Code No: R059010203 **Set No. 1**

I B.Tech Regular Examinations, May/Jun 2006
ELECTRICAL CIRCUITS
(Common to Electrical & Electronic Engineering, Electronics & Control Engineering and Instrumentation & Control Engineering)
Time: 3 hours **Max Marks: 80**
Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Find the voltage to be applied across AB in order to drive a current of 5A into the circuit by using star-delta transformation. Refer figure 1.

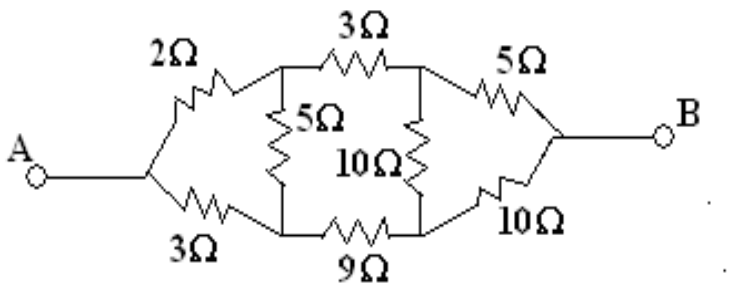

Figure 1:

(b) Using Kirchoff's current law, find the values of the currents i_1 and i_2 in the circuit shown in figure 2. [8+8]

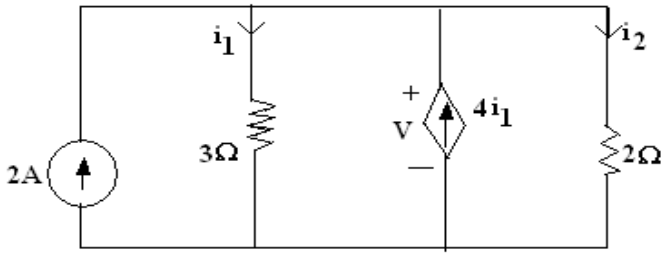

Figure 2:

2. (a) Define the following:
   i. Self inductance
   ii. Mutual Inductance
   iii. Static Induced e.m.f
   iv. Dynamically induced e.m.f.

   (b) Derive the relationship between the self, mutual inductances and coefficient of coupling.

(c) Two similar coils connected in series gave a total inductance of 600 mH and when one of the coil is reversed, the total inductance is 300mH. Determine the mutual inductance between the coils and coefficient of coupling? [6+6+4]

3. (a) Bring out the differences between series and parallel resonance?

   (b) A series RLC circuit consists of resistance R = 20Ω, inductance, L=0.01H and capacitance, C = 0.04 μF. Calculate the frequency at resonance. If a 10 Volts of frequency equal to the frequency of resonance is applied to this circuit, calculate the values of V_C and V_L across C and L respectively. Find the frequencies at which these voltages V_C and V_L are maximum? [6+10]

4. (a) Three impedances each of (3-j4) Ω is connected in delta connection across a 3-ϕ, 230V balanced supply. Calculate the line and phase currents in the Δ connected load and the power delivered to the load?

   (b) In power measurement of 3-ϕ load connected by 3-ϕ supply by two wattmeter method, prove that $\tan\theta = \frac{-\sqrt{3}(w_1-w_2)}{(w_1+w_2)}$ for leading power factor loads. [8+8]

5. (a) For the circuit shown in figure 3, draw the graph and indicate tree.
   i. Branch
   ii. Node
   iii. Degree of a node
   iv. Links.

   (b) Using Nodal method, find the current through 5W resistor, in the following circuit. [6+10]

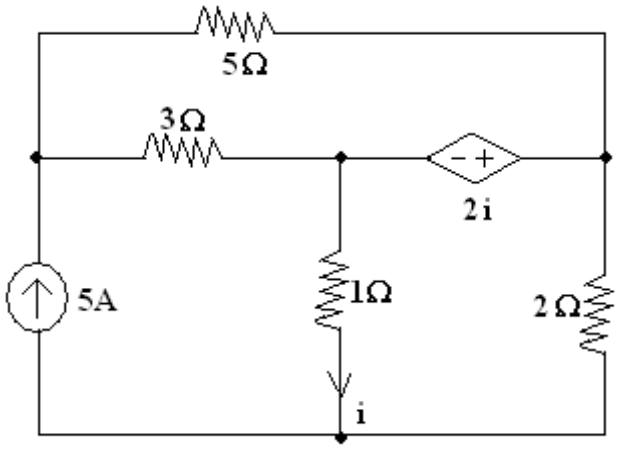

Figure 3:

6. (a) Explain the steps for solving a network problem using Thevenin's theorem.

