Basic Electrical Engineering (ELE 1051)

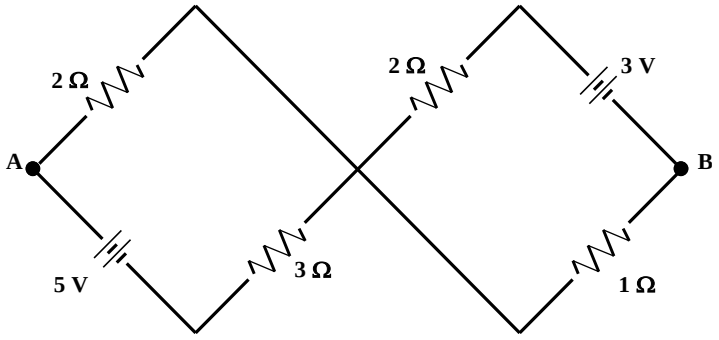
Test- 01

Scheme of Evaluation

1 A heater coil made of ***Nichrome wire*** is of rating 2000 W is cut in to two equal halves. If it is now connected in parallel and used, what would be its wattage?

A. 2000 W B. 500 W C. 4000 W D. **8000 W**

2 For the circuit shown below, find V_{AB}.



A. **3 V** B. 2 V C. - 2 V D. - 3 V

3 For the network equation given, Identify the pair of loops without common branch.

$$\begin{bmatrix} 50 & -10 & -15 & -20 \\ -10 & 60 & -5 & -25 \\ -15 & -5 & 40 & 0 \\ -20 & -25 & 0 & 70 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ I_4 \end{bmatrix} = \begin{bmatrix} 10 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

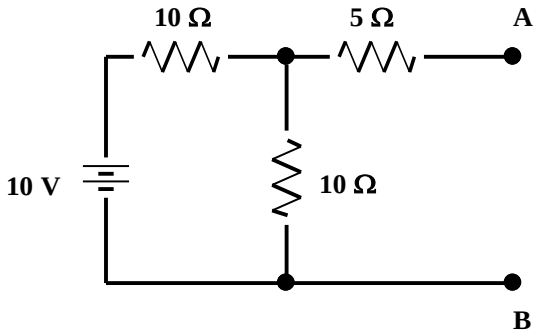
A. 2 and 3 **B.** **3 and 4** **C.** 2 and 4 **D.** 1 and 4

4 For the network equation given, find the value of resistance connected between node 3 and reference node.

$$\begin{bmatrix} 0.29 & -0.05 & 0 & -0.2 \\ -0.05 & 0.175 & -0.025 & -0.1 \\ 0 & -0.025 & 0.295 & -0.25 \\ -0.2 & -0.1 & -0.25 & 1.05 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \\ V_4 \end{bmatrix} = \begin{bmatrix} -2 \\ 2 \\ 3 \\ 5 \end{bmatrix}$$

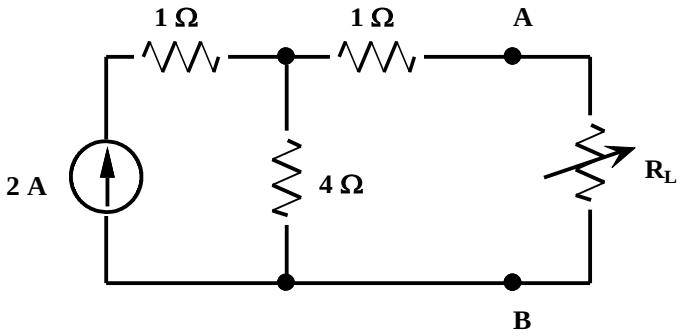
A. 40 Ω **B.** 20 Ω **C.** **50 Ω** **D.** 25 Ω

5 Thevinin equivalent of the circuit given has V_{TH} and R_{TH}



A. **5 V and 10 Ω** B. 10 V and 10 Ω C. 5 V and 5 Ω D. 10 V and 5 Ω

6 In the circuit given, if the load resistance R_L can take any positive value, the maximum power transferred to load would be

