Code No: Z0222 / R07 **Set No. 1**

I B.Tech - Regular Examinations, June 2009
ELECTRICAL CIRCUITS ANALYSIS
(Common to Electrical & Electronic 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 current delivered by the source for the network shown in figure 1a using network reductions technique.

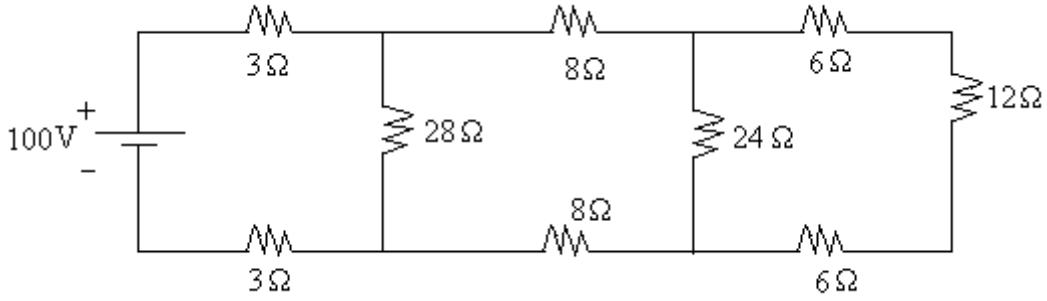

Figure 1a

(b) Find the value of applied d.c. voltage for the network, shown in figure 1b. [8+8]

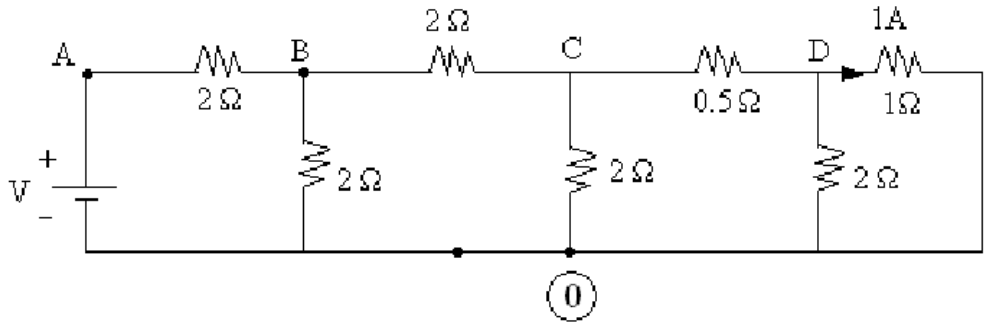

Figure 1b

2. State Faraday's law of Electromagnetic Induction. Two coils A & B are wound on same ferromagnetic core. There are 300 turns on A & 2800 turns on B. A current of 4A through coil A produces a flux of 800μWb in the core. If this current is reversed in 20 ms, find the average emf induced in coils A & B. [16]

3. For the trapezoidal waveform shown in the figure 3, determine. [16]

   (a) Average and rms values.

   (b) Form factor.

   (c) Peak factr.