   (b) Find the current I in the circuit shown in figure 4. [6+10]

7. Find ϑ_c (t) at t = 0 + while the switching is done from x to y at t = 0. as shown in figure 5 [16]

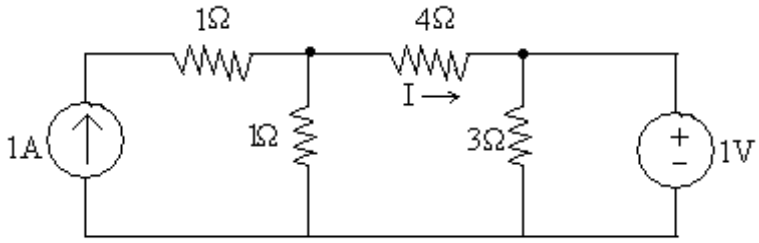

Figure 4:

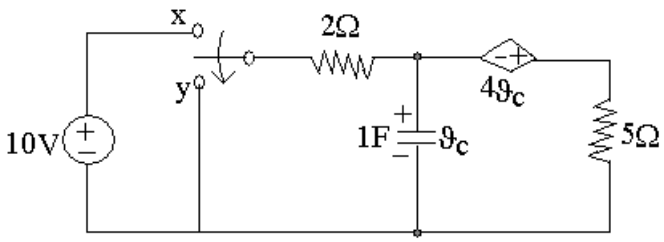

Figure 5:

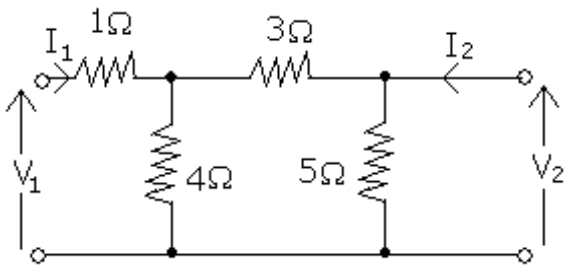

Figure 6:

8. (a) Determine the Z-parameter of the network shown in figure 6.
   (b) The y-parameters of a two port network are y_{11}=0.6 mho, y_{22}=1.2 mho and y_{12}=-0.3 mho.
      i. Determine the ABCD Parameters and
      ii. Equivalent Π network. [8+8]

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Code No: R059010203 **Set No. 2**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) For the circuit shown in figure 1, find the current through 20Ω resistor?

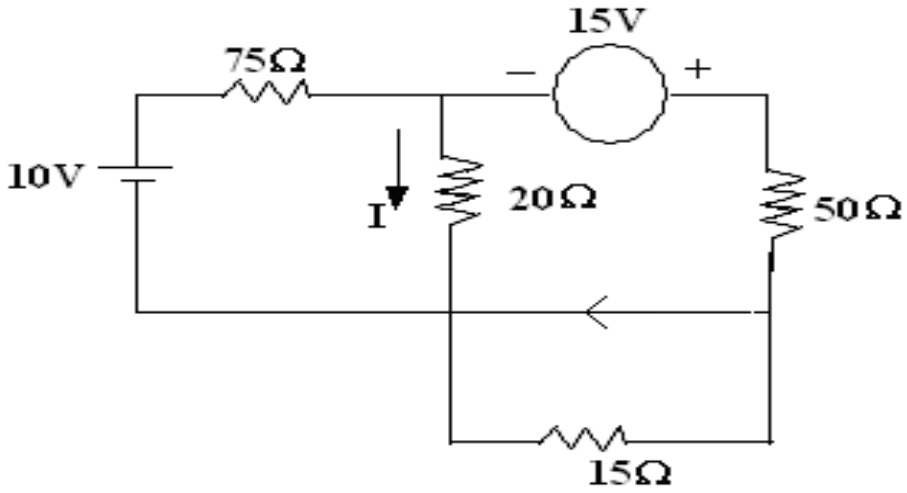

Figure 1:

(b) Reduce the network shown in figure 2, to a single loop network by successive source transformation, to obtain the current in the 12Ω resistor. [8+8]

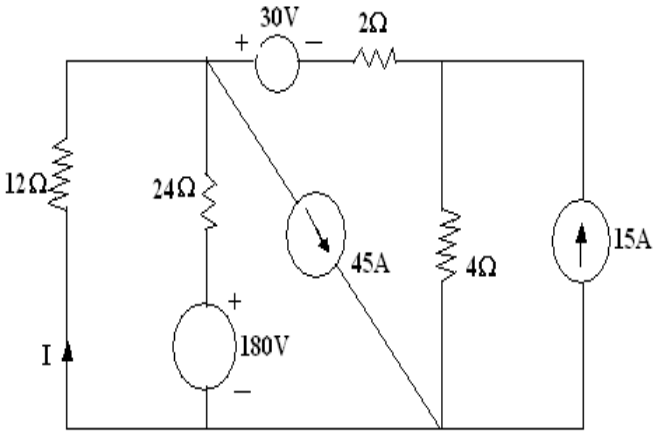

Figure 2:

2. (a) Write short notes on dot convention used in magnetically coupled coils.
   (b) In the network shown in figure 3, L_1=1H, L_2=2H, M=1.2H. Assuming the inductance coils to be ideal, find the amount of energy stored after 0.1 see of the circuit connected to a d.c.source of 10V. [6+10]

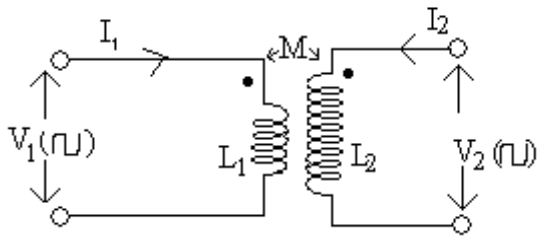

Figure 3:

3. (a) Explain the concept of
      i. Susceptance and
      ii. Admittance
   (b) An inductive coil takes 10A and dissipates 1000 watts when connected to a supply of 250v, 25Hz. Calculate.
      i. the impedance
      ii. the effective resistance
      iii. reactance
      iv. the inductance
      v. power factor. Also, Draw the vector diagram. [6+10]

4. (a) A balanced 3-ph star connected load of 150 Kw takes a leading current of 100A with a line voltage of 1100 V, 50Hz. Find the circuit constants of the load per phase?
   (b) Three equal star connected inductors takes 8Kw at P.f of 0.8 when connected to 460V, 3-ϕ, 3 wire supply. Find the line currents, if one conductor is short circuited. [6+10]

5. (a) Define the following and explain by taking an example.
      i. Node
      ii. Tree
      iii. Sub graph
      iv. Loop
      v. Links
      vi. Directed graph.
   (b) Find the fundamental tie-set and cut-set matrix for the graph and for the tree shown in the figure 4. [9+7]

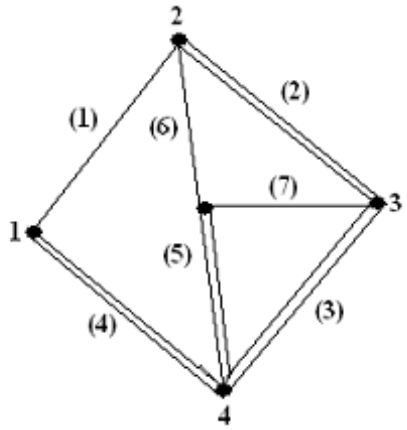

Figure 4:

6. (a) State and explain compensation theorem.
   (b) In the network shown in figure 5, find the value of Z_L so that the power transfer from the source is maxi mum. Also find P_{max}. [8+8]

