


Final Assessment Test – November 2024

Course: BEEE102L - Basic Electrical and Electronics Engineering

Time: Three Hours

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

 Answer ALL Questions

(10 X 10 = 100 Marks)

1. a) Obtain the equivalent resistance R_{ab} for the circuit in Fig. 1 and use it to find current i .

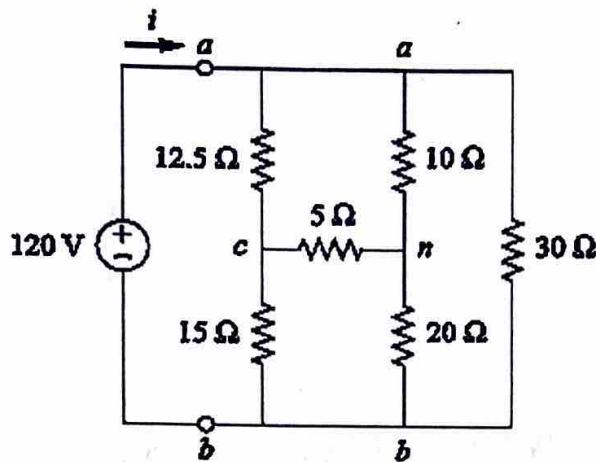


Fig. 1

[OR]

1. b) Find the Thevenin equivalent by looking into terminals $a-b$ of the circuit in Fig. 2 and solve for i_x .

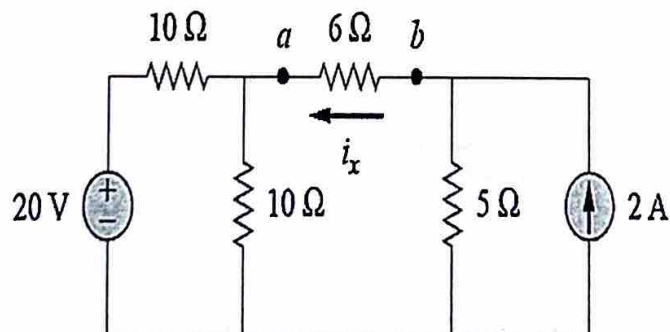


Fig. 2

2. Obtain the mesh-current equations for the circuit in Fig. 3. Calculate the power absorbed by the 8Ω resistor.

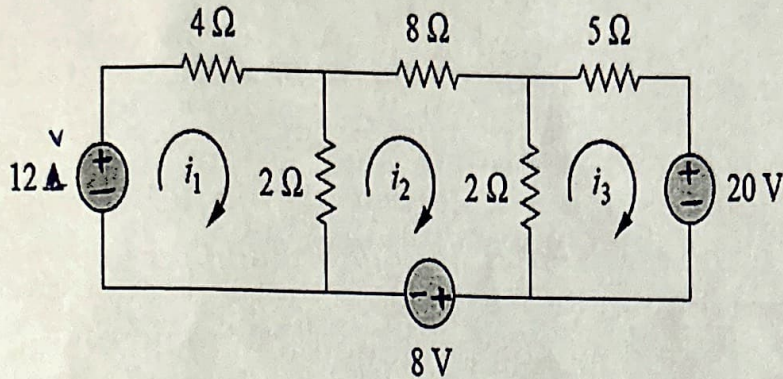


Fig. 3

3. In a series circuit containing pure resistance and pure inductance, the current and voltage supplied by the source in the circuit as

$$i(t) = 5 \sin(314t + 120^\circ) \text{ A and } v(t) = 20 \sin(314t + 150^\circ) \text{ V.}$$

- What is the impedance of the circuit?
 - What are the resistance, inductance and power factor values?
 - What is the average power consumed in the circuit?
4. When a voltage of 100V at 50Hz is applied to a choking coil A, the current taken is 8A and the power is 120W. When applied to the coil B, the current is 10A and the power is 500W. The coils A and B are connected in series and a voltage of 100V is applied across it. What is the current and average power taken by the circuit now?
5. Find the current (I), required to establish a flux $\phi = 0.24 \text{ mWb}$ in the magnetic circuit of Fig. 4. Here, the Area (throughout) is $2 \times 10^{-4} \text{ m}^2$, $l_{ab} = l_{ef} = 0.05 \text{ m}$, $l_{of} = l_{be} = 0.02 \text{ m}$, $l_{bc} = l_{dc}$, and the relative permeability of steel sheet is 1000.

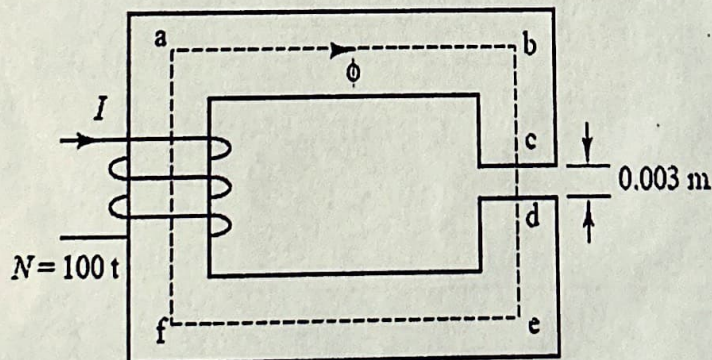


Fig. 4

6. The number of turns in coil A is 250. When a current of 2A flows in this coil, the flux is 0.3mWb. When this current is reduced to zero in 2ms, the voltage induced in coil B lying near coil A is 63.75V. If the coefficient of coupling between the coils is 0.75, find the self-inductances of coils A and B, mutual inductance and the number of turns in the coil B.

7. List the types of DC motors. Also, give the electrical equivalent circuits and applications of each motor.
8. a) A combinational logic circuit accepts 3 binary inputs and produces the output bit as the majority of bits received. Construct the truth table, minimise the Boolean equation and illustrate the logic circuit.

OR

8. b) Represent the following function as a K-map and minimize the Boolean function F , and draw the logic circuit with minimum number of logic gates.

$$F(A, B, C, D) = \sum (m_1, m_3, m_6, m_7, m_9, m_{11}, m_{14}, m_{15})$$

9. Convert the following numbers:

- (i) $(AOC9)_{16} = (\quad)_{10}$
- (ii) $(1890)_{10} = (\quad)_8$
- (iii) $(10111100101.1011)_2 = (\quad)_8 = (\quad)_{16}$
- (iv) $(185.35)_{10} = (\quad)_2$
- (v) $(011001.101)_2 = 9\text{-bit } 2\text{'s complement}$

10. Explain the construction and working of a PN-junction diode. Also, explain the VI characteristics.

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