Code No: R05010203 **Set No. 1**

I B.Tech Regular Examinations, Apr/May 2007
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 value of current I_i in figure 1a.

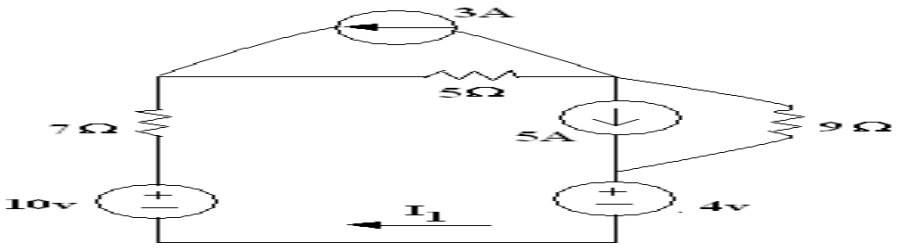

Figure 1a

(b) Find the value of E in the network shown in figure 1c.

(c) Write short notes on dependent source. [6+6+4]

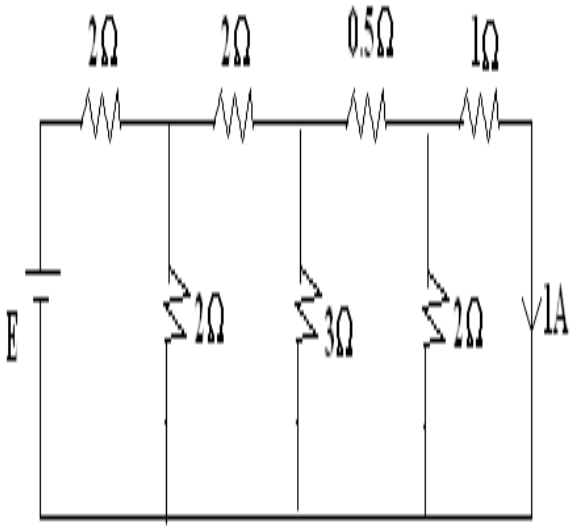

Figure 1c

2. (a) What is magnetic coupling? What is its effect? How can you arrange two coils so that they donot have magnetic coupling?

(b) Two coils having 30 and 600 turns are wound side by side on a closed iron circuit of 100 cm^2 cross section and mean length 150cm. Calculate

i. The self inductance of the two coils and mutual inductance if relative permeability of iron is 2000. Assume no magnetic leakage.

ii. Calculate from 0 to 10A steadily in 0.01sec.

(c) Define reluctance? Give its units. 6+8+2]

3. (a) Explain the phenomenon of " Acceptor resonance" in electrical circuits.

   (b) Proceeding analytically, sketch the resonance curves for a series resonant circuit with variable frequency and constant R, L and C.

   (c) A series circuit comprising R, L and C is supplied at 220v, 50Hz. At resonance, the voltage across the capacitor is 550v. The current at resonance is 1A. Determine the circuit parameters R, L and C. [5+5+6]

4. (a) For the network shown in figure 4b, calculate the line currents and power consumed if the phase sequence is ABC.

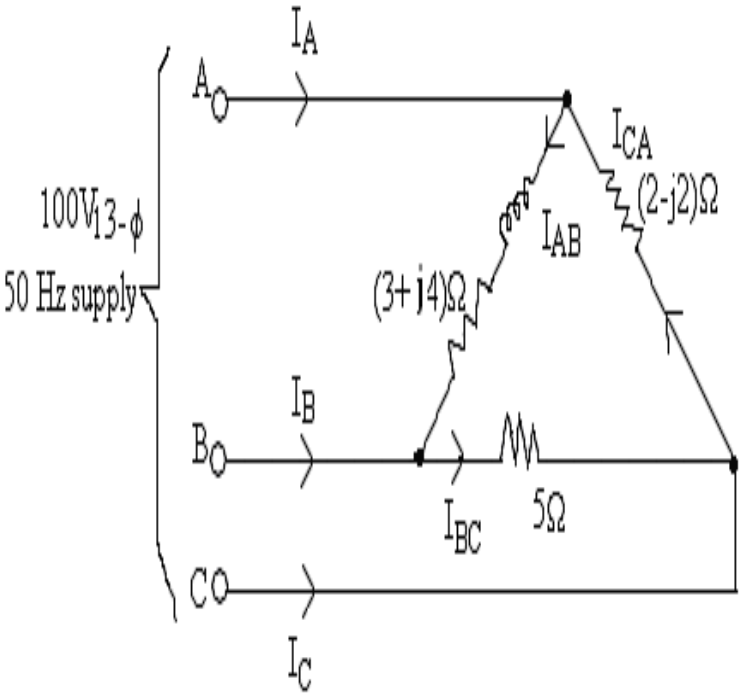

Figure 4a

   (b) An unbalanced star connected load is connected across a 3-ϕ, 400V balanced supply of phase sequence RYB as shown in figure 4a. Two wattmeters are connected to measure the total power supplied as shown in fig. Find the readings of the wattmeters. [8+8]