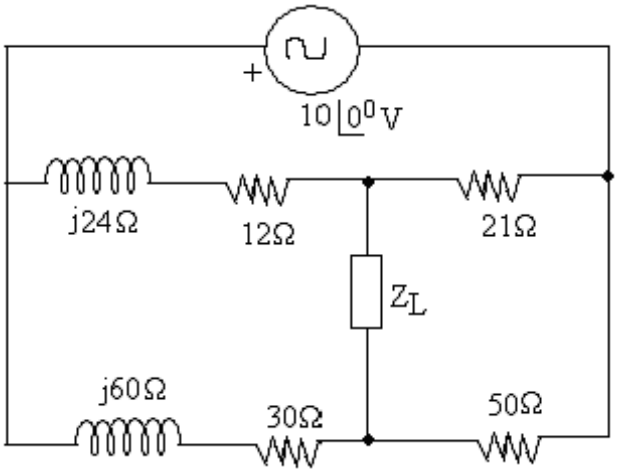

Figure 5:

7. (a) A dc voltage of 100V is applied in the circuit shown in figure 6 and the switch is kept open. The switch K is closed at t = 0. Find the complete expression for the current.
   (b) A dc voltage of 20V is applied in a RL circuit where R = 5Ω and L = 10H. Find [8+8]
      i. The time constant
      ii. The maximum value of stored energy.

8. (a) Find the Z-parameters for the network shown in figure 7.
   (b) For the h parameter equivalent network shown in figure 8 find the voltage gain load resistance is R_L. [6+10]

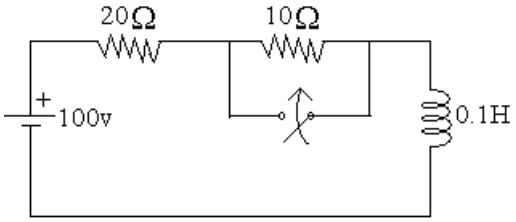

Figure 6:

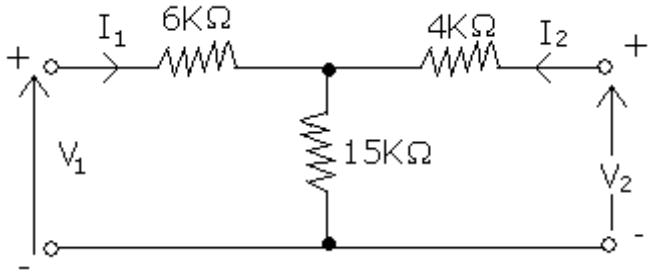

Figure 7:

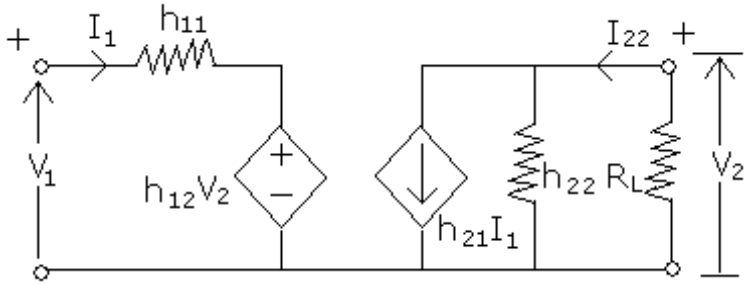

Figure 8:

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Code No: R059010203 **Set No. 3**

I B.Tech Regular Examinations, May/Jun 2006
ELECTRICAL CIRCUITS
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Time: 3 hours **Max Marks: 80**
Answer any FIVE Questions
All Questions carry equal marks
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1. (a) For the circuit shown in figure 1, find the current through 20Ω resistor?

