

B.Tech I Year (R13) Supplementary Examinations December 2019

**ELECTRICAL CIRCUITS**

(Electrical &amp; 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)
  - (a) Define about Active and Passive elements with examples
  - (b) When two branches having  $(2+j10)\Omega$  and  $(5+j20)\Omega$  are connected in parallel and their equivalent is in series with  $(8+j30)\Omega$ . Find the total equivalent impedance.
  - (c) Describe the importance of power factor.
  - (d) For half wave rectified alternating current, find form factor.
  - (e) Define and describe briefly about band width.
  - (f) Discuss briefly about Super Node with neat sketch.
  - (g) Write the statement of compensation theorem.
  - (h) Write any two applications of superposition theorem.
  - (i) List any two applications of Laplace transforms.
  - (j) Describe briefly about Line Spectra.

**PART – B**

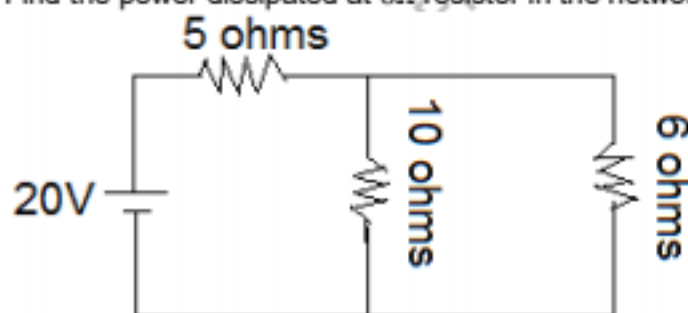
(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 (a) Explain in detail about resistance, inductance and capacitance parameters.
- (b) An iron ring 10 cm diameter and  $15 \text{ cm}^2$  in cross section is wound with 250 turns of wire of flux density of  $1.5 \text{ Web/m}^2$  and permeability 500. Find the exciting current, the inductance and stored energy. Find corresponding quantities when there is a 2 mm air gap.

OR

- 3 (a) Derive the relation between self and mutual inductances. Also, derive the expression for coefficient of coupling between two mutually coupled coils.
- (b) Find the power dissipated at  $6\Omega$  resistor in the network shown below.


**UNIT – II**

- 4 (a) Explain about how to calculate voltage and power in a balanced three phase circuit.
- (b) For a half wave rectified alternating current find Average value, RMS value, Form factor and Peak factor. Find the average and RMS values when  $I_m$  is 3A.

OR

- 5 (a) Discuss in detail about unbalanced three phase delta circuits with inductive loads.
- (b) Explain about two wattmeter method for measuring three phase power.

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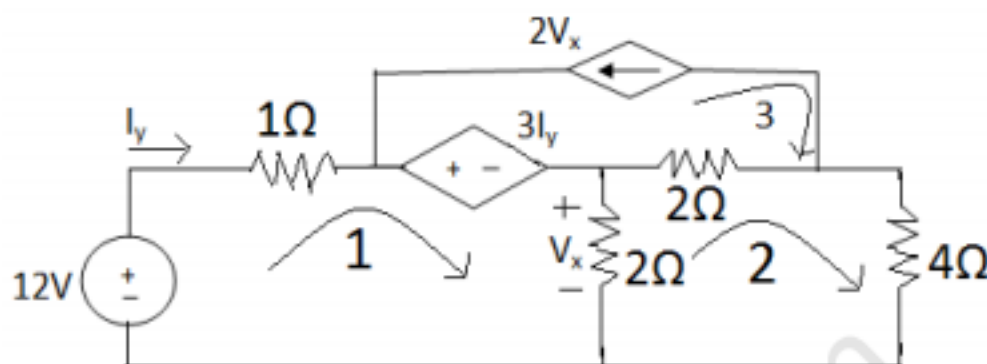
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**UNIT – III**

- 6 (a) Draw and explain in detail about the locus diagram for R-L-C series circuit.  
 (b) Write short notes on Graph, Tree and Link with examples.

**OR**

- 7 (a) In the circuit shown below, determine the power delivered to  $4\Omega$  resistor by mesh analysis.

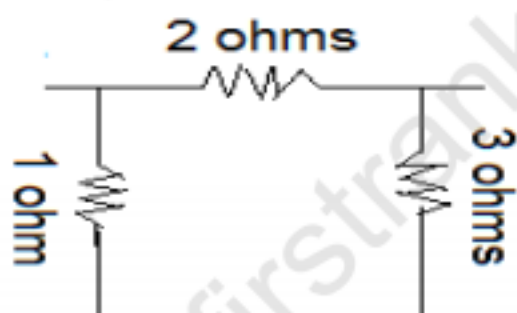


- (b) The reduced incidence matrix of a graph is given below. Draw the graph corresponding to it.

$$\begin{bmatrix} -1 & +1 & 0 & 0 & 0 & -1 \\ 0 & 1 & -1 & +1 & 0 & 0 \\ 0 & 0 & +1 & 0 & -1 & +1 \end{bmatrix}$$

**UNIT – IV**

- 8 (a) Find the z-parameters of the network shown below.



- (b) State and explain in detail about the maximum power transfer theorem with an example.

**OR**

- 9 (a) Discuss in detail about transmission and hybrid parameters and also derive their relation for two port network.  
 (b) Verify reciprocity theorem with a suitable example.

**UNIT – V**

- 10 (a) Explain in detail about DC transient R-C series circuit.  
 (b) Describe in detail about trigonometric form and exponential form of Fourier series.

**OR**

- 11 (a) Discuss response of R-C networks for pulse excitation.  
 (b) Explain in detail about the transient response of R-L circuit for sinusoidal excitation.

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