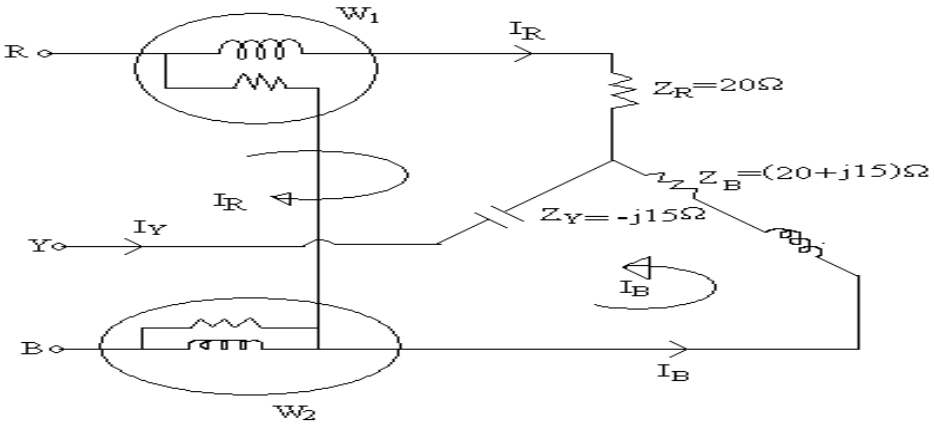

Figure 4b

5. (a) Explain the procedure for obtaining fundamental tie-set matrix of a given network.

   (b) Draw the oriented graph of the network shown in figure 5 and write the incidense matrix. [6+10]

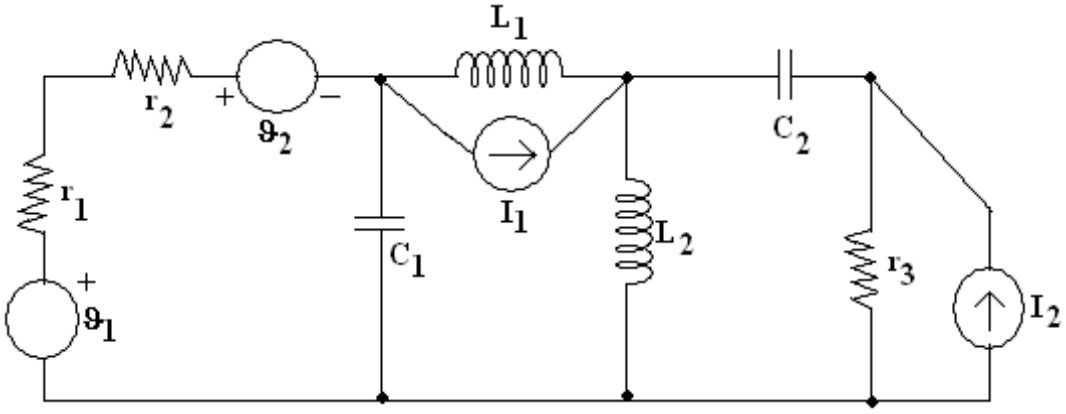

Figure 5

6. (a) State and explain compensation theorem.

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

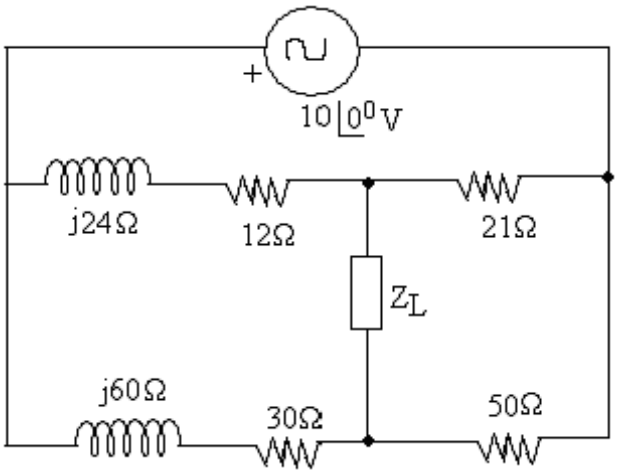

Figure 6

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

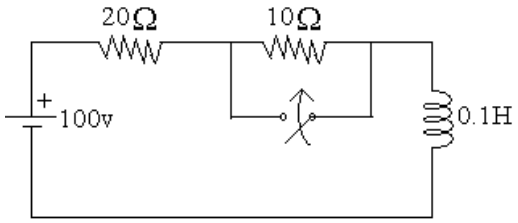

Figure 7a

(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 y-parameters of the network shown in figure 8a.

