Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

Mid Semester Test - Sep 2024
B.Tech. First Semester
Basic Electrical Technology (ELE 1071)

BASIC ELECTRICAL TECHNOLOGY [ELE 1071]

Marks: 30   **Duration: 90 mins.**

MCQs
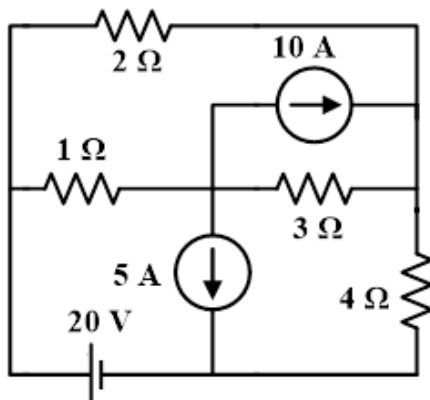
Answer all the questions.   Section Duration: 20 mins

- Programmable calculators are not permitted for use.
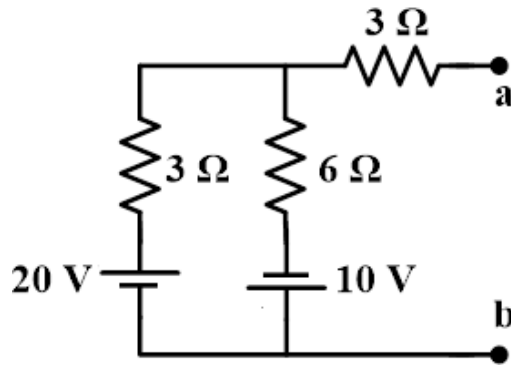- Wherever required, make reasonable assumptions and clearly state them.

1)   The current in the **2 Ω** resistor when only the **20 V** source is acting alone is:

(1)

     3.75 A   1.25 A   3.33 A   2.5 A

2)   The circuit across terminals **a** and **b** can be represented by a single voltage source (V_{ab}) in
             series with a resistance (R_{ab}) with the following values:

3 Ω

a

3 Ω   **6 Ω**

20 V   **10 V**

b

(1)

10 V and 5 Ω   - 30 V and 5 Ω   20 V and 6 Ω   - 10 V and 9 Ω

3) A certain **50 Hz** ac circuit draws a current of **(- 5 + j 10) A** when the applied voltage is **(50 + j 200) V**. The power factor of the circuit is:

(1)

0.21 Leading   0.76 Lagging   Zero   0.76 Leading

4) Two separate tests were carried out on a coil. First, when the coil is connected to a **48 V** dc supply, the current flowing through the coil was **4 A**. Then, it was connected to **48 V**, **50 Hz** ac supply, and the current flowing was **1.6 A**. The resistance and the inductance of the coil are, respectively:

(1)

30 Ω and 27.5 H   12 Ω and 87.5 mH   12 Ω and 95.5 mH   27.5 Ω 38.2 mH

5) A **310 μF** capacitor is connected across a **230 V**, **50 Hz** ac system. With supply voltage as the reference phasor, the equation of the circuit current is:
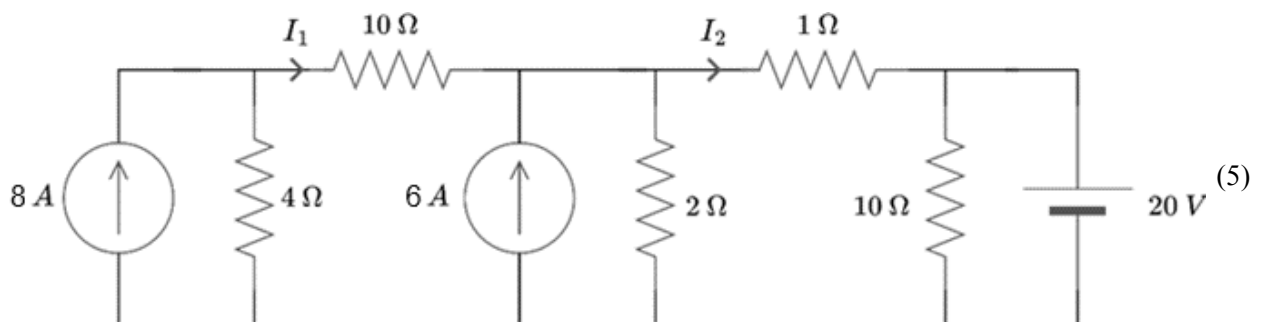
(1)

31.7 sin(314t) A   22.4 sin(314t + 90°) A   31.7 sin(314t + 90°) A   31.7 sin(314t - 90°) A

Descriptive

Answer all the questions.

