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

I B.Tech Supplimentary Examinations, Aug/Sep 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) Determine the current supplied by each battery in the circuit shown in figure 1a, by using kirchoff's laws.

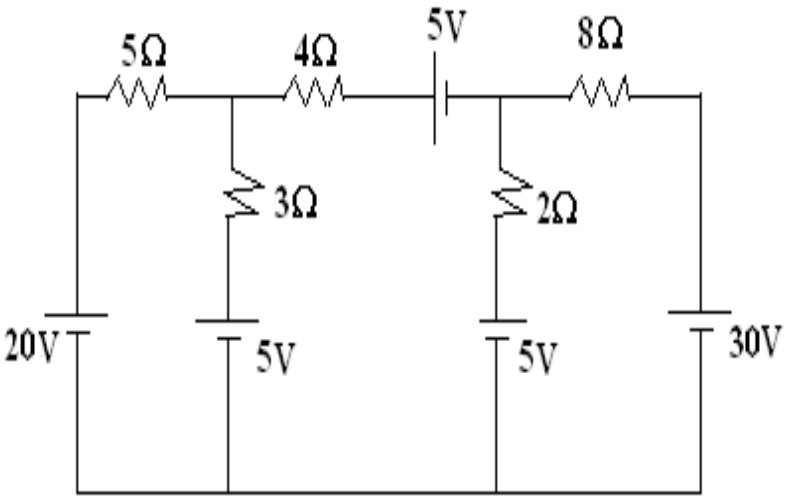

Figure 1a

(b) Find the current in each resistor and the total current taken by the network shown in figure 1. How will you double the current from the same source?

[8+8]

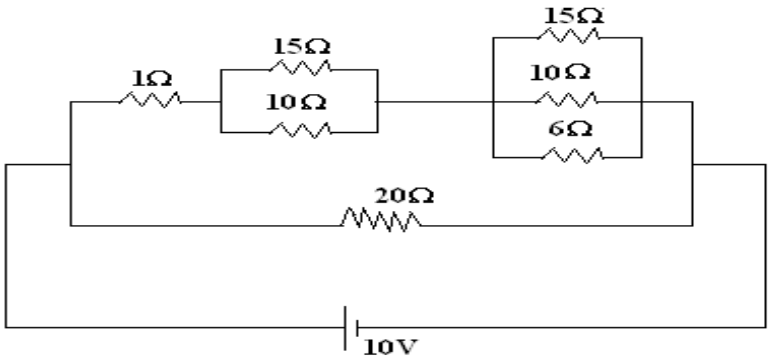

Figure 1

2. (a) Determine the amount of energy stored after 0.15sec, when the primary side of the circuit shown in figure 2a. is connected to a d.c. source of 20 volts. Given that, L_1 = 2H, L_2 =1.5H and M=1.4H.

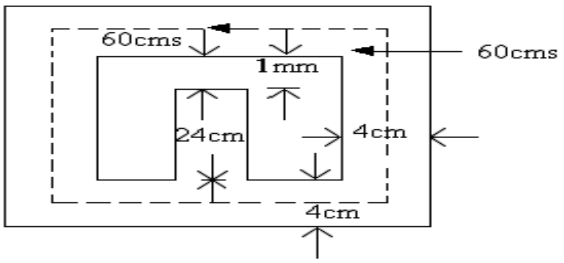

Figure 2a

(b) A 680 turn coil is wound on the central limb of the cast steel frame shown in figure 2. A total flux of 1.6mwb is required in the gap. Find the current required. All dimensions are in cms. Assume H=900 AT/m for B=1 wb/m^2. [8+8]

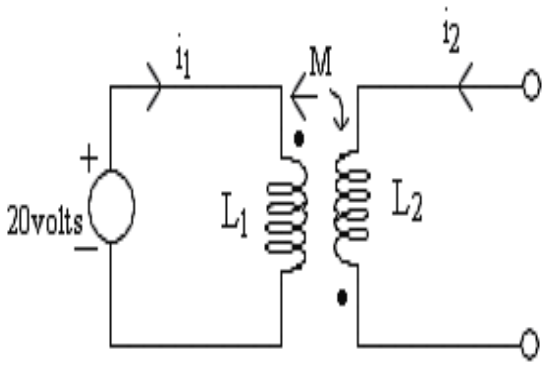

Figure 2

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

(b) In the circuit shown in figure 3, 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]