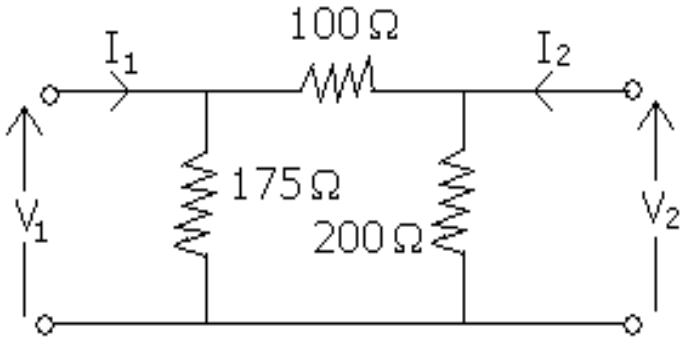

Figure 8a

(b) Calculate the Z-parameters for the lattic network shown in figure 8b. [6+10]

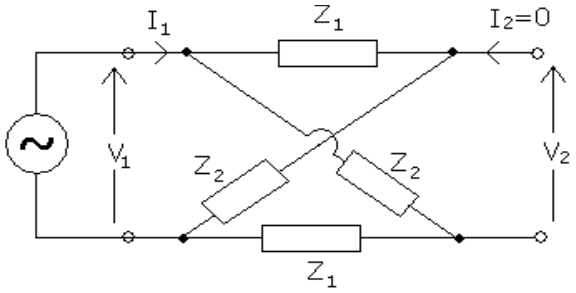

Figure 8b

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Code No: R05010203 **Set No. 2**

I B.Tech Regular Examinations, Apr/May 2007
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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) What is the difference between an ideal source and a practical source? Draw the relevant characteristics of the above sources.
   (b) Explain the difference between active elements and passive elements with suitable examples.
   (c) Determine the current through 6Ω resistor and the power supplied by the current source for the circuit shown in figure 1. [6+4+6]

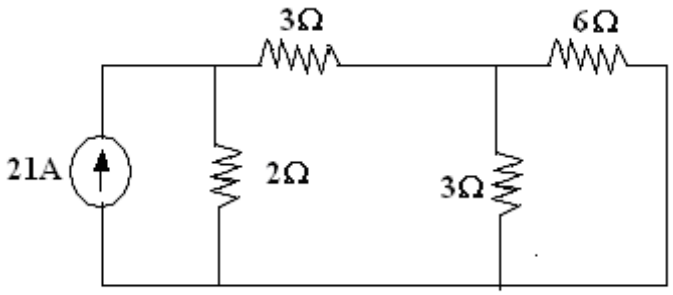

Figure 1

2. (a) Solve for the currents I_1 and I_2 in the circuit shown in figure 2a. Also, find the ratio of V_2/V_1.

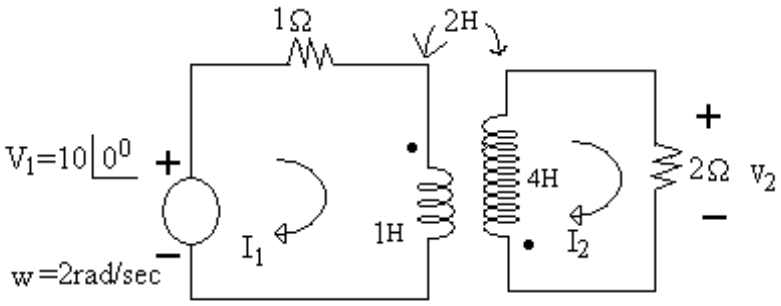

Figure 2a

   (b) What is magnetic circuit? Compare magnetic circuit with electric circuit in any four aspects. [10+6]

3. (a) The voltage of a circuit is v = 200 sin (wt + 30^o) and the current is i = 50 sin(wt + 60^o). Calculate
      i. The average power, reactive volt-amperes and amparant power.

ii. Find the circuit elements if w =100π rad /sec.