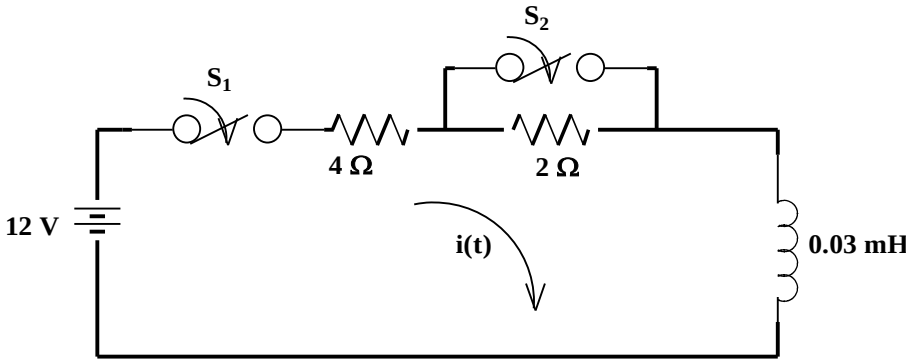


A.3 W B. 3.16 W C. **3.2 W** D. 4 W

7 An RC series circuit with R = 100 Ω and C = 100 µF is switched across a DC voltage source of 12 V. If initial rate of rise of voltage is maintained, find the time taken for the voltage across capacitor to reach 6 V. Assume the capacitor is initially relaxed.

A. 10 ms **B.** 6.93 ms **C.** 13.86 ms **D.** **5 ms**

8 In the RL circuit given if the switch **s1** is closed at time t = 0 second and the switch **s2** is closed at time t = 5 millisecond. Find the final value of current flowing through the inductor.



A. 2 A **B.** **3 A** **C.** 1.9 A **D.** 1.3 A

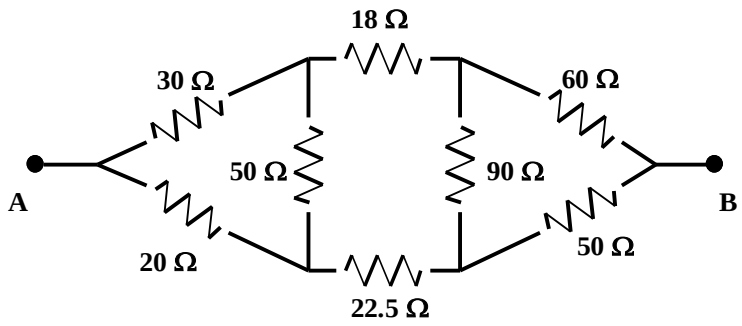
9 Equivalent of ***Resistivity*** in magnetic circuit is

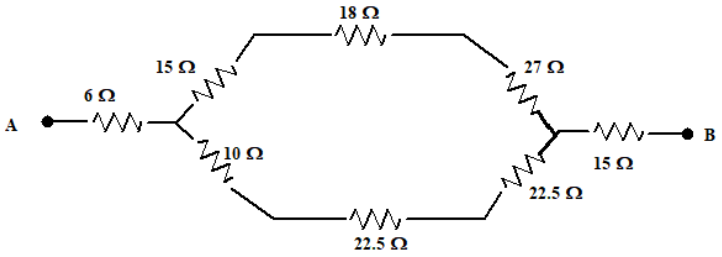
A. Permeability **B**. Permeance **C.** Reluctance D. **Reciprocal of Permeability**

