

ELECTRICAL CIRCUITS – I

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

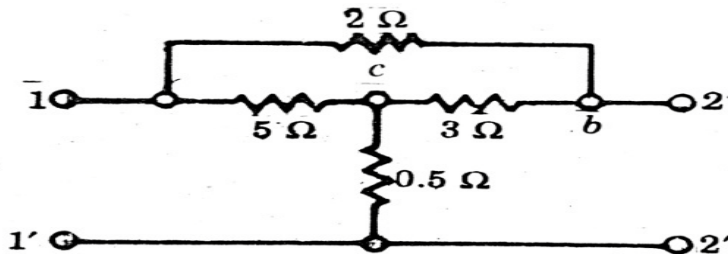
- 1 Answer the following: (10 X 02 = 20 Marks)
- State and explain Kirchoff's Laws.
 - What are self-inductance and mutual inductance?
 - Define Peak factor and Form factor.
 - Explain the concept of power factor, real and reactive power.
 - Define resonance and Q-Factor.
 - State Milliman's and Tellegen's theorem.
 - Define Relative permeability and coupling coefficient.
 - Explain Faradays laws of electromagnetic induction.
 - Express transmission parameters in terms of Open and Short circuit impedances.
 - Represent a Two Port Network in T and π sections.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 Simplify the network given in the figure below to a three-resistor star network between terminals 1, 1' and 2, 2' and convert it to equivalent delta network.



OR

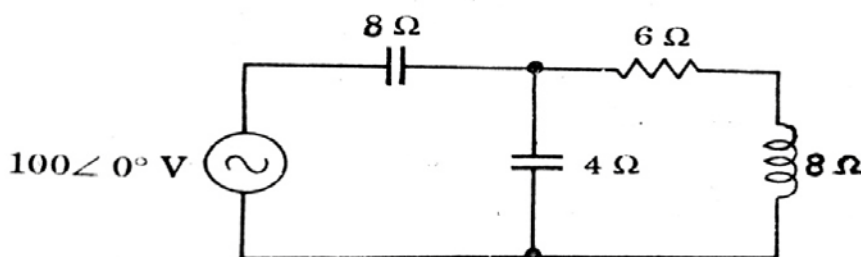
- 3 (a) when two identical coupled coils are connected in series, the inductance of the combination is found to be 80 mH. When the connections to one of the coils are reversed, a similar measurement indicates 20 mH. Find the coupling coefficient between the coils.
 (b) Derive an expression for energy stored in an inductor.

UNIT – II

- 4 (a) Calculate the reactance of a $2\mu\text{F}$ capacitor at: (i) 50 Hz. (ii) 2.5 kHz. (iii) 1.5 MHz.
 (b) A coil has an inductance of 20 mH and a resistance of $5\ \Omega$. It is connected across a supply voltage $v = 50 \sin 314t$. Obtain a similar expression for the supply current.

OR

- 5 Determine the total current, power factor and power consumed by the circuit shown in figure below.



Contd. in page 2

UNIT - III

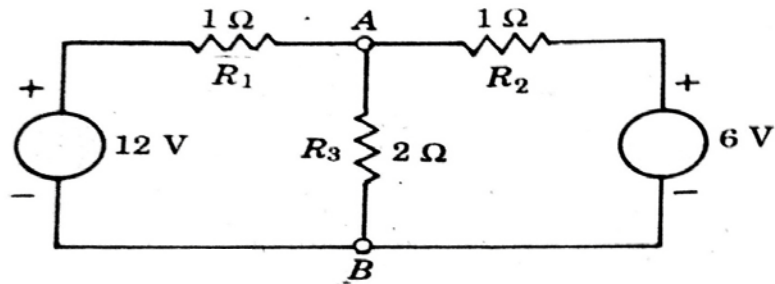
- 6 (a) show that resonant frequency is the geometric mean of the lower and upper half- power frequencies.
 (b) A series RLC circuit has $R = 10 \Omega$, $L = 0.1H$ and $C = 8\mu F$. Determine Resonant frequency and the half- power frequencies.

OR

- 7 (a) Derive the Quality factor of the parallel RLC circuit at Resonance.
 (b) Derive the Quality factor of the series RLC circuit at Resonance.

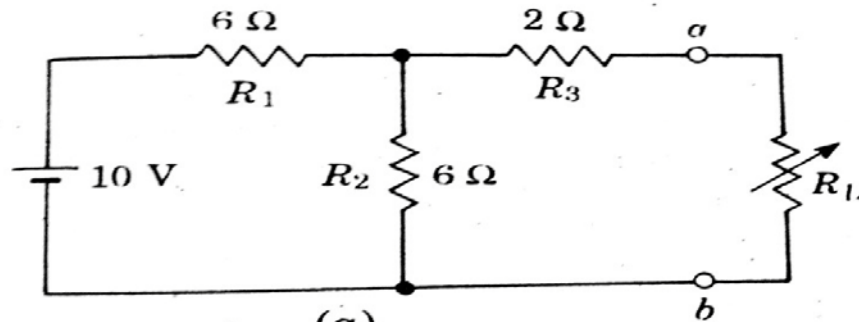
UNIT - IV

- 8 Find the current through 2 ohms resistor in the network shown below by Thevenin's and Nortan's equivalents.



OR

- 9 In the network shown below determine:
 (a) The value of load resistance to give maximum power transfer.
 (b) The power delivered to the load.

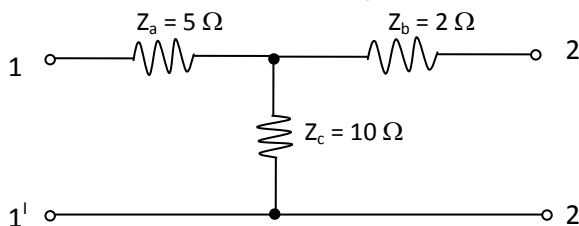


UNIT - V

- 10 The y-parameters for certain two port network are $y_{11} = 2$, $y_{12} = -0.2$, $y_{21} = 20$ and $y_{22} = 0.1$, all in $m\Omega$. A source having an internal resistance of 500Ω is connected the input and $2.5 k\Omega$ resistor is at the output. Calculate: (i) G_v . (ii) G_I . (iii) G_P .

OR

- 11 (a) Find the Equivalent π network for the given T network.



- (b) For the given Two port network find Z parameters.