(b) Find the form factor of the following waveform shown in figure 3

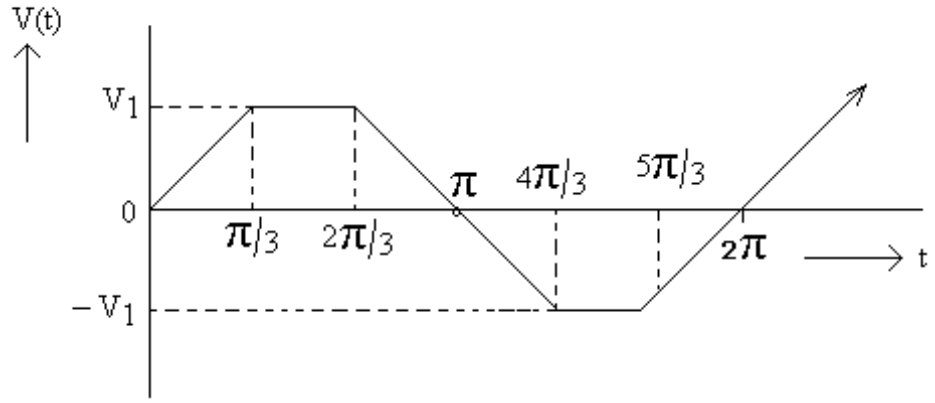

Figure 3

4. (a) Two wattmeters are used to measure power in a 3-phase three wire load. Determine the total power, power factor and reactive power, if the two wattmeters read

   i. 1000w each, both positive

   ii. 1000w each, but of opposite sign.

   (b) What is phase sequence? Explain its significance?

   (c) What are the advantages of a poly phase system over a single phase system. [8+4+4]

5. (a) Draw the oriented graph of the network shown in figure5a.

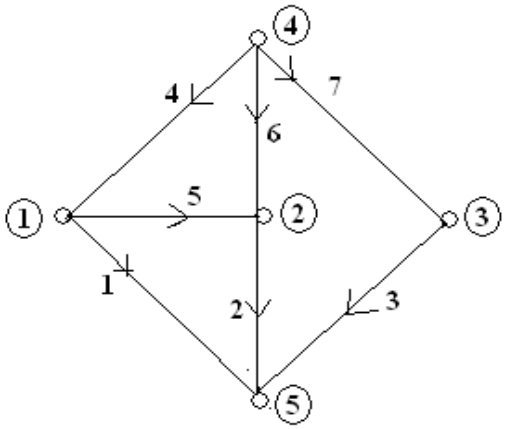

Figure 5a

(b) Obtain the fundamental loop and fundamental cut-set matrices for the graph shown in figure5b. [6+10]

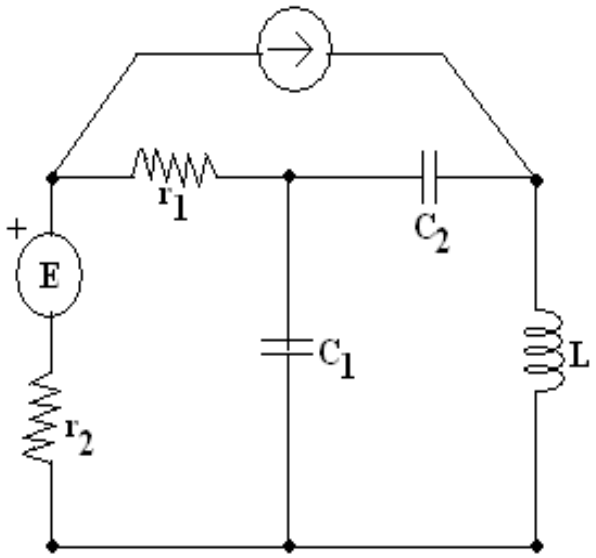

Figure 5b

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

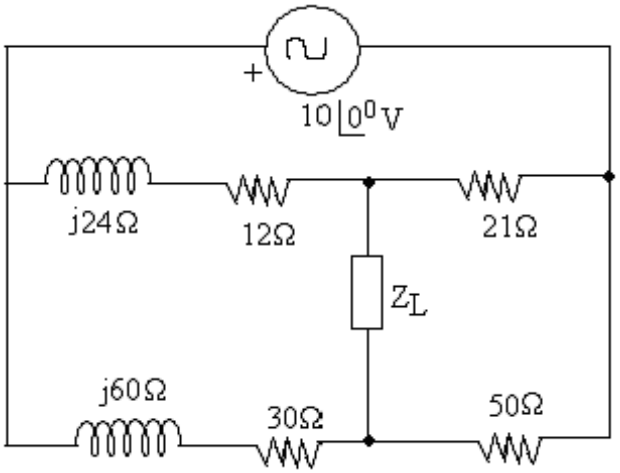

Figure 6

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

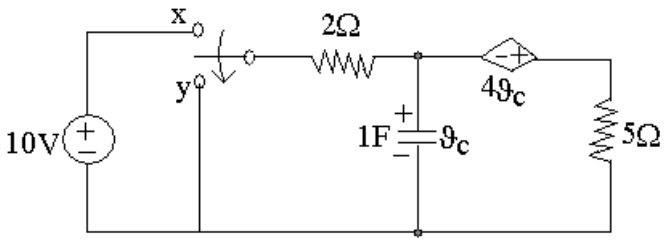

Figure 7

8. (a) Determine the ABCD parameters of the network shown in figure 8a.