10 Equivalent of Permeance in Electric circuit is

A. Resistance B. Resistivity C. Temperature coefficient of Resistance D. **Conductance**

11 Find the equivalent resistance between terminals A & B.



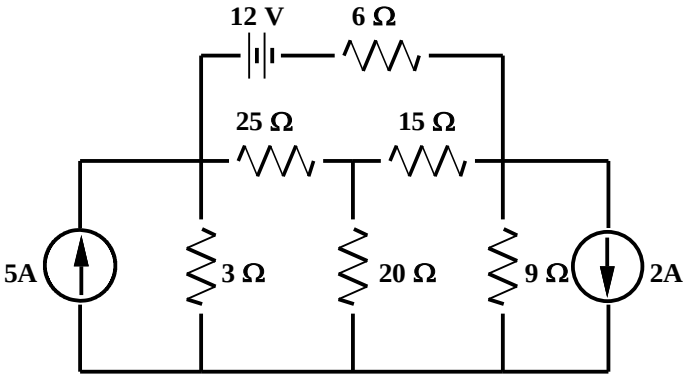


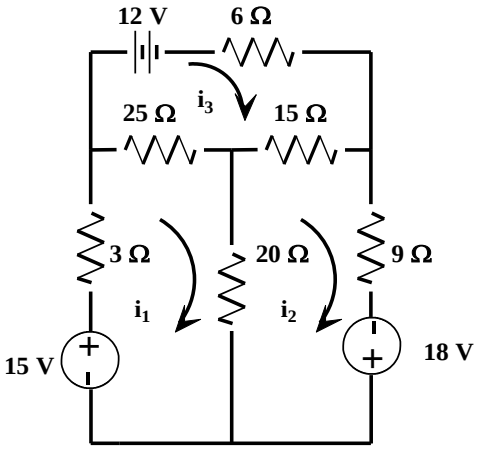
-----1Mark

$$R_{AB} = 49.7\ \Omega$$

-----1Mark

12 Write the mesh equations of the network given and express in matrix form.



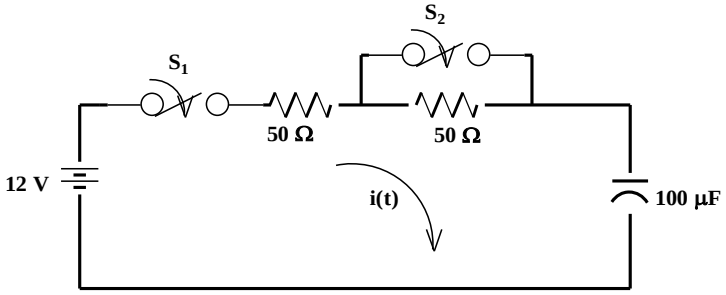


-----1Mark

$$\begin{bmatrix} 48 & -20 & -25 \\ -20 & 44 & -15 \\ -25 & -15 & 46 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \\ i_3 \end{bmatrix} = \begin{bmatrix} 15 \\ 18 \\ -12 \end{bmatrix}$$

----1Mark

13 In the RC circuit given if the switch s1 is closed at time t = 0 second and the switch s2 is closed at time t = 5 millisecond. Find the time taken for the capacitor to get charged to 8 V.



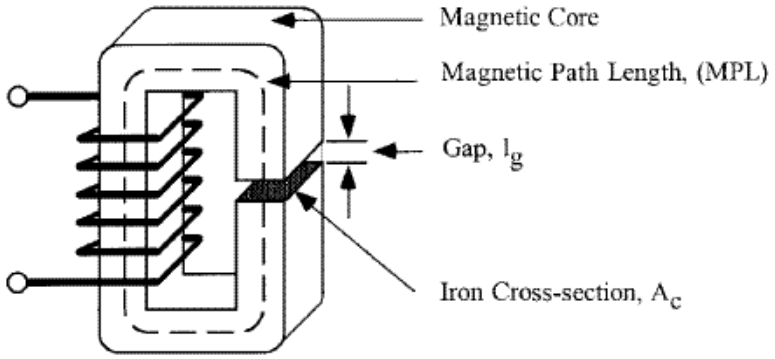
$$v_c(t) = V_s\left(1 - e^{-\frac{t}{\tau}}\right)$$
$$v_c(t) = 4.7216\,V$$

---- 1Mark

$$v_c(t) = V_s - (V_s - V_o)\left(1 - e^{-\frac{(t-t_o)}{\tau}}\right)$$
$$t = 8ms$$

---- 1Mark

14 Find the number of turns of the coil required to drive a flux of 0.0002 Wb in the ferromagnetic core shown in the figure. Given current through the coil 5A, MPL = 30 cm, lg = 1 mm, A_c = 2 cm^2 , μ_r = 2000



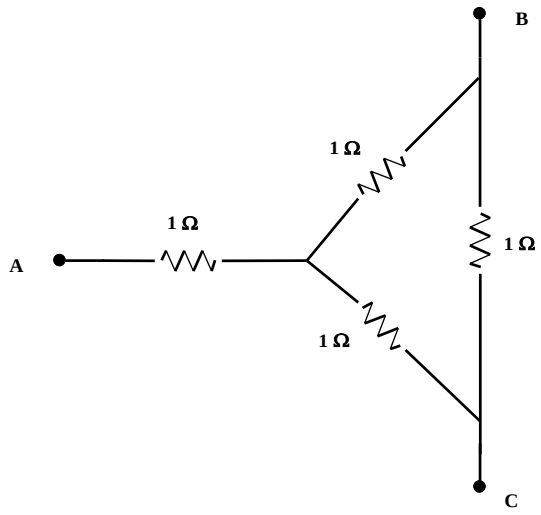
$$NI = \emptyset(S_f + S_{ag})$$

----1Mark

$$N = \frac{0.2m\left(\frac{0.3}{\mu_o \times 2000 \times 2 \times 10^{-4}} + \frac{1m}{\mu_o \times 2 \times 10^{-4}}\right)}{5} = 183\ turns$$

----1Mark

15 Given a black box with three terminals, as shown below. The box contains four 1-ohm resistors interconnected. Given the resistance measured between the two terminals are $R_{AB} = 1.66\Omega$, $R_{BC} = 0.66\Omega$, $R_{AC} = 1.66\Omega$. Realise the resistive network.



----2 Mark