PRN:-

Shirpur Education Society's

R. C. PATEL INSTITUTE OF TECHNOLOGY, SHIRPUR

An Autonomous Institute

(Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere)

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(स्वायत्त महाविद्यालय)

Programme: B.TECH (COMP)/B.TECH (EXTC)/B.TECH (ELECT)/B.TECH (DATA SCI)

Year: I/Semester I (Exam Year: 2024-2025)

Subject: Basic Electrical Engineering and Digital Electronics **Time:** 10:00 am - 12:00 pm (02:00 Hrs.)

Date: 27 Jan 2025 **Max Marks:** 60

END SEMESTER EXAMINATION ODD SEM-I(2024-2025)

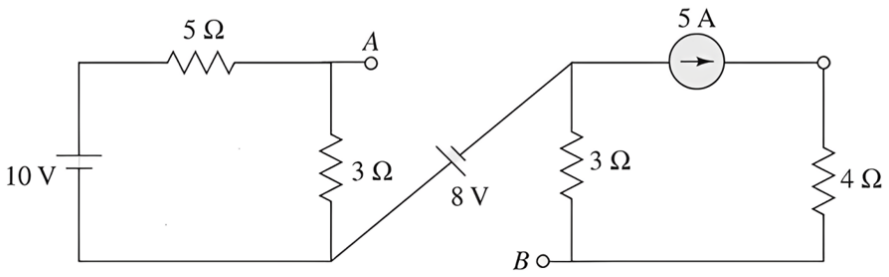
Instructions: 1. This question paper contains 3 pages

2. Answer to each new question to be started on a fresh page.

3. Figure in right hand side indicates full marks

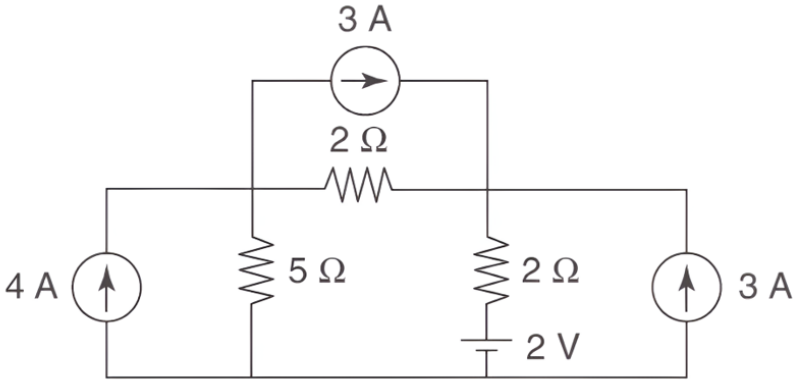
1. **15**

A. 1. Determine the potential difference V_{AB} for the given network **5**



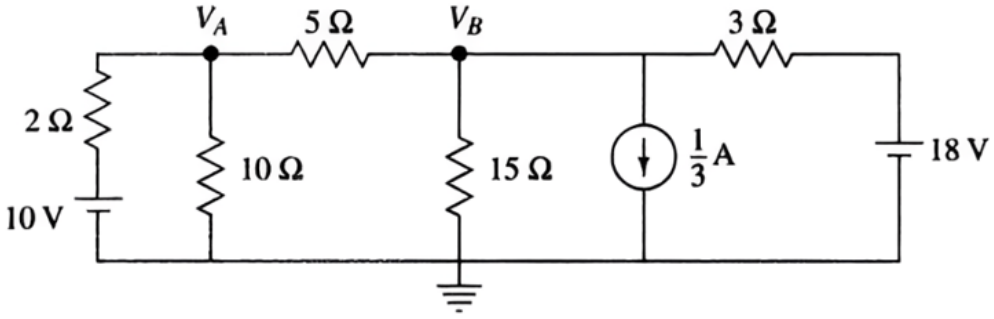
B. 1. **5**

i. Find the current through the 5Ω register in the network using mesh analysis **5**