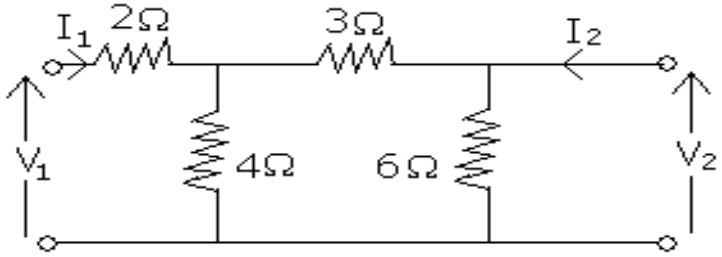

Figure 8a

(b) Determine the ABCD parameters of the network shown in figure 8. [6+10]

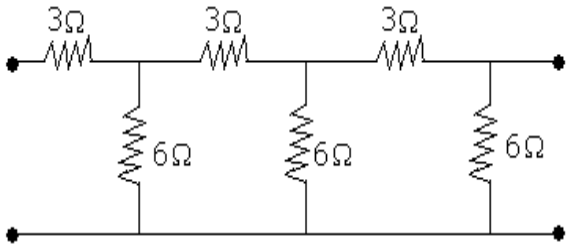

Figure 8

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Code No: R05010203 **Set No. 3**

I B.Tech Regular Examinations, Apr/May 2007
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) Write short notes on source transformation.
   (b) Find the power supplied by 12v source as shown in figure. 1b

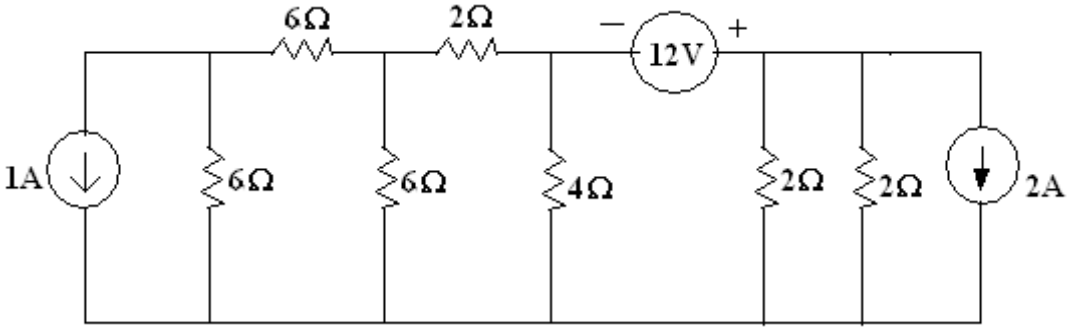

Figure 1b

   (c) Draw the volt-current characteristic of practical current source? [6+8+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) The voltage of a circuit is v = 200 sin (wt + 30^o) and the current is i = 50 sin(wt + 60^o). Calculate
      i. The average power, reactive volt-amperes and amparant power.
      ii. Find the circuit elements if w =100π rad /sec.
   (b) Find the form factor of the following waveform shown in figure 3

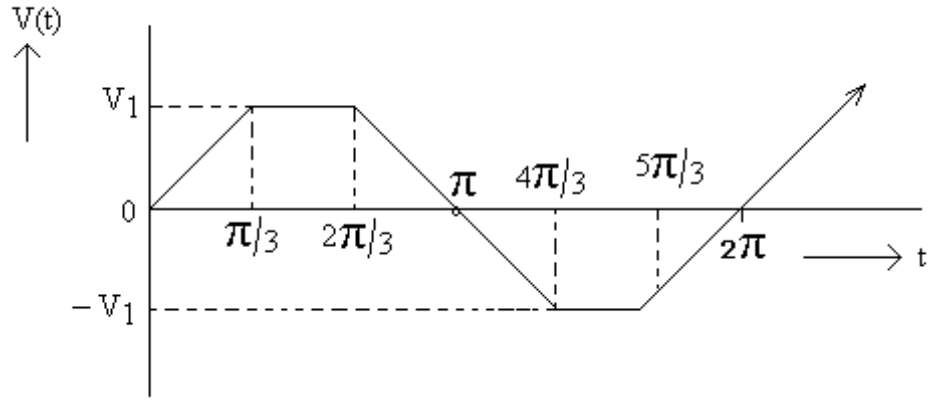

Figure 3

4. (a) The power delivered to a balanced delta connected load by a 400 volt 3-phase supply is measured by two wattmeter method. If the readings of the two wattmeter are 2000 and ?1500 watts respectively, calculate the magnitude of the impedance in each arm of the delta load and its resistive component?