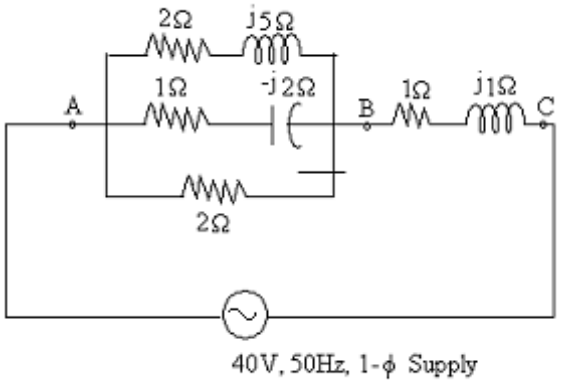

Figure 3

4. (a) What is phase sequence? Explain its significance.
   (b) A star connected three phase load has a resistance of 8 ohms and a capacitive reactance of 10 ohms in each phase. It is fed from a 400v, 3-ϕ balanced supply.
      i. Find the line current, total volt-amperes, active and reactive power
      ii. Draw phasor diagram showing phase voltages, line voltages and currents. [6+10]

5. (a) For the resistive network shown in figure 5a, obtain cut-set matrix.

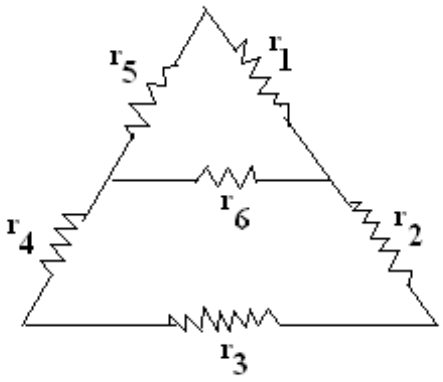

Figure 5a

   (b) Develop the tie-set matrix of the circuit shown in figure 5. [6+10]

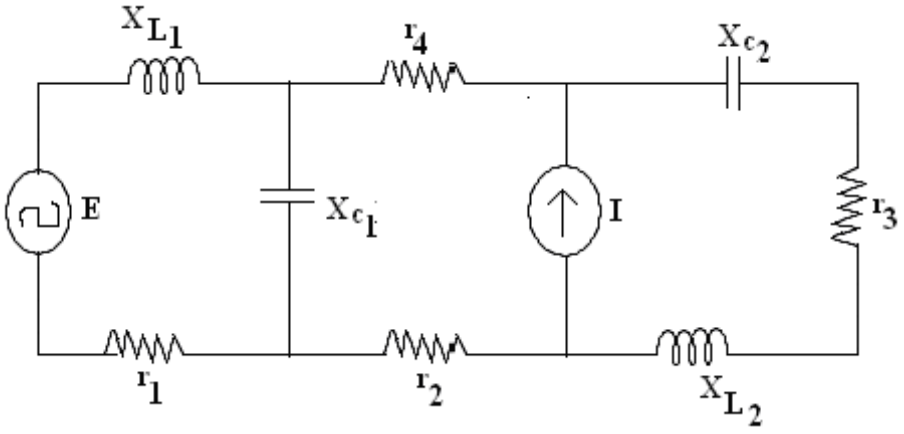

Figure 5

6. (a) State and explain Thevenin's theorem. [2+4]
   (b) Estimate the power loss in the 8Ω resistor using Thevenin's theorem. as shown in figure 6. [10]

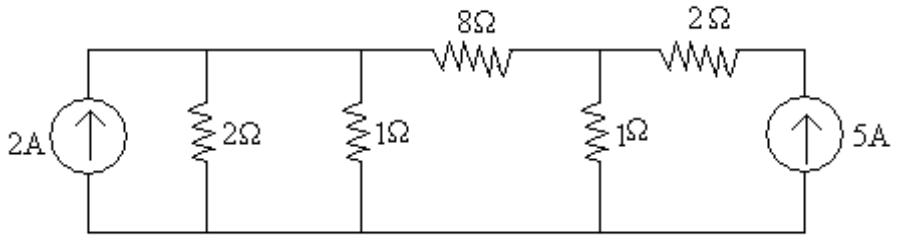

Figure 6

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.

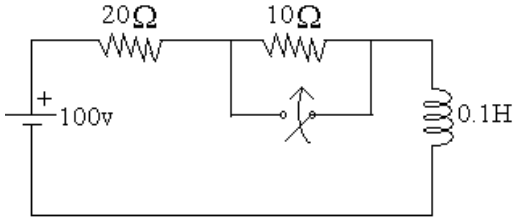

Figure 7a

(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.