---------- OR ----------

ii. Find VA and VB using nodal analysis **5**

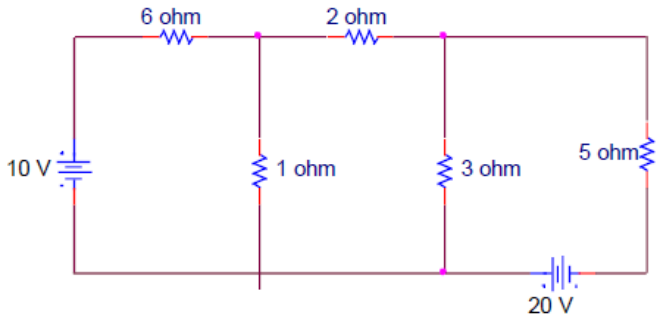


C. 1. Obtain the sum of three voltages. **5**

$V_1 = 147.3 \cos(\omega t + 98.1)$, $V_2 = 294.6 \cos(\omega t - 45°)$, $V_3 = 88.4 \sin(\omega t + 135°)$

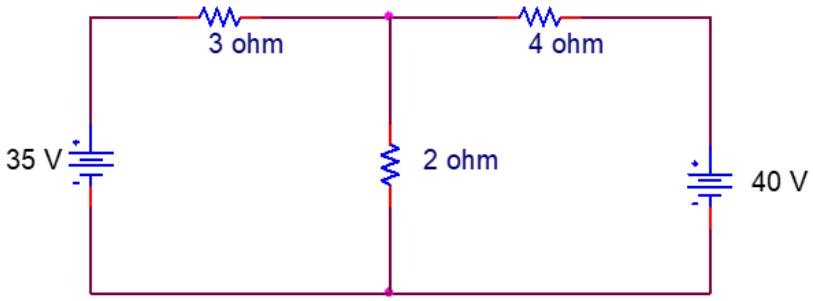
2. **15**

A. I. Determine the current through 5Ω resistor in the network using Thevenin's theorem. **5**



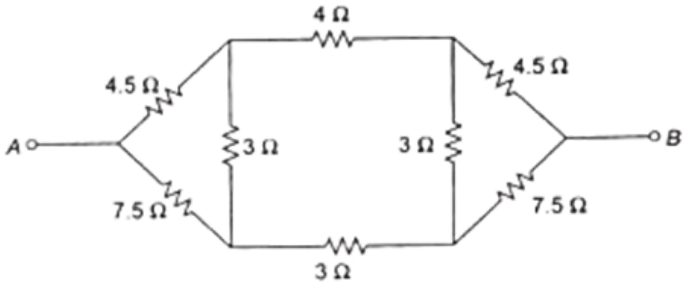
B. I. **10**

i. In the Circuit shown, find the current flowing through 2 Ω resistor using Superposition theorem. **10**



---------- **OR** ----------

ii. Derive the formulae to convert Delta connected network into its equivalent Star connected network. Also find the equivalent resistance between the terminals A and B. **10**



3. **15**

A. I. **5**

i. An impedance of (7 + j5) Ω is connected in parallel with another impedance of (10 – j8) Ω across a 230 V, 50 Hz supply. **5**

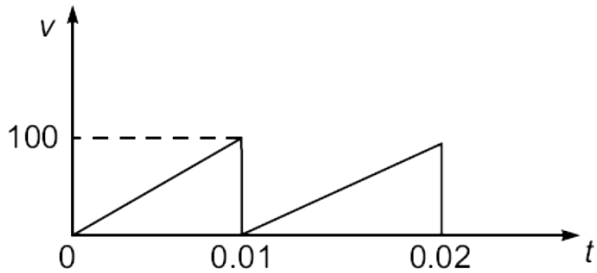
Calculate:

(i) Admittance, conductance and susceptance of the combined circuit, and

(ii) Total current and power factor.

---------- **OR** ----------

ii. Find the RMS value of the waveform shown. **5**



B. I. A coil having a resistance of 10 Ω and an inductance of 40 mH is connected to a 200 V, 50 Hz supply. **10**

Calculate: impedance of the coil, current, power factor, power consumed, Reactive Power.

4. **15**

A. I. **5**

i. Perform the following Number system conversions: **5**

1. $(1011.111)2 = (----------)_{10}$
2. $(105.65)10 = (----------)_{2}$
3. $(456.37)8 = (----------)_{16}$
4. $(BEEDE.AB)16 = (----------)_{2}$
5. $(253.65)10 = (----------)8$

ii. Prove the following Boolean expressions: 1. $AC + \bar{A}\,BC = AC + BC$ **5**

2. $AB + ABC + AB(E+F) = AB$

B. I. What do you mean by Universal gates? Implement NOT, AND and OR gates using only NOR gates. **5**

C. I. 1. Draw neat diagram, write truth table and explain the operation of SR flip-flop. **5**