Code No: 07A1EC02 **Set No. 1**

I B.Tech Regular Examinations, May/Jun 2008
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) Distinguish between passive and active elements with suitable examples.
   (b) Find the voltage and current source equivalent representation of the following network across AB, as shown in figure 1b. [6+10]

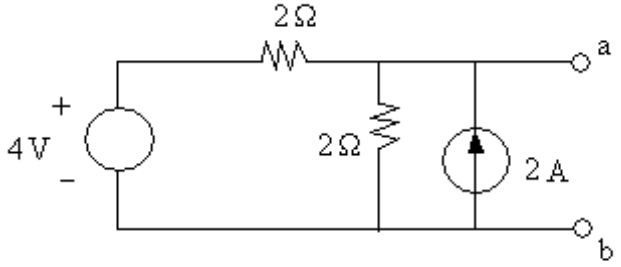

Figure 1b

2. (a) Derive an expression for the energy stored in an inductor and a capacitor.
   (b) Obtain an expression for Co-efficient of coupling. [10+6]

3. Obtain the rms value, average value, form factor and peak factor for a voltage of symmetrical square shape whose amplitude is 10V and time period is 40secs. [16]

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) Obtain the cut - set matrix for the network, as shown in figure 5a.

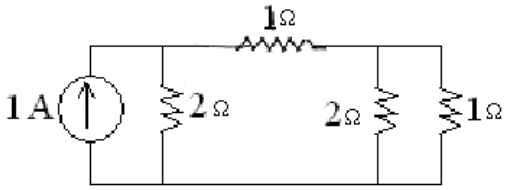

Figure 5a

(b) For the network shown in figure 5b. Determine the power dissipated in 9Ω resistor using Mesh analysis. [6+10]

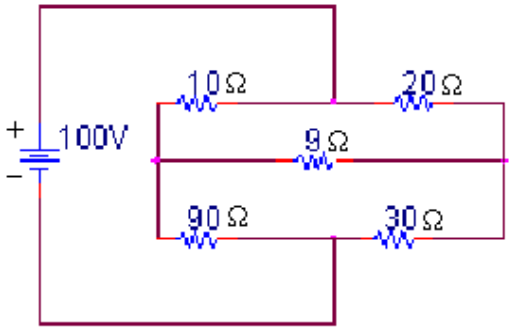

Figure 5b

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

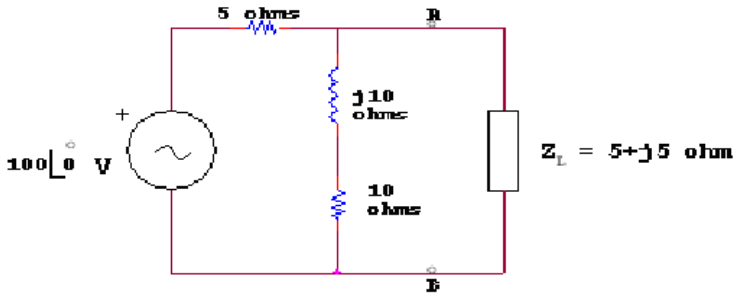

Figure 6a

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

7. Derive an expression for the current response in R-L series circuit with a sinusoidal source. [16]

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

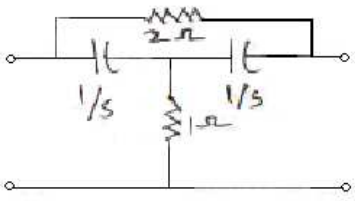

Figure 8

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Code No: 07A1EC02 **Set No. 2**

I B.Tech Regular Examinations, May/Jun 2008
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) 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 non-magnetic ring having a mean diameter of 30cm and a cross-sectional area of $4cm^2$ is uniformly wound with two coils A and B one over the other. A has 100 turns and B has 250 turns. Calculate the mutual inductance between the coils. Also, calculate the emf induced in B when a current of 6A in A is reversed in 0.02secs. Derive the formulae used. [16]

3. Define form factor and peak factor of an alternating quantity. Calculate the average and rms value, the form factor and peak factor of a periodic current having the following values for equal time intervals, changing suddenly from one value to next: 0,40,60,80,100,80,60,40,0,-40,-60,-80 A. [16]

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) For the network shown in figure 5a draw the oriented graph and frame the cut-set matrix.