   (b) A balanced delta connected load of (2+j3) Ω per phase is connected to a balanced three-phase 440V supply. The phase current is 10A. Find the

   i. total active power
   ii. Reactive power and
   iii. apparent power in the circuit. [8+8]

5. (a) Draw the Dual of the network shown in figure 5a.

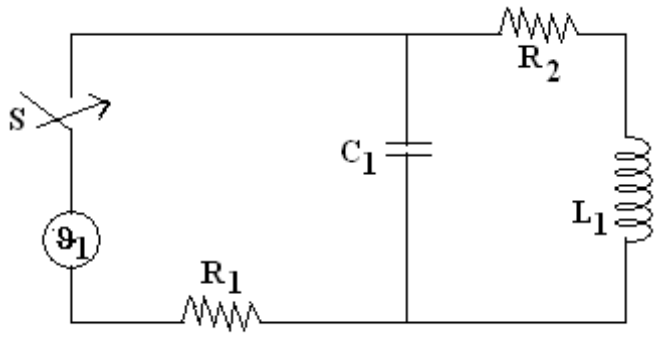

Figure 5a

   (b) Find the current through Z2 in the network shown in figure 5busing mesh analysis. [6+10]

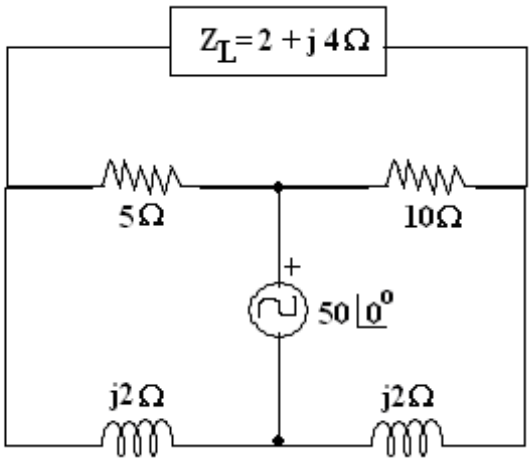

Figure 5b

6. (a) State and explain Reciprocity theorem.
   (b) Find the current i in the circuit shown in figure 6 using superposition theorem. [8+8]

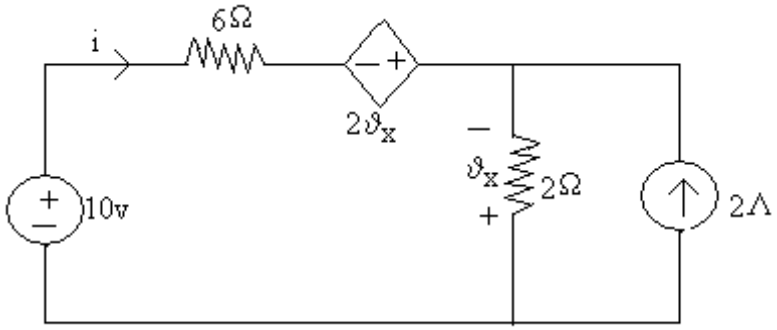

Figure 6

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

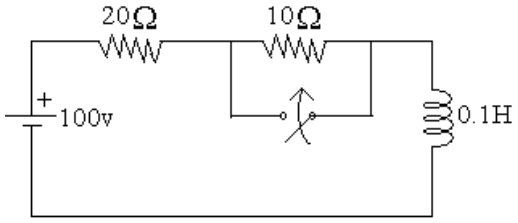

Figure 7a

   (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 8a, $Z_1 = 2\angle 0^o$, $Z_2 = 5\angle -90^o$, $Z_3 = 3\angle 90^o$, find the Z-parameters.

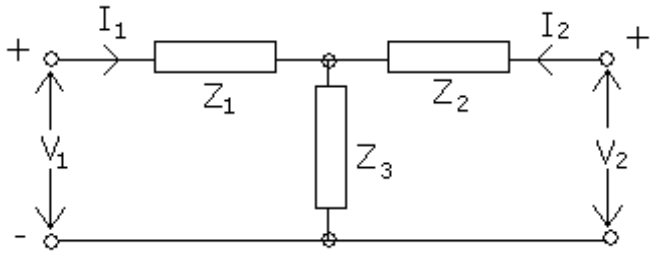

Figure 8a

(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: R05010203 **Set No.4**

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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 1a, find the current through 20Ω resistor?

