
6-b.	Define power factor of a circuit. Also explain different types of powers in context with an AC circuit.(CO3,K1)	4
7.	Answer any <u>one</u> of the following:-	
7-a.	Write short notes on Faraday's law electromagnetic induction.(CO4,K1)	4
7-b.	What is electromagnetic energy conversion, and how does it occur in electric motors? (CO4,K2)	4
8.	Answer any <u>one</u> of the following:-	
8-a.	Write short notes on: (CO5, K1) a) Piezo electric effect b) Thermocouple	4
8-b.	Explain the working principle of battery. Also classify the types of batteries.(CO5,K1)	4