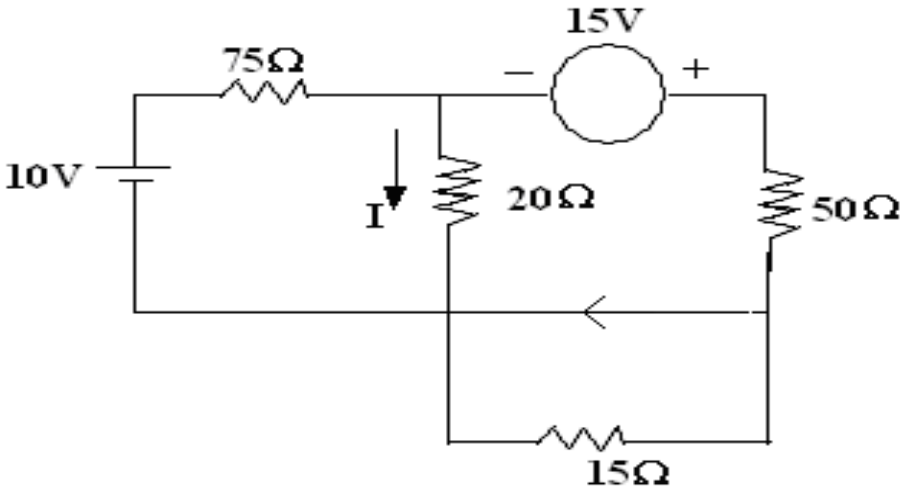

Figure 1:

(b) Reduce the network shown in figure 2, to a single loop network by successive source transformation, to obtain the current in the 12Ω resistor. [8+8]

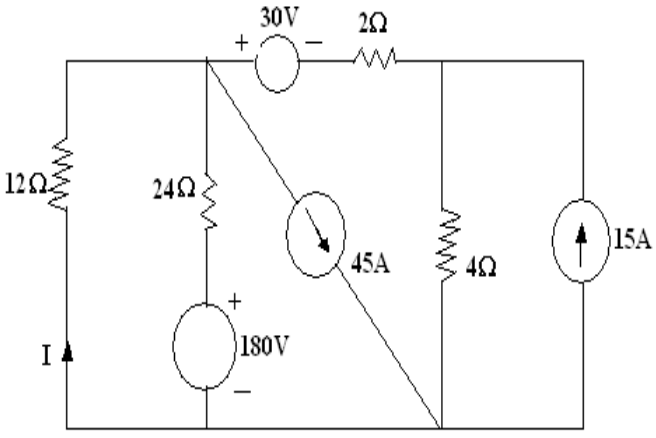

Figure 2:

2. (a) Explain
   i. Statically induced e.m.f and
   ii. Dynamically induced e.m.f
   (b) The combined inductance of two coils connected in series is 0.6H or 0.1H, depending upon the relative directions of the currents in the coils. If one of the coils when isolated has a self inductance of 0.2H, Calculate
   i. Mutual inductance, and
   ii. The Coefficient of coupling.
   (c) Explain the terms
   i. MMF
   ii. Reluctance. [6+6+4]

3. (a) Draw the current, impedance and admittance loci for an R L series circuit having fixed resistance but variable reactance.
   (b) figure 3 shows a series parallel circuit. Find
   i. admittance of each branch
   ii. admittance between points b and g.
   iii. impedance between points b and g.
   iv. total circuit impedance
   v. total current and power factor
   vi. currents in each branch. [6+10]

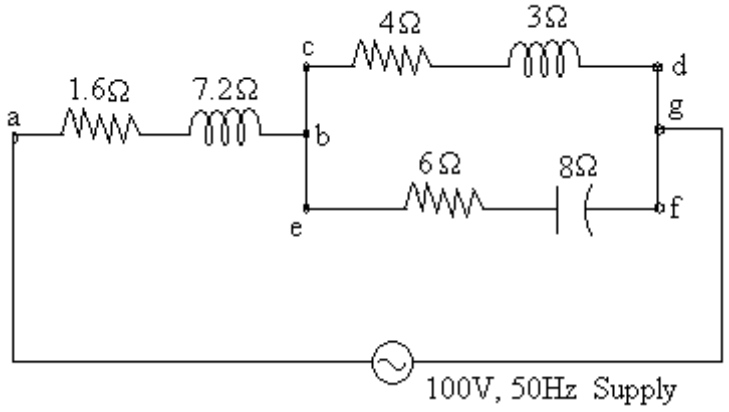

Figure 3:

4. (a) Three identical resistances are connected in a star fashion against a balanced three phase voltage supply. If one of the resistance is removed, how much power is to be reduced?
   (b) A 3-phase load has a resistance of 10Ω in each phase and is connected in
   i. star and

ii. delta against a 400V, 3-phase supply. Compare the power consumed in both the cases.