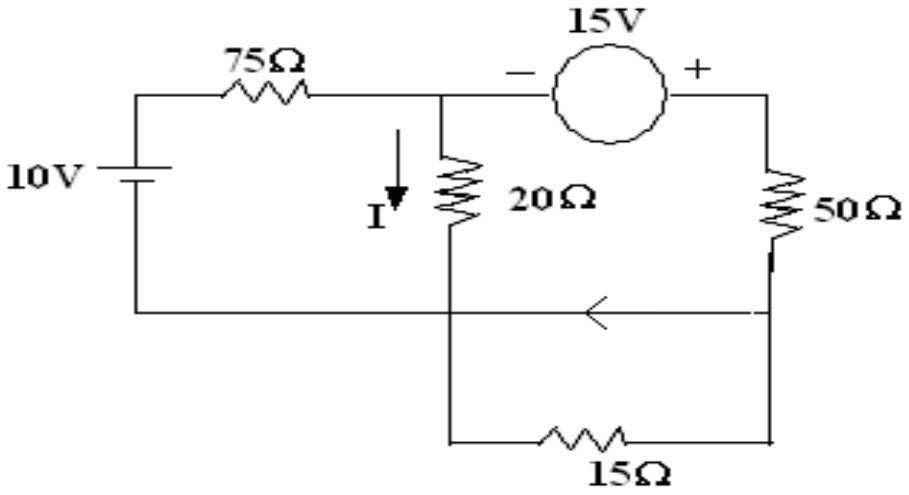

Figure 1a

(b) Reduce the network shown in figure 1, to a single loop network by successive source transformation, to obtain the current in the 12Ω resistor. [8+8]

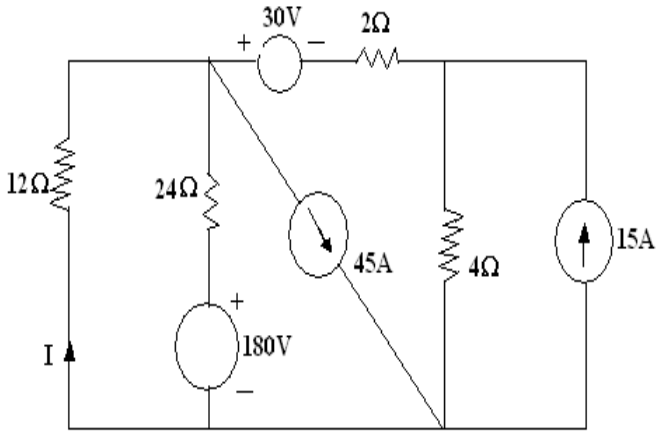

Figure 1

2. (a) Explain the Faraday's Law of electromagnetic induction?

(b) A cast steel ring has a circular cross section 3cm in diameter and a mean circumference of 80cm. The ring is uniformly wound with 600 turns.

i. Estimate the current required to produce a flux of 0.5 mcob in the ring.

ii. If a saw cut 2mm wide is made in the ring, find approximately the flux produced by the current found in (i).

iii. Find the current value which will give the same flux as in (i). Assume the gap density to be the same as in the iron and neglect fringing. [6+10]

3. (a) What is Form factor of an alternating quantity? Explain its significance?

(b) In the circuit shown in figure 3. What 50Hz voltage is to be applied across A B terminals so that a current of 10Amps will flow in the capacitor. [6+10]

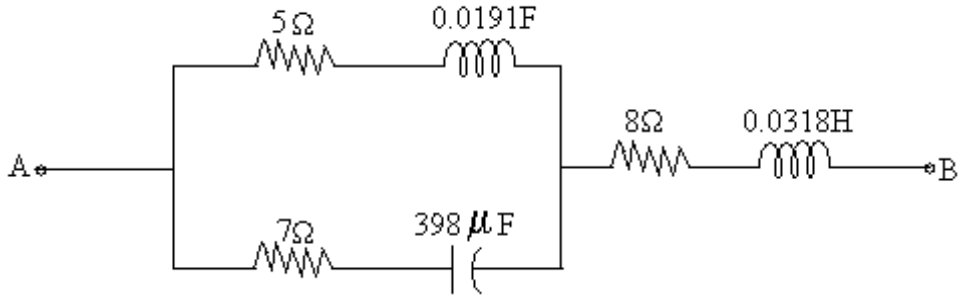

Figure 3

4. (a) Two wattmeters are used to measure power in a 3-phase three wire load. Determine the total power, power factor and reactive power, if the two wattmeters read

i. 1000w each, both positive

ii. 1000w each, but of opposite sign.

(b) What is phase sequence? Explain its significance?

(c) What are the advantages of a poly phase system over a single phase system. [8+4+4]

5. (a) Explain the procedure for obtaining fundamental tie-set matrix of a given network.

