

B.Tech I Year II Semester (R15) Regular &amp; Supplementary Examinations May/June 2017

**ELECTRICAL CIRCUITS – I**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

**PART – A**

(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- Three arms of star network has  $6 \Omega$  resistance. What is the equivalent delta network arm resistance?
  - Define Faradays laws of electromagnetic induction.
  - Draw voltage current and power waveforms for pure inductive circuit.
  - Draw phasor diagram for simple RC series circuit.
  - Define resonance in electrical circuits.
  - Draw locus diagram for series RL circuit with 'L' as the variable parameters.
  - Define compensation theorem.
  - State Norton's theorem.
  - Define z-parameters.
  - What is the condition of reciprocity and symmetry in ABCD parameters?

**PART – B**

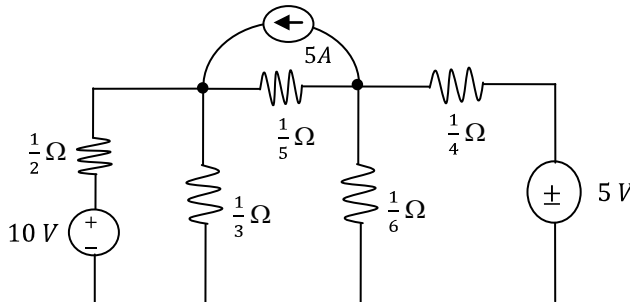
(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 (a) Define coefficient of coupling.  
 (b) An iron ring of 30 cm in diameter and  $10 \text{ cm}^2$  cross-section is wound with 300 turns of wire. For a flux density of  $1 \text{ Wb/m}^2$  and a permeability of 600. Find the exciting current and inductance when there is a 1 mm air-gap.

**OR**

- 3 Using node voltage analysis for the circuit shown in figure below. Find all the node voltages and currents in all the branches.

**UNIT – II**

- 4 (a) Show that the power through pure inductor when excited with  $e = E_m \sin \omega t$  is zero.  
 (b) In a series parallel circuit, the two parallel branches A and B are in series with C. The impedances are  $Z_a = 10 + j8$ ,  $Z_b = 9 - j6$  and  $Z_c = 3 + j2 \Omega$ , voltage across  $Z_c$  is  $100 + j0 \text{ V}$ . Find the currents and phase angles.

**OR**

- 5 (a) A resistor R is connected in series with a capacitor C and the combination is connected across a 100 V, 50 Hz supply. The voltage drop across the resistor is 60 V, the power dissipated in the resistor is 108 W. Find R and C.  
 (b) Define RMS value and Average value.

Contd. in page 2

## UNIT – III

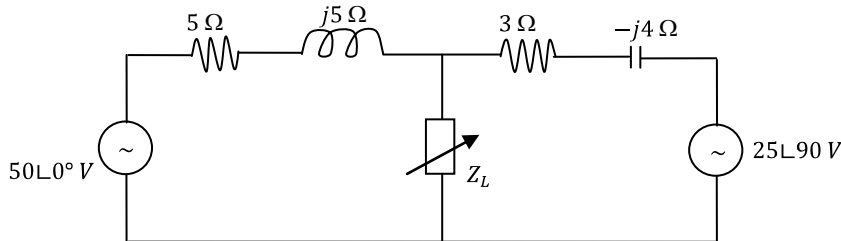
6 Draw locus diagrams for series RLC circuit with all parameter variations.

OR

7 A circuit consists of a  $4 \mu F$  capacitor in parallel with a coil of resistance  $40 \Omega$  and inductance of  $0.25 H$ . If the voltage applied to the circuit at this frequency is  $250 V$ . Calculate the current in each branch, supply current and current magnification.

## UNIT – IV

8 In the network shown in figure below, what load  $Z_L$  will receive maximum power.



OR

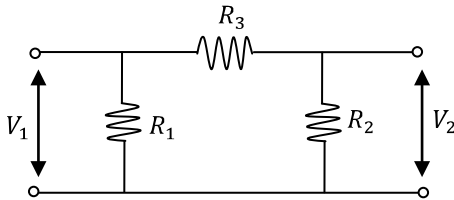
9 State and prove Norton's theorem for both AC and DC networks.

## UNIT – V

10 Derive the relation between transmission parameters and admittance parameters.

OR

11 Determine z-parameters for the given network.



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