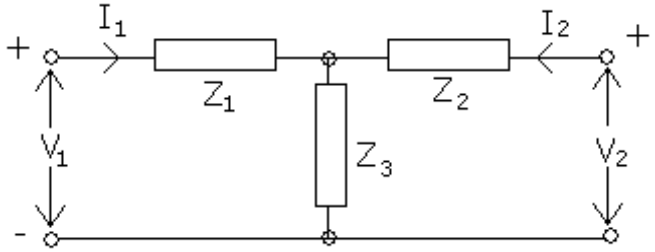

Figure 8a

(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. 2**

I B.Tech Supplimentary Examinations, Aug/Sep 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) Find the current through to 10Ω resistor in the circuit shown in figure 1a.

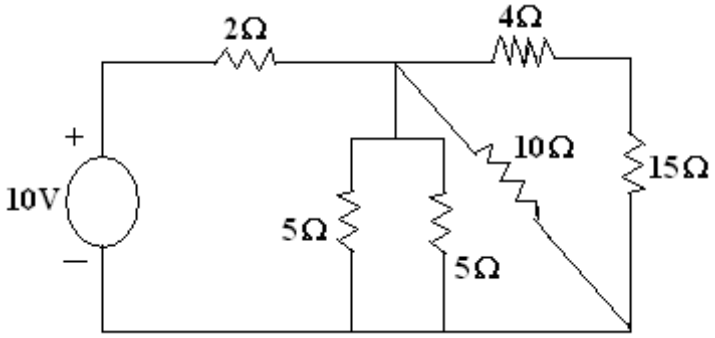

Figure 1a

(b) State and explain kirchoff's laws.

(c) Explain the difference between practical sources and ideal sources. [6+6+4]

2. (a) Bring out an analogy between magnetic circuits and electric circuits.

(b) Define:

i. Permeability and
ii. Magnetic flux.

(c) A ring shaped electromagnet has an air gap of 6mm and 20 cm^2 in area, the mean length of the core being 50cm and its cross section is 10 cm^2. Calculate the ampere-turns required to produce a flux density of 0.5 Wb/m^2 in the gap. Assume the permeability of iron is 1800. [6+4+6]

3. (a) Explain the following:-

i. Impedance
ii. Reactance
iii. Phase angle difference
iv. Power factor

(b) An alternating voltage (80 + j60) v is applied to a circuit and current flowing is (-4 + j10) A. Find the

i. impedance of the circuit and
ii. the power factor.

(c) In a particular circuit a voltage of 10v at 25 Hz produces 100mA, while the same voltage at 75Hz produces 60mA. Draw the circuit diagram and insert the values of the constants. At what frequency will the value of impedance be twice that at 25Hz. [6+4+6]

4. (a) A 3-phase balanced delta connected load with line voltage of 200V, has line current as $I_1 = 10\angle 90^0$, $I_2 = 10\angle -150^0$ and $I_3 = 10\angle -30^0$.
   i. What is the phase sequence.
   ii. what are the impedances?
   (b) A symmetrical three phase 100V, 3-wire supply feeds an unbalanced star connected load with impedances of the load as $Z_R = 5\angle 0\ \Omega$; $Z_y = 2\angle -90^0\ \Omega$. and $Z_B = 4\angle -90^0\ \Omega$. Find the
   i. line currents
   ii. voltage across the impedance.
   iii. the displacement neutral voltage. [6+10]

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]

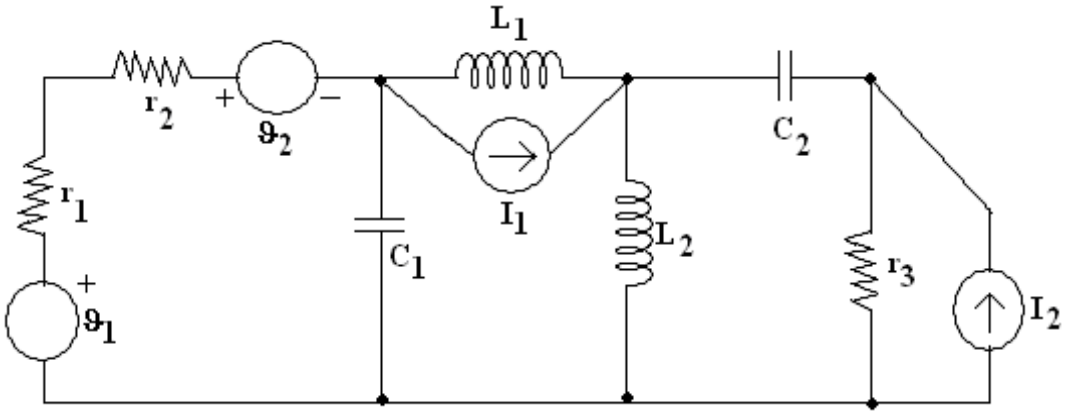

Figure 5

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]

