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

I B.Tech Supplimentary Examinations, Aug/Sep 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

⋆ ⋆ ⋆ ⋆ ⋆

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 1b, 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]

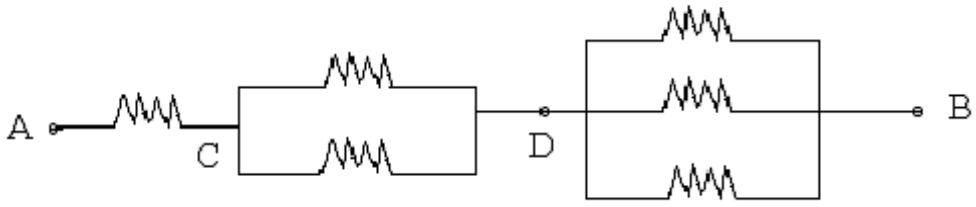

Figure 1b

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. (a) Compare series and parallel resonant circuits.
   (b) A series RLC circuit consists of resistor of 100 Ω, an inductor of 0.318H and a capacitor of unknown value. When this circuit is energised by a 230V, 50Hz ac supply, the current was found to be 23A. Find the value of capacitor and the total power consumed. [4+12]

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. In the network as shown in figure 5, the numerical values of resistances are given with numbers. Write the oriented graph of the network. Select a tree with branches 1, 2, 3 as the tree branches, write tie-set and cut-set schedule.. The numbers in the brackets are related to element numbering. [16]

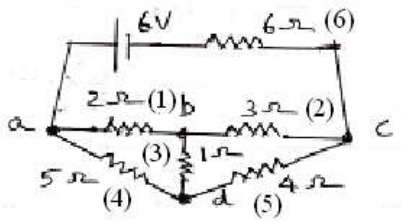

Figure 5

6. (a) State and explain reciprocity theorem.