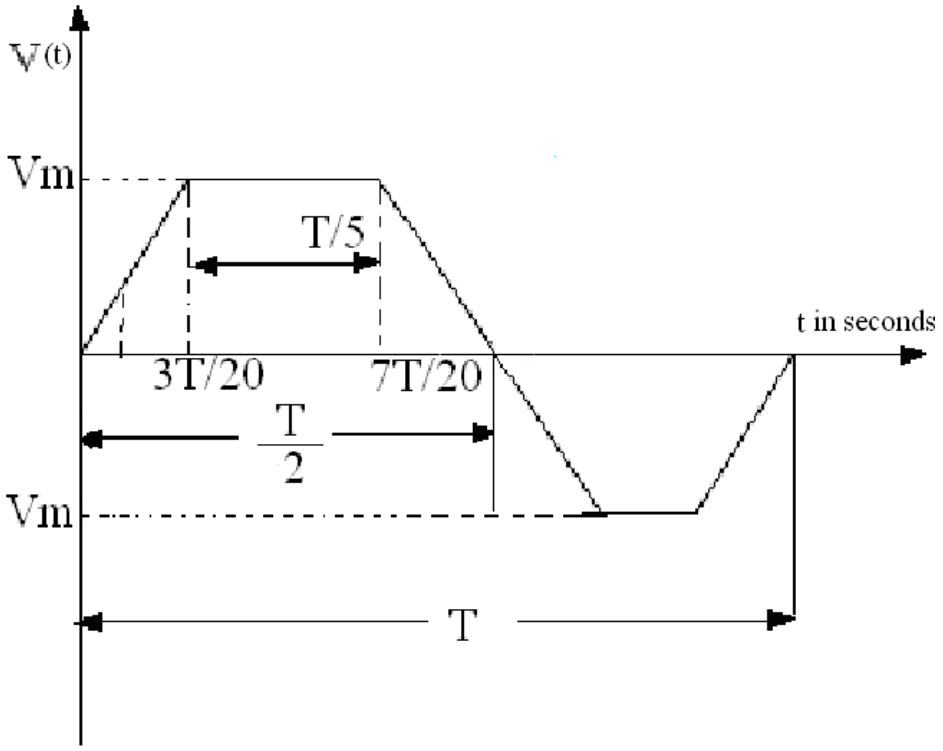

Figure 3

4. A balanced delta connected load is supplied from a symmetrical, 3-phase, 400V, 50Hz supply system. The current in each phase is 20A and lags behind its phase voltage by an angle 40^0. Calculate

   (a) The line current.

   (b) Total power.

   (c) Also draw the phasor diagram showing the voltages and currents in the lines and the phases.

   (d) The wattmeter readings if two wattmeters are used. [16]

5. For the resistive network as shown in figure 5 write a tie-set schedule and equilibrium equations on current basis. Determine the branch currents and branch voltages. [16]

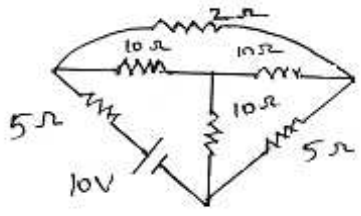

Figure 5

6. (a) Find the value of R_L so that maximum power is delivered to the load resistance R_L as shown in figure 6a, and find the maximum power.

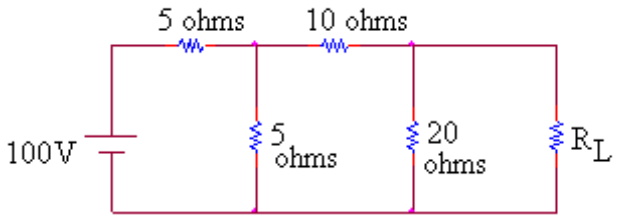

Figure 6a

(b) State and explain Thevenin's theorem. [8+8]

7. In the circuit shown in the figure 7, the switch is put in position - 1 for 1 m sec and then thrown to position - 2. Find the transient current in both intervals. [16]

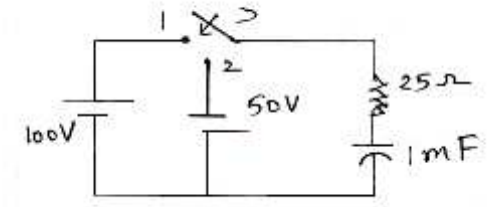

Figure 7

8. Find the Z and Y parameters of the circuit shown in figure 8. [16]

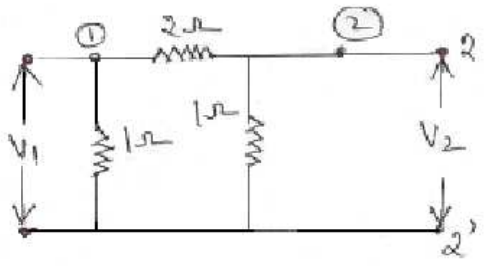

Figure 8

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Code No: Z0222 / R07 **Set No. 2**

I B.Tech - Regular Examinations, June 2009
ELECTRICAL CIRCUITS ANALYSIS
(Common to Electrical & Electronic Engineering and Instrumentation & Control Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) A bridge network ABCD is arranged as follows:
Resistance between terminals AB, BC, CD, DA and BD are 10 ohms, 30 ohms, 15 ohms, 20 ohms and 40 ohms respectively. A 4V battery is connected with negligible internal resistance between terminals A and C. Determine the current through each element in the network using network reduction techniques.
   (b) Three equal resistances are available. Find
      i. Two ratios of the equivalent resistances when they are connected in parallel.
      ii. The ratio of the current through each elements when they are connected in parallel. [10+6]

2. (a) An iron ring has a mean circumferential length of 60cm and a uniform winding of 300 turns. An air gap has been made by a saw cut across the section of the ring. When a current of 1A flows through the coil, the flux density in the air gap is found to be 0.126mb/m^2. How long is the air gap? Assume iron has a relative permeability of 300.
   (b) A steel ring of 25cm mean diameter and of circular section of 3cm in diameter has an air gap of 1.5mm length. It is wound uniformly with 700 turns of wire carrying a current of 2A. Calculate.
      i. Magneto motive force.
      ii. Flux density
      iii. magnetic flux
      iv. Relative permeability of steel ring. [8+8]

3. Why the rms values of an alternating quantity is more important than its average value. Find the rms value of the resultant current in a conductor which carries simultaneously sinusoidal alternating current with a maximum value of 15A and direct current of 15A, by deriving necessary expressions. [16]

4. A symmetrical 3-phase, 3-wire, 440V supply is connected to a star connected load. The impedances in each branch are : Z_1=(2+j3)Ω, Z_2=(1-j2)Ω, Z_3=(3+j4)Ω. Find its equivalent delta connected load. Hence find the phase and line currents and the total power consumed in the circuits. [16]

5. (a) Draw the oriented network graph from the incidence matrix given below.

Nodes	Branches					
	1	2	3	4	5	6
A	-1	0	0	+1	-1	0
B	+1	-1	0	0	0	-1
C	0	+1	-1	0	+1	0
D	0	0	+1	-1	0	+1

(b) Draw the graph of the network shown in figure 5b. Obtain a tree thereof. What is the number of mesh currents required for the network. [8+8]

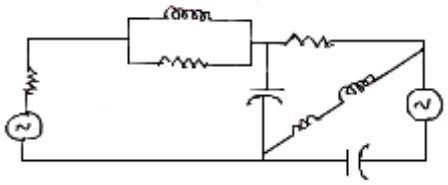

Figure 5b

6. (a) State and explain Norton's theorem

(b) For the circuit shown in figure 6b, find the value of current through 1 ohm in the arm PQ using Thevenin's theorem. [6+10]

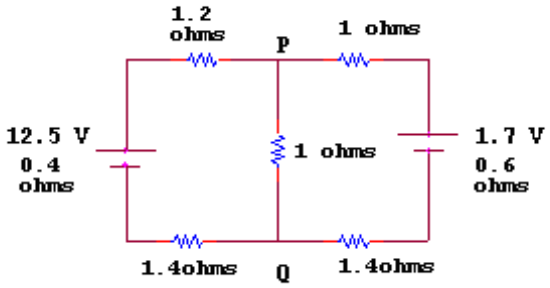

Figure 6b

7. A series RLC circuit with R = 4 KΩ, L = 10 H and C = 100 μF has a constant voltage of 60 V applied at t = 0. Find the current transient and the maximum current, if the circuit is initially relaxed. [16]

8. (a) Find the Z - parameters of the lattice network shown in figure 8a:

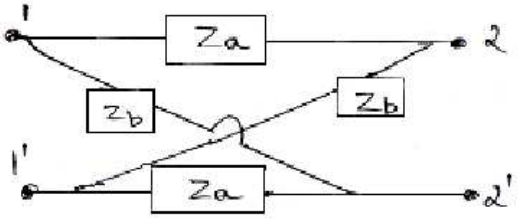

Figure 8a

(b) Find the Y - parameters for the n/w shown in figure 8b: [8+8]

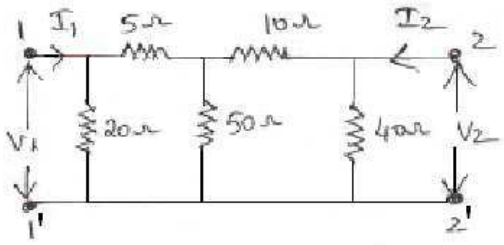

Figure 8b

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Code No: Z0222 / R07 **Set No. 3**

I B.Tech - Regular Examinations, June 2009
ELECTRICAL CIRCUITS ANALYSIS
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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) State and explain Kirchhoff's laws.
   (b) A Wheatstone bridge ABCD is arranged as follows, AB=10 Ω, BC=30 Ω, CD=15 Ω and DA=20 Ω. A 2V battery of internal resistance 2 Ω is connected between A and C with A positive. A galvanometer of resistance 40 Ω is connected between B and D. Find the magnitude and direction of galvanometer current. [6+10]

2. Two long single layer solenoids have the same length and the same number of turns but are placed co-axially one with in the other. The diameter of the inner coil is 8cm and that of the outer coil is 10cm. Calculate the co-efficient of coupling. [16]

3. Why the rms values of an alternating quantity is more important than its average value. Find the rms value of the resultant current in a conductor which carries simultaneously sinusoidal alternating current with a maximum value of 15A and direct current of 15A, by deriving necessary expressions. [16]

4. A symmetrical 3-phase, 3-wire, 440V supply is connected to a star connected load. The impedances in each branch are : Z_1=(2+j3)Ω, Z_2=(1-j2)Ω, Z_3=(3+j4)Ω. Find its equivalent delta connected load. Hence find the phase and line currents and the total power consumed in the circuits. [16]

5. (a) Discuss on the dot method of obtaining a dual network.
   (b) Draw the dual network of the circuit shown in figure 5b. [16]

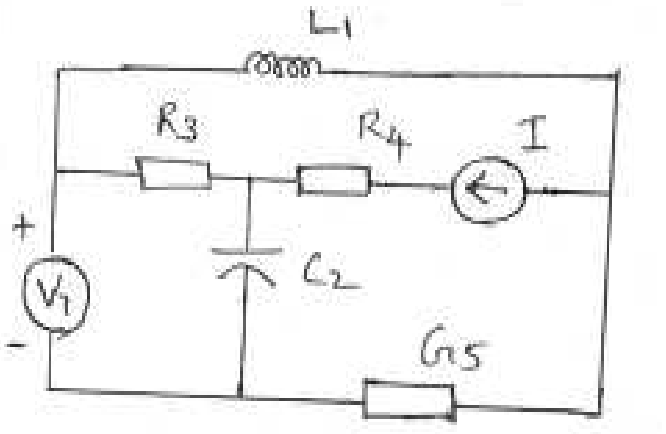

Figure 5b

6. (a) Using Norton's theorem, find the current through the load impedance Z_L as shown in figure 6a.

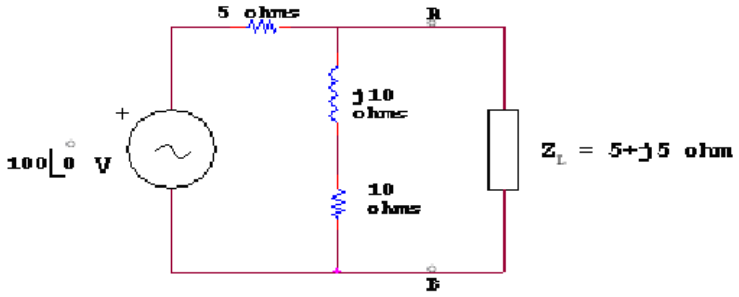

Figure 6a

(b) State and explain reciprocity theorem. [10+6]

7. A series RLC circuit with R = 4 KΩ, L = 10 H and C = 100 μF has a constant voltage of 60 V applied at t = 0. Find the current transient and the maximum current, if the circuit is initially relaxed. [16]

8. (a) Derive ABCD parameters from Z parameters.

(b) The Z parameters of a two port n/w are Z_{11} = 10Ω, Z_{22} = 20Ω, Z_{12} = Z_{21} = 5Ω.

i. Find the ABCD parameters.

ii. Find the equivalent T network. [8+8]

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Code No: Z0222 / R07 **Set No. 4**

I B.Tech - Regular Examinations, June 2009
ELECTRICAL CIRCUITS ANALYSIS
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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) Four resistances of equal value are available. Find
   i. The total equivalent conductance and total equivalent resistance ratio
   ii. The ratios of current drawn in each configuration
   iii. The ratios of power drawn by each configuration in each element. Considering that the supply voltage is same when the configuration are in series and parallel.
   (b) Find R_{AB} in the network as shown in figure 1b. [10+6]

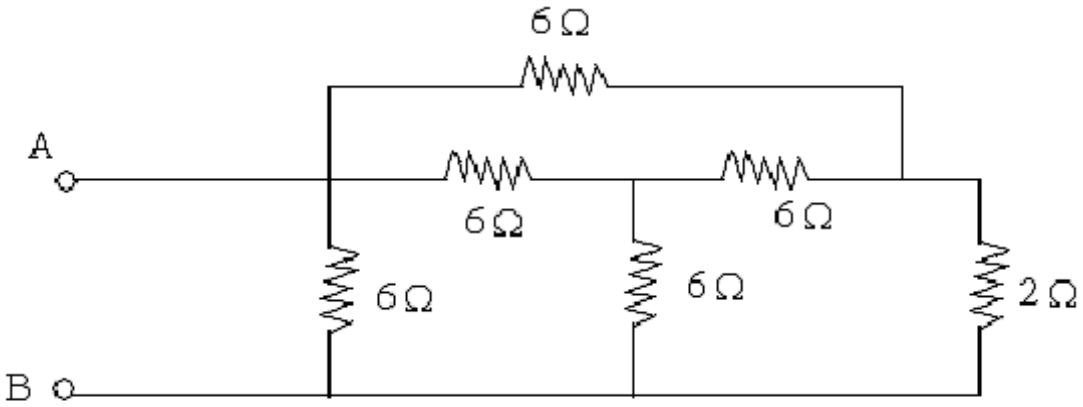

Figure 1b

2. Obtain the equation for the total inductance when two coils are connected in
   (a) Series aiding and opposing
   (b) Parallel aiding and opposing. [16]

3. (a) Derive the equation for resonant frequency and the bandwidth for series RLC circuit.
   (b) What is locus diagram? Draw and explain current the locus diagram for a series RL circuit, with fixed resistance, deriving necessary expressions. [8+8]

4. (a) Three identical impedances of (3+j4)Ω are connected in delta. Find an equivalent star network such that the line current is the same when connected to the same supply.
   (b) Three impedances of (7+j4)Ω, (3+j2)Ω and (9+j2)Ω are connected between neutral and the R, Y and B phases. The line voltage is 440V, Calculate.

i. The line currents and
ii. The current in the neutral wire.
iii. Find the power consumed in each phase and the total power drawn by the circuit. [4+12]

5. (a) Draw the oriented network graph from the incidence matrix given below.

	Branches					
Nodes	1	2	3	4	5	6
A	-1	0	0	+1	-1	0
B	+1	-1	0	0	0	-1
C	0	+1	-1	0	+1	0
D	0	0	+1	-1	0	+1

(b) Draw the graph of the network shown in figure 5b. Obtain a tree thereof. What is the number of mesh currents required for the network. [8+8]

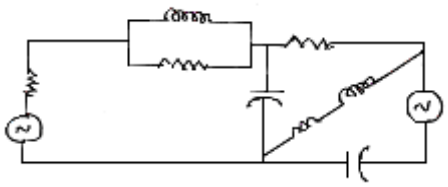

Figure 5b

6. (a) Solve for current in 5 ohms resistor by principle of super position theorem shown in figure 6a.

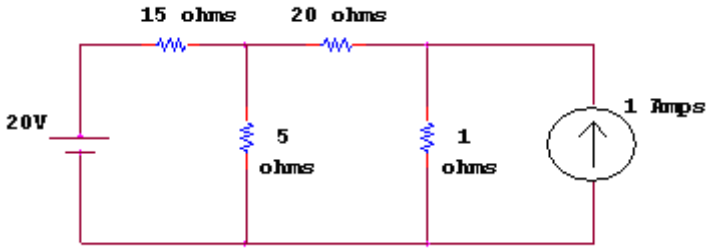

Figure 6a

(b) State and explain Millmann's theorem. [10+6]

7. The switch K is kept at position 1 for a long time and moved to position - 2 at t = 0. Find the currents in both the cases as shown in figure 7. [16]

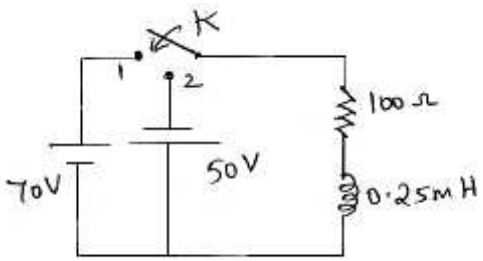

Figure 7

8. Find the Y - parameters for the bridged T-network as shown in figure 8. [16]

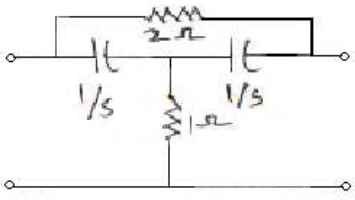

Figure 8

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