(b) Draw the oriented graph of the network shown in figure 5 and write the incidense matrix. [6+10]

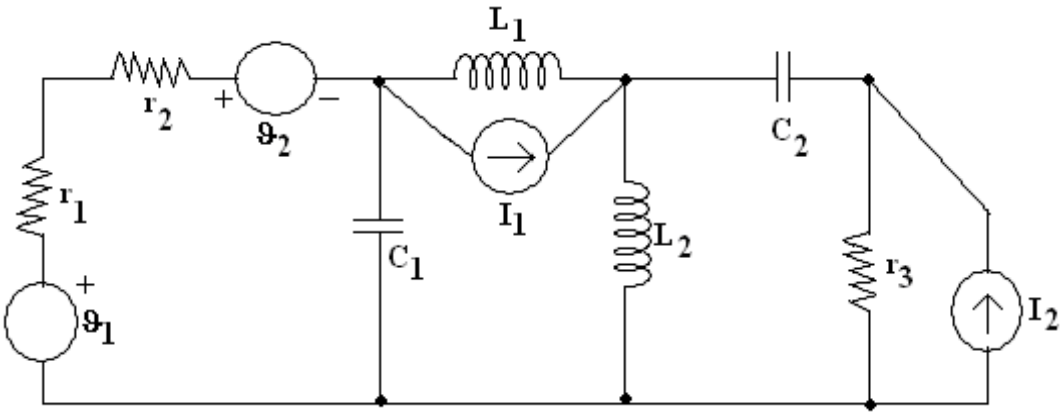

Figure 5

6. (a) State and explain compensation theorem.

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

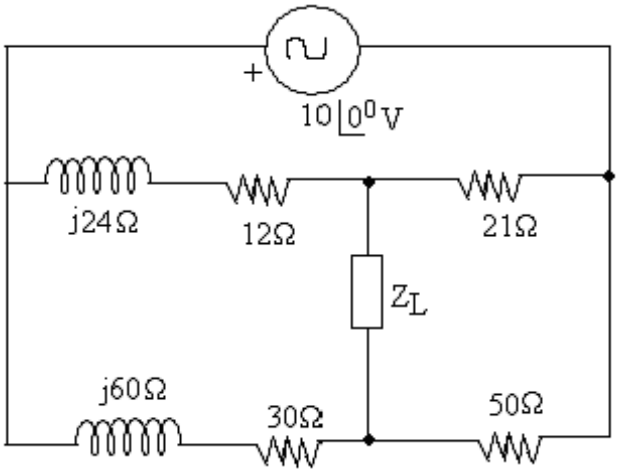

Figure 6

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

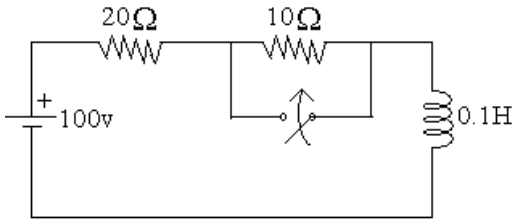

Figure 7a

(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 y-parameters of the network shown in figure 8a.

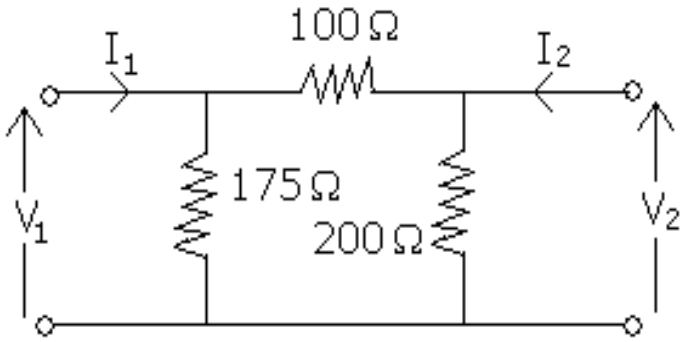

Figure 8a

(b) Calculate the Z-parameters for the lattic network shown in figure 8b. [6+10]

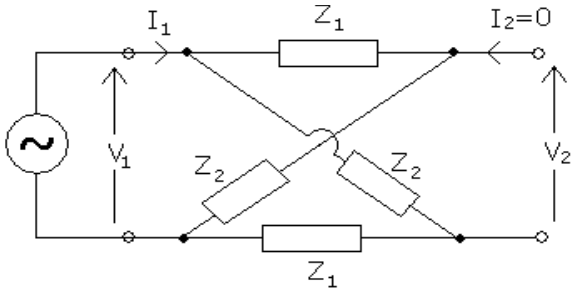

Figure 8b

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