(c) What is the difference between RYB phase sequence with RBY phase sequence? [6+6+4]

5. (a) Define the following and explain by taking an example.
   i. Branch
   ii. Node
   iii. Path
   iv. Sub graph
   v. Tree
   vi. Degree of a node.

   (b) Draw the oriented graph of the network shown in figure 4 and write the cut set matrix. [9+7]

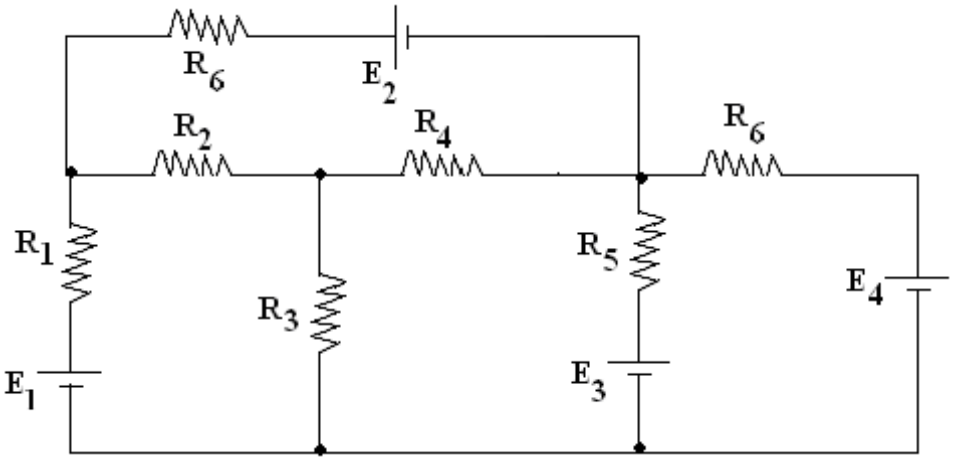

Figure 4:

6. (a) State and explain the Millmann's theorem.

   (b) Find the current in the 6Ω resistor using Superposition theorem. as shown in figure 5 [6+10]

7. (a) A dc voltage of 100V is applied in the circuit shown in figure 6 and the switch is kept open. The switch K is closed at t = 0. Find the complete expression for the current.

   (b) A dc voltage of 20V is applied in a RL circuit where R = 5Ω and L = 10H. Find [8+8]
   i. The time constant
   ii. The maximum value of stored energy.

8. (a) In a T network shown in figure 7, $Z_1 = 2\angle 0^o$, $Z_2 = 5\angle -90^o$, $Z_3 = 3\angle 90^o$, find the Z-parameters.

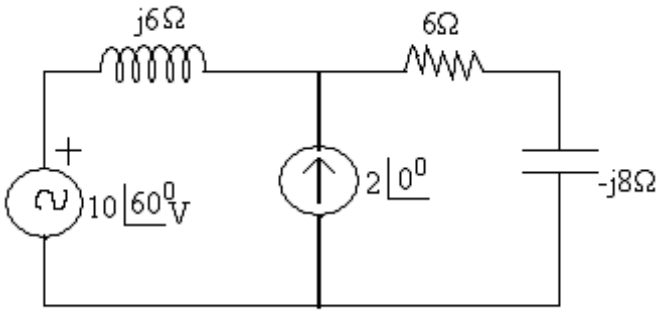

Figure 5:

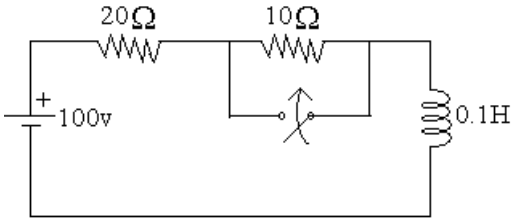

Figure 6:

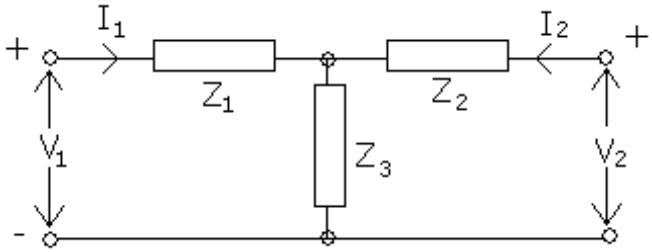

Figure 7:

(b) Z-parameters for a two port network are given as Z_{11}=25Ω, Z_{12}=Z_{21}=20Ω, Z_{22}=50Ω. Find the equivalent T-network. [8+8]

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Code No: R059010203 **Set No. 4**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain
   i. KCL
   ii. KVL
   iii. Practical current source
   iv. Practical voltage source.

   (b) A 20V battery with an internal resistance of 5 ohms is connected to a resistor of x ohms. If an additional resistance of 6Ω is connected across the battery, find the value of x, so that the external power supplied by the battery remain the same. [8+8]

2. (a) Explain the following terms:-
   i. Magnetic circuit
   ii. Permeability
   iii. Magneto motive force
   iv. Reluctance.

   (b) A cast steel structure is made of a rod of square section 2.5cm × 2.5cm as shown in figure 1. What is the current that should be passed in a 500 turn coil on the left limb, so that a flux of 2.5mwb is made to pass in the right limb. Assume permeability as 750 and neglect leakage. [8+8]

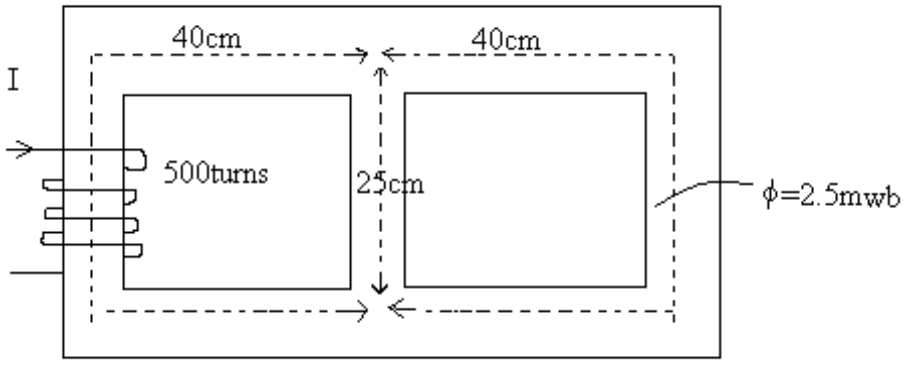

Figure 1:

3. (a) Derive the expression for power in a1-ϕ A.c circuits.

(b) In the circuit shown in figure 2, Calculate.

i. The total impedance
ii. The total current
iii. Power factor
iv. The total S,P and Q
v. The total admittance. Also, draw vector diagram. [6+10]

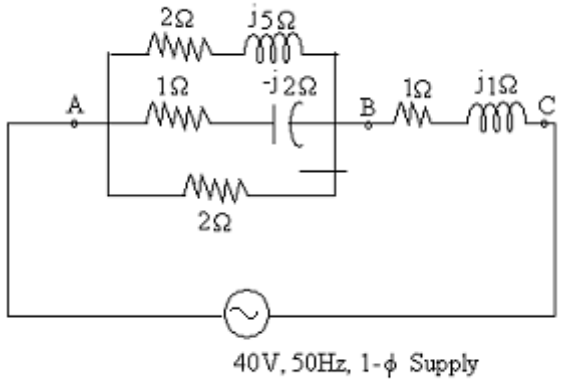

Figure 2:

4. (a) Two resistors each of 100Ω are connected in series. The phases a and c of a three phase 400V supply are connected to the two ends and phase b is connected to the junction of the two resistors. Find the line currents.

   (b) Derive the expressions for wattmeter readings in two wattmeter method with balanced star connected load. How do you calculate the power factor of the balanced load from wattmeter readings? [8+8]

5. (a) Define the following and explain by taking an example.

   i. Node
   ii. Tree
   iii. Sub graph
   iv. Loop
   v. Links
   vi. Directed graph.