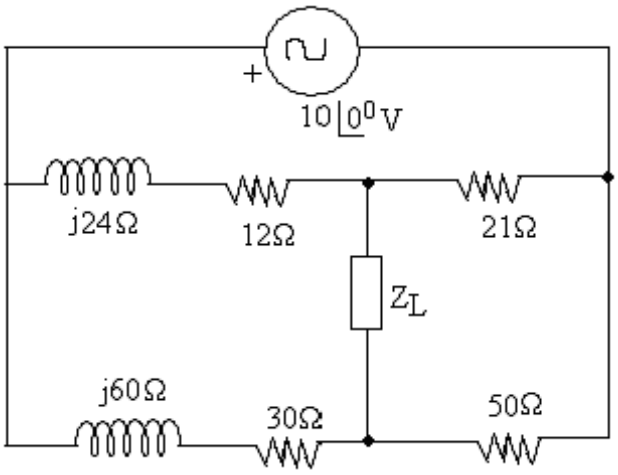

Figure 6

7. As shown in figure 7 represents a parallel RLC circuit where R =0.1Ω, L = 0.5H and C is 1F. Capacitor C has an initial voltage of 12V as per the polarity shown in figure. The switch K is closed at time t = 0. Obtain ϑ(t). [16]

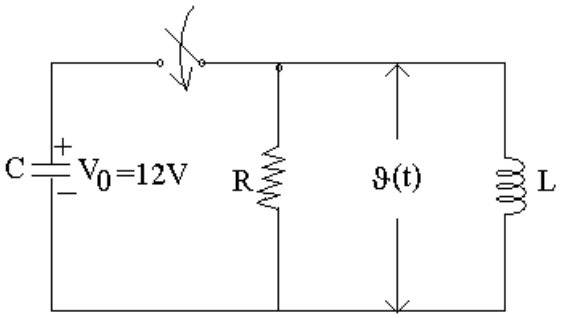

Figure 7

8. Determine the transmission parameters of the network shown in figure 8. [16]

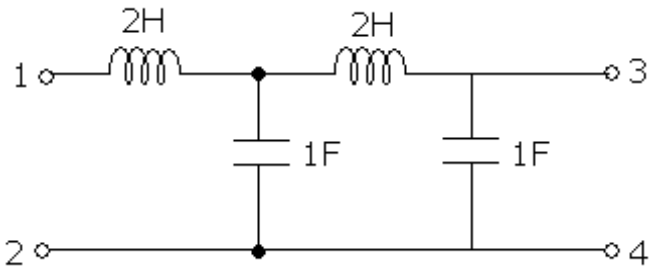

Figure 8

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

I B.Tech Supplimentary Examinations, Aug/Sep 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) Explain source transformation with suitable examples.
   (b) A current wave form shown in figure 1b. is applied to a capacitor of value 2 μ F. Find the voltage waveform.

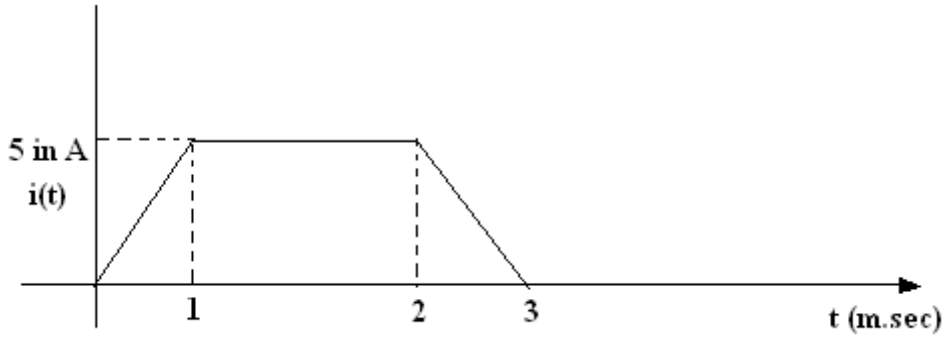

Figure 1b

   (c) What is ideal source? Explain them. [4+8+4]

2. (a) Bring out the differences between magnetic circuits and electric circuits.
   (b) Explain
      i. Permeance and
      ii. relative permeability
   (c) A flux density of 0.5T is created in a magnetic core when magnetic field strength is 800AT/m. The core has a length of 0.3 m and cross sectional area of $8cm^2$. Find
      i. mmf
      ii. relative permeability
      iii. flux and
      iv. reluctance. [4+4+8]