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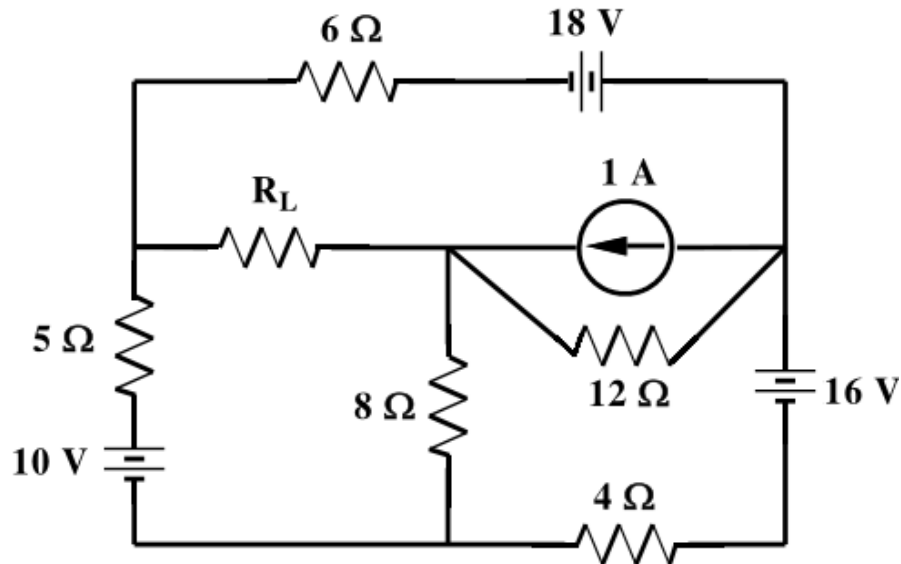- Wherever required, make reasonable assumptions and clearly state them.

6) Determine the currents I_1 and I_2 in the given network.

I_1 10 Ω I_2 1 Ω
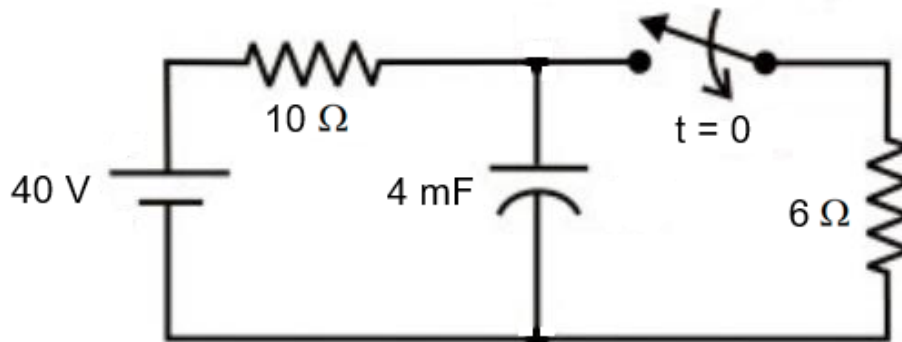
8 A   4 Ω   6 A   2 Ω   10 Ω   20 V

(5)

7) Obtain the value of load resistance R_L for maximum power dissipation in it, and then

calculate the maximum power.

(5)

8) In the given circuit, the switch has been open for a long time and is closed at **t = 0**. Obtain the expression for capacitor voltage for **t > 0**. Determine the time at which the capacitor voltage reaches **25 V**.

(4)

9) An impedance coil in parallel with a **100 µF** capacitor is connected across a **200 V**, **50 Hz**, single-phase ac supply. The coil takes a current of **4 A** and the power loss in the coil is **600 W**. Calculate (i) the resistance of the coil, (ii) the inductance of the coil, (iii) the current drawn by the entire circuit, and (iv) the power factor of the entire circuit.

(5)

10) Determine the input voltage at **50 Hz** to be applied to the circuit across terminals **A** and **B**, such that the current in the capacitor is **8 A**.

(6)

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