   (b) Find the fundamental tie-set and cut-set matrix for the graph and for the tree shown in the figure 3. [9+7]

6. (a) State and explain compensation theorem.

   (b) In the network shown in figure 4, find the value of Z_L so that the power transfer from the source is maxi mum. Also find P_{max}. [8+8]

7. In the figure 5, the switch is close at position 1 at t = 0. At t = 0.5 m sec. The switch is moved to position 2. Find the expression for the current in both the conditions and sketch the transient. [16]

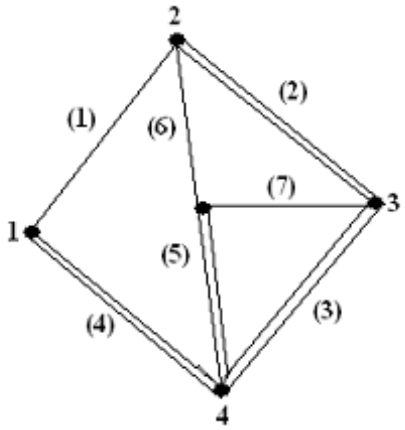

Figure 3:

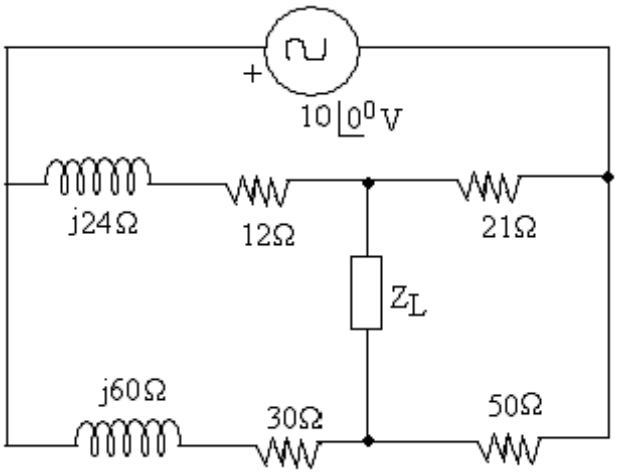

Figure 4:

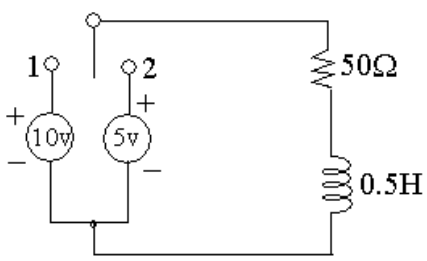

Figure 5:

8. Determine Y-Parameters of the network shown in figure 6. [16]

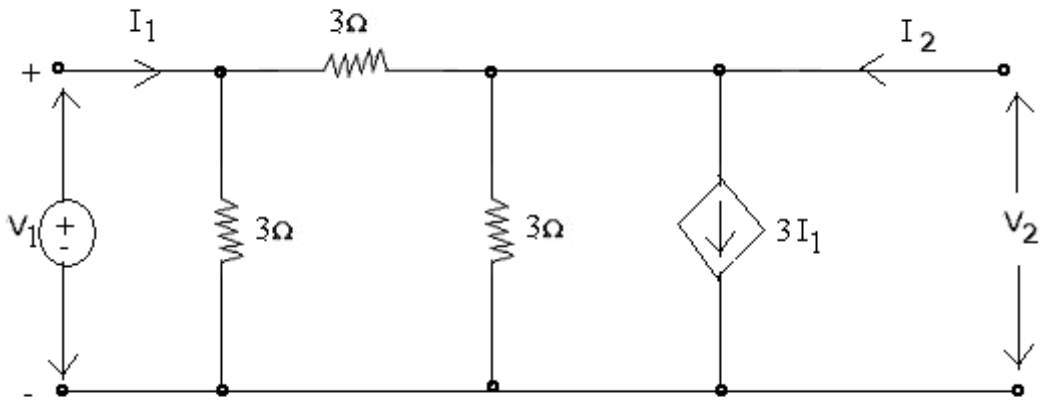

Figure 6:

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