3. (a) The voltage of a circuit is υ = 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

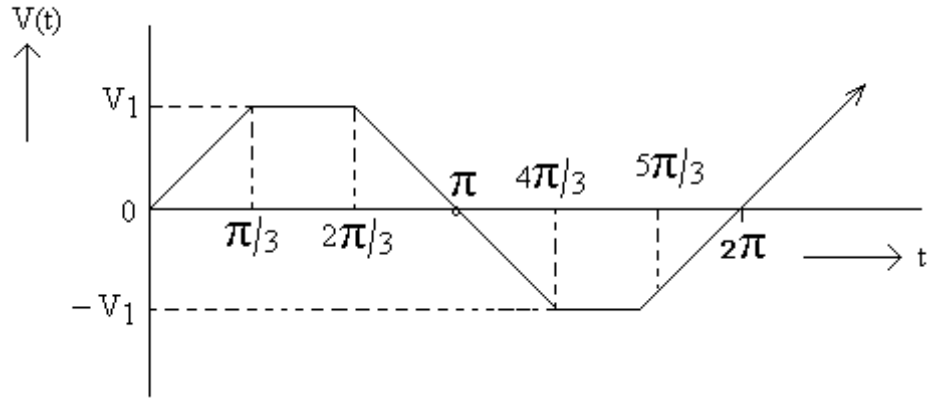

Figure 3

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

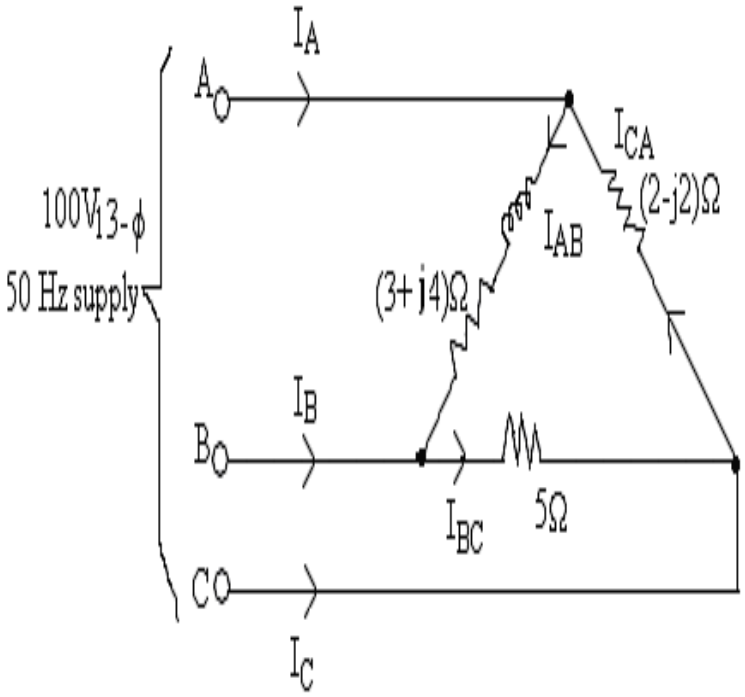

Figure 4a

(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]

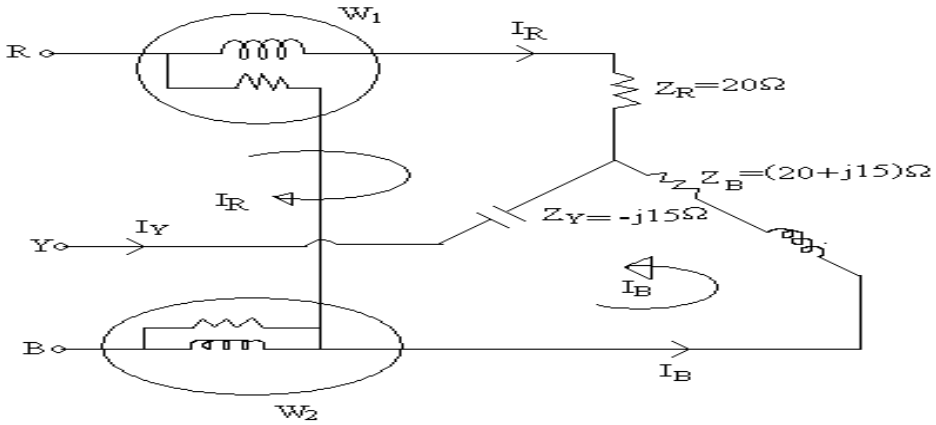

Figure 4b

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]

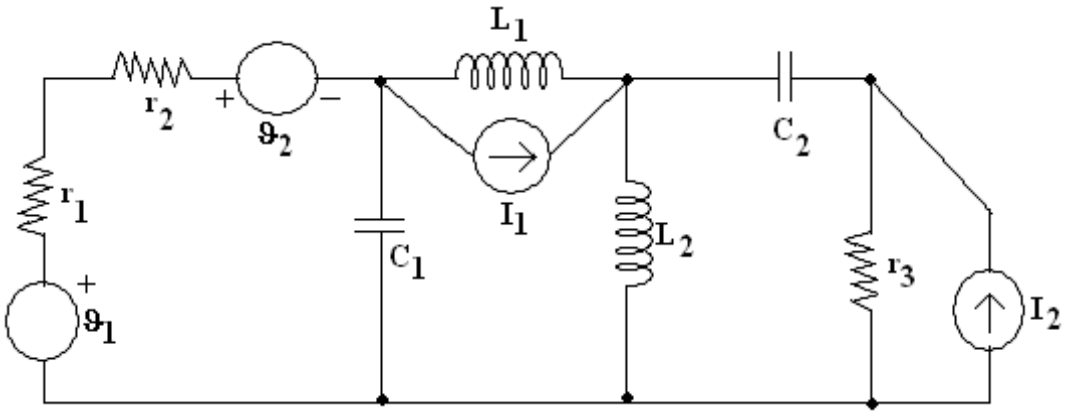

Figure 5

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]

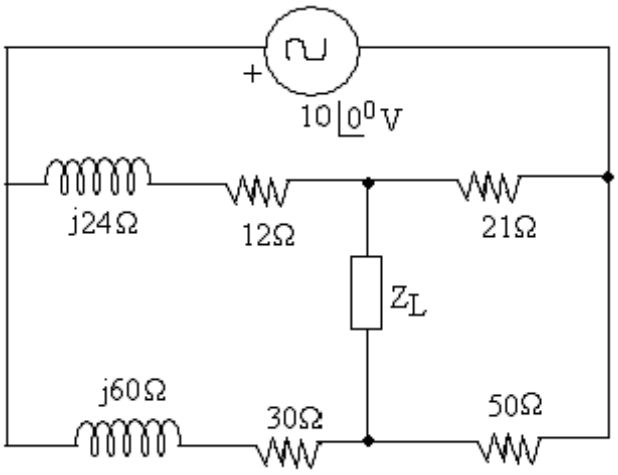

Figure 6

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.

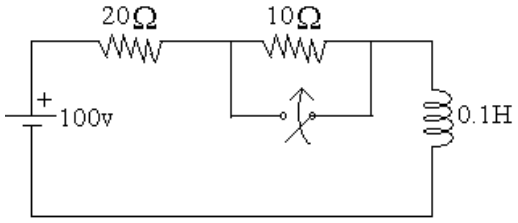

Figure 7a

(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) 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.

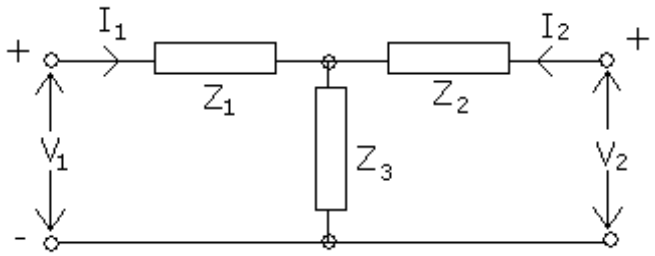

Figure 8a

(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
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Write down the expressions used in conversion of Y to Δ and Δ to Y transformations.
   (b) Find R_{eq} between terminals x and y as shown in figure 1. Resistor values are in ohms. [6+10]

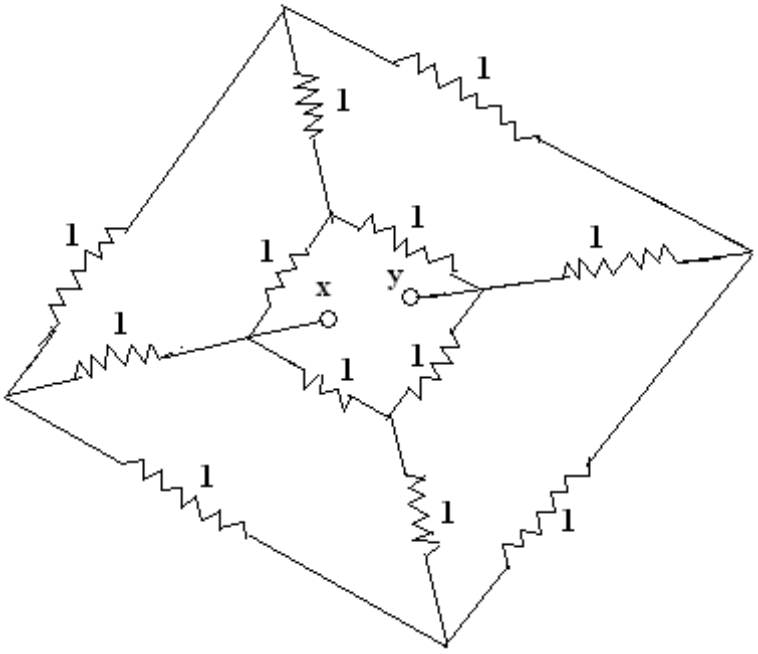

Figure 1

2. (a) Determine the amount of energy stored after 0.15sec, when the primary side of the circuit shown in figure 2a. is connected to a d.c. source of 20 volts. Given that, L_1 = 2H, L_2 =1.5H and M=1.4H.

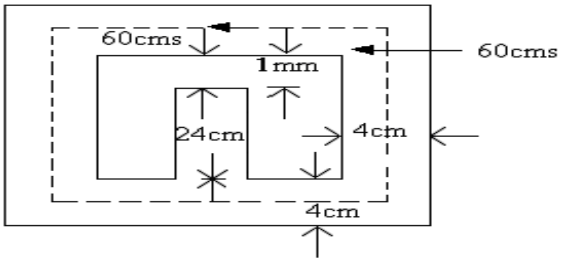

Figure 2a

(b) A 680 turn coil is wound on the central limb of the cast steel frame shown in figure 2. A total flux of 1.6mwb is required in the gap. Find the current required. All dimensions are in cms. Assume H=900 AT/m for B=1 wb/m^2. [8+8]

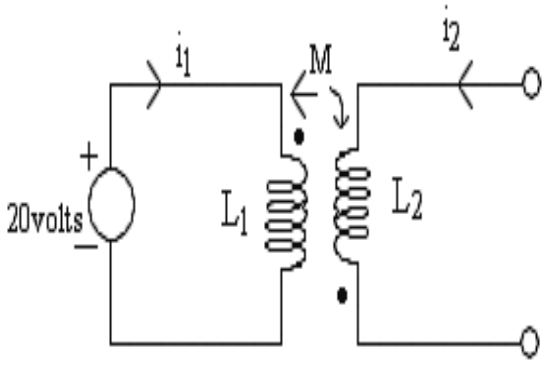

Figure 2

3. (a) Define the terms:
   i. Band width
   ii. Q of a coil.

   (b) A series RLC circuit has R=10 ohm, L = 0.5H and C = 40μF. The applied voltage is 100v. Find
   i. Resonant frequency
   ii. Quality factor of a coil
   iii. Upper and lower half power frequencies
   iv. Band width
   v. Current at resonance
   vi. Current at half power points
   vii. Voltage across inductance at resonance. [4+12]

4. (a) A 220V, 3-ϕ balanced supply is given to a 3-ϕ star connected unbalanced, 4 wire load as shown in figure 4a. Find the line currents, neutral current and the power read by the wattmeter. Phase sequence is RYB.

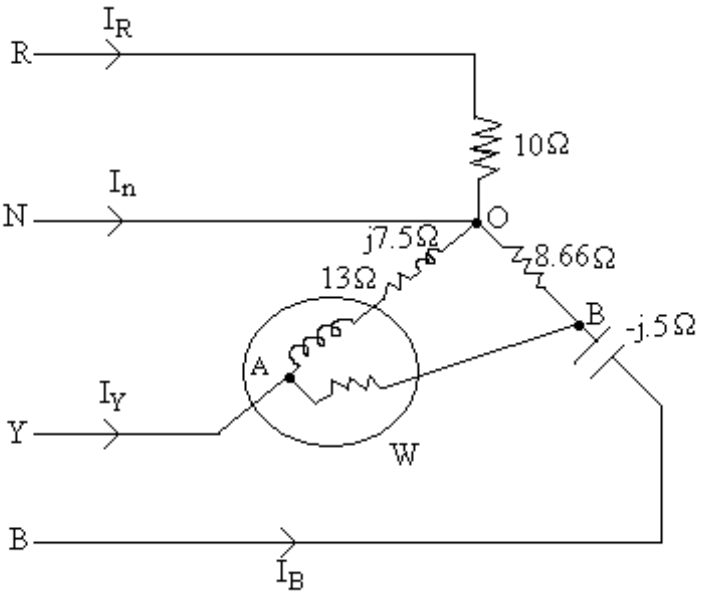

Figure 4a

(b) A balanced delta connected three phase load absorbs a complex power of 100 KVA with a lagging power factor of 0.8 when the r.m.s line to line voltage is 2400 volts. Calculate the impedance of each arm of the D connected load? [10+6]

5. (a) Explain the procedure adopted to find the dual of a network.

(b) Using the nodal analysis, find the node voltage, V_1 and V_2 in the circuit shown in figure 5. [6+10]

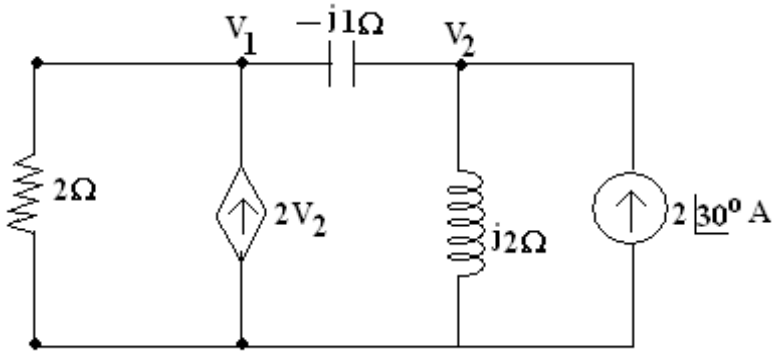

Figure 5

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]

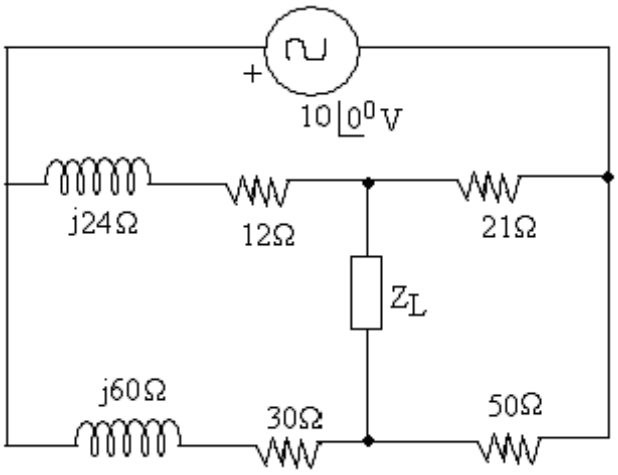

Figure 6

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.

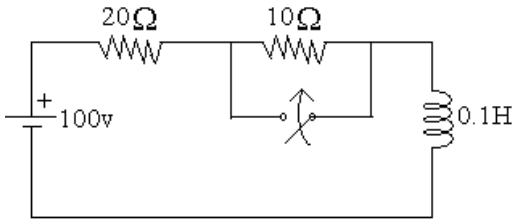

Figure 7a

(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 Z-parameters for the network shown in figure 8a.

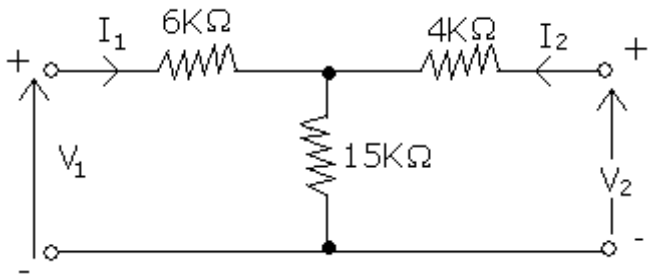

Figure 8a

(b) For the h parameter equivalent network shown in figure 8 find the voltage gain load resistance is R_L. [6+10]

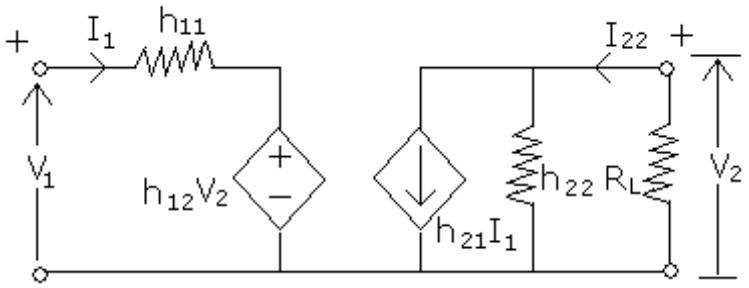

Figure 8

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