Code: 15A02201 **R15**

B.Tech I Year II Semester (R15) Regular Examinations May/June 2016

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)

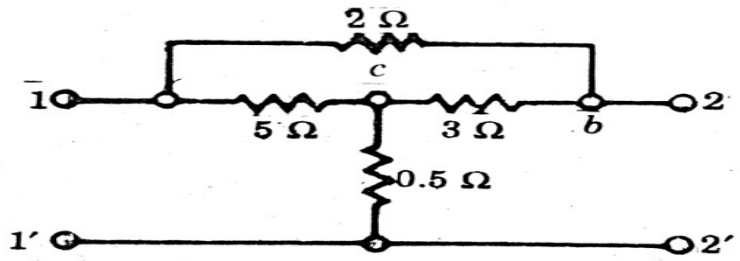
(a) State and explain Kirchhoff's Laws.
(b) What are self-inductance and mutual inductance?
(c) Define Peak factor and Form factor.
(d) Explain the concept of power factor, real and reactive power.
(e) Define resonance and Q-Factor.
(f) State Milliman's and Tellegen's theorem.
(g) Define Relative permeability and coupling coefficient.
(h) Explain Faradays laws of electromagnetic induction.
(i) Express transmission parameters in terms of Open and Short circuit impedances.
(j) 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.

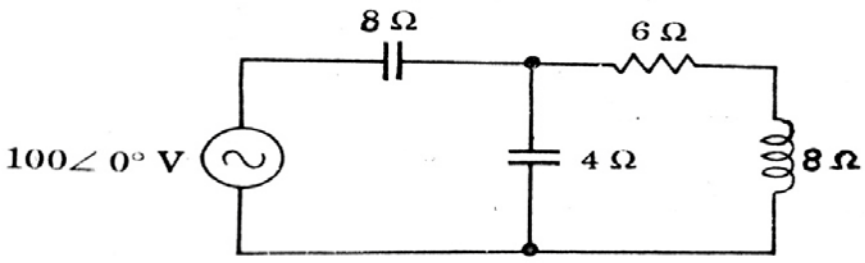
UNIT – II

4 (a) Calculate the reactance of a 2μF 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 Ω. 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

Code: 15A02201

R15

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 Ω, L = 0.1H and C = 8μF. Determine Resonant frequency and the half-power frequencies.

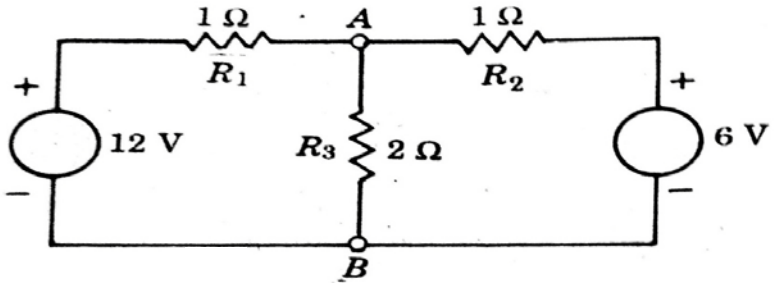
OR

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.

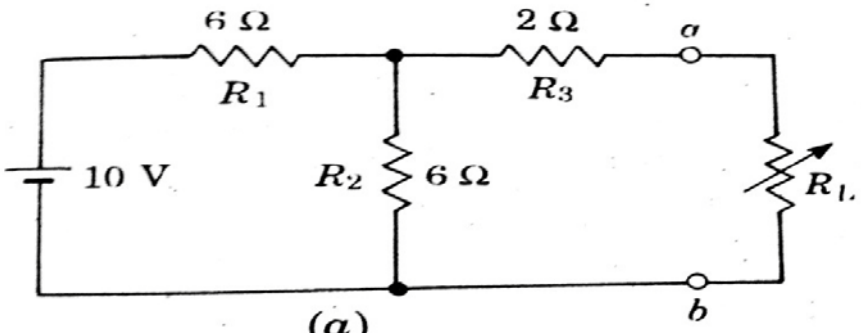


OR

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.



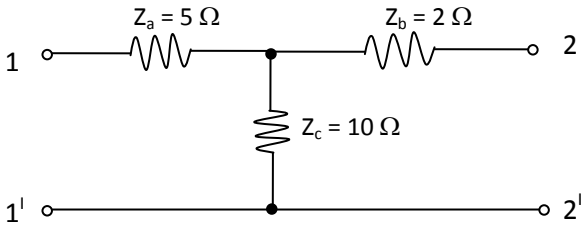
(a)

UNIT – V

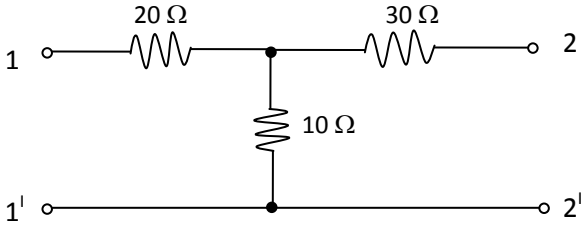
10 The y-parameters for certain two port network are y_{11} = 2, y_{12} = -0.2, y_{21} = 20 and y_{22} = 0.1, all in $m\mho$. A source having an internal resistance of 500 Ω is connected the input and 2.5 kΩ resistor is at the output. Calculate: (i) G_v. (ii) G_I. (iii) G_P.

OR

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



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



*****