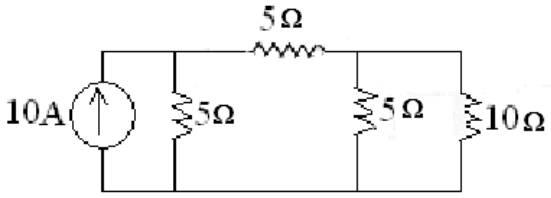

Figure 5a

(b) Compute node voltages for the circuit as shown in figure 5b. [6+10]

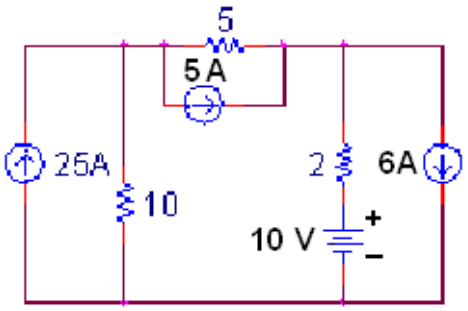

Figure 5b

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.

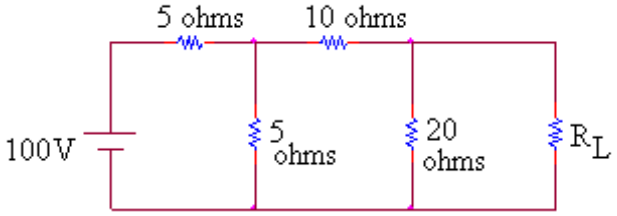

Figure 6a

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

7. Derive the expression for transient response of RLC series circuit with unit step input. [16]

8. Find the Z and transmission parameters for the resistance n/w shown in figure 8. [8+8]

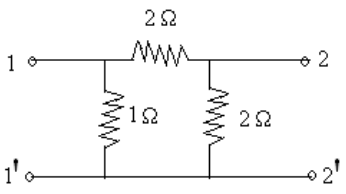

Figure 8

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Code No: 07A1EC02 **Set No. 3**

I B.Tech Regular Examinations, May/Jun 2008
ELECTRICAL CIRCUITS ANALYSIS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) Voltage of 60V d.c. is applied across two capacitors of 100 μF. Find the voltage sharing between them if they are connected in series. What is the energy stored in each of the capacitors.
   (b) Find the equivalent capacitance between the terminals A and B in the circuit shown in figure 1b. [8+8]

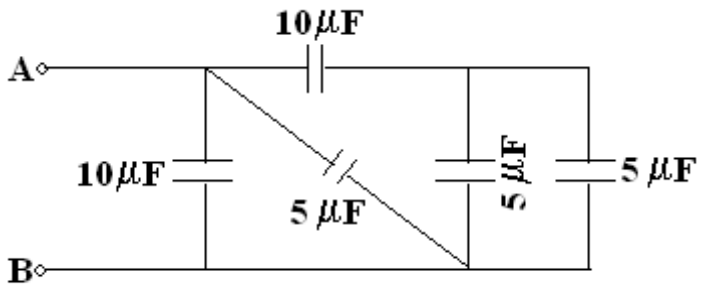

Figure 1b

2. The mean diameter of a steel ring is 40cm and flux density of 0.9 wb/m^2 is produced by 3500 ampere turns per metre. If the cross-section of the ring be 15 cm^2 and the number of turns 440, calculate
   (a) The exciting current,
   (b) The self inductance
   (c) The exciting current and the inductance when an air gap of 2cm is cut in the ring, the flux density being the same. Ignore leakage and fringing. [16]

3. (a) Derive an expression for the current, impedance, average power for a series RC circuit excited by a sinusoidally alternating voltage and also find the power factor of the circuit. Draw the phasor diagram.
   (b) A series R-L series circuit having a resistance of 4Ω and 3 ohms inductive reactance is fed by 100V, 50Hz, 1- ϕ supply. Find current, power drawn by the circuit and power factor. [8+8]

4. (a) Explain how power is measured in three phase delta connected load using two wattmeters.
   (b) A balanced mesh connected load of (8+j6)Ω per phase is connected to a 3-phase, 50Hz, 230V supply. Calculate

i. line current
ii. Power factor
iii. Reactive volt-ampere and
iv. Total volt-ampere. [8+8]

5. (a) For the network shown in figure 5a draw the oriented graph and frame the cut-set matrix.

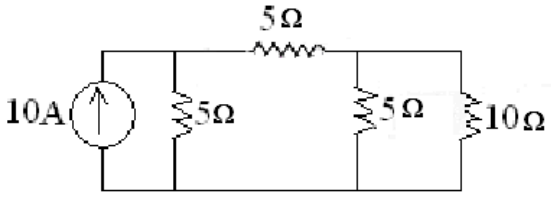

Figure 5a

(b) Compute node voltages for the circuit as shown in figure 5b. [6+10]

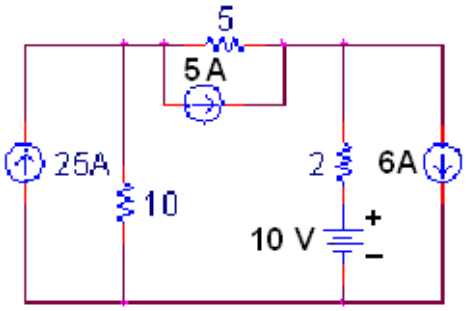

Figure 5b

6. (a) Find the current through the branch A-B of the network shown in the figure 6a using Thevenins theorem.

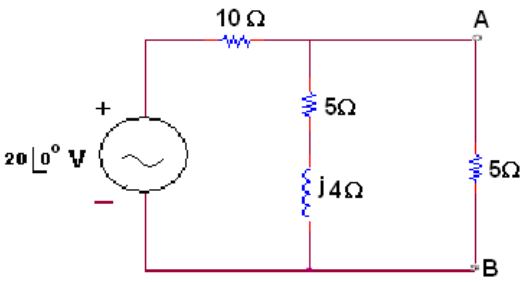

Figure 6a

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

7. Derive an expression for the current response in R-L series circuit with a sinusoidal source. [16]

8. Find the transformed Z - parameters of the n/w shown in figure 8: [16]

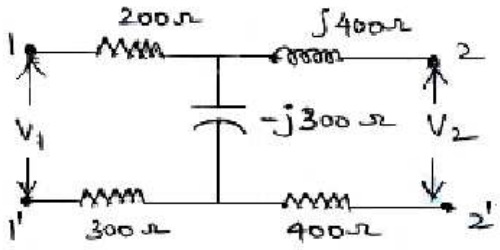

Figure 8

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Code No: 07A1EC02 **Set No. 4**

I B.Tech Regular Examinations, May/Jun 2008
ELECTRICAL CIRCUITS ANALYSIS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) Two resistances when they are in series has an equivalent resistance of 9 ohms and when connected in parallel has an equivalent resistance of 2 ohms. Find the resistances and the ratio of the voltage and current sharing between these elements if supply voltage is 50V.
   (b) Find the equivalent resistance between the terminals AB in the network as shown in figure 5b, if each has a resistance of R ohms and hence find the total current, current through each of the element if the total voltage is 45V. [8+8]

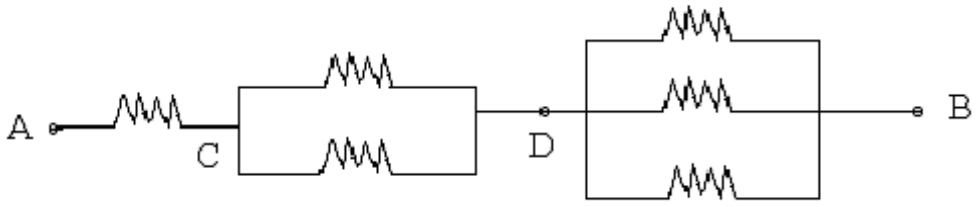

Figure 5b

2. The number of turns in a coil is 250. When a current of 2A flows in the coil, the flux in the coil is 0.3mwb. When the current is reduced to zero in 2ms, the voltage induced in a coil lying in the vicinity of the coil is 63.75V. If the co-efficient of coupling between the coils is 0.75, find.
   (a) The self inductance of two coils.
   (b) Mutual inductance.
   (c) Number of turns in the second coil.
   Derive the formulae used. [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) Write the tie - set schedule for the network shown in figure 5a

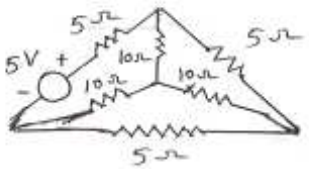

Figure 5a

(b) Using mesh analysis, determine the voltage V which gives a voltage of 50V across 10 Ω resistor shown in figure 5b. [6+10]

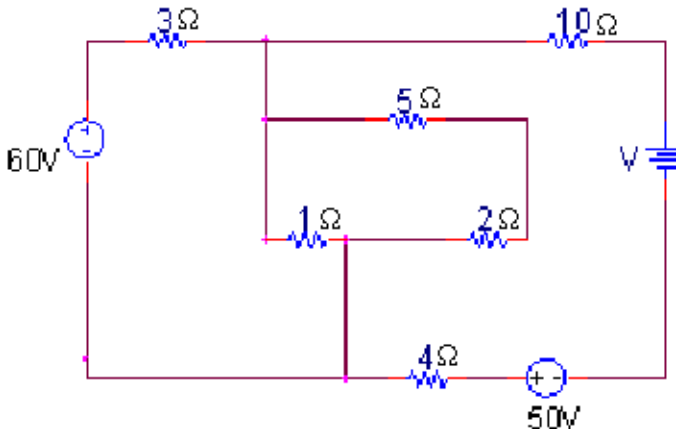

Figure 5b

6. (a) Obtain Norton's equivalent across terminals A and B for network shown in figure 6a.

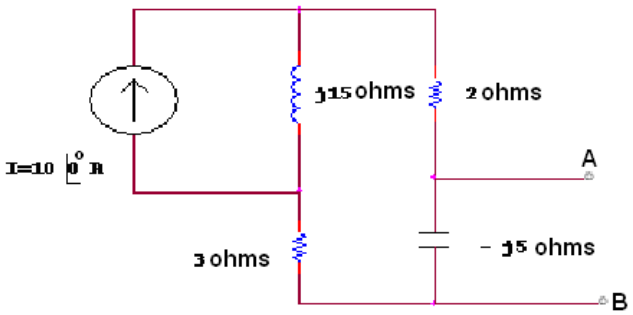

Figure 6a

(b) State and explain Maximum power transfer theorem. [10+6]

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]

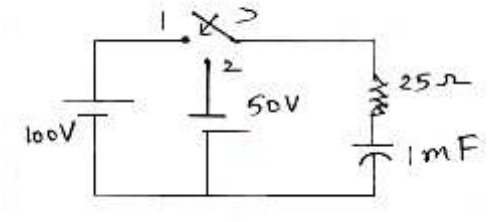

Figure 7

8. (a) Find the Y parameters of the pie shown in figure 8a:

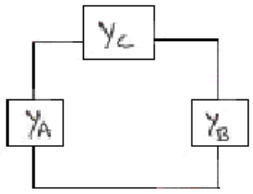

Figure 8a

(b) Find the Z parameters of the T- network shown in figure 8b. Verify the network is reciprocal or not. [4+12]

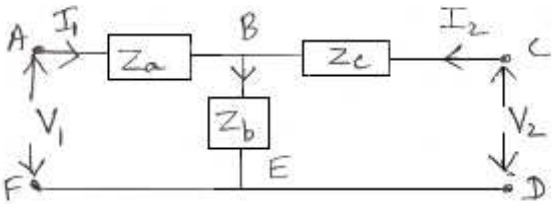

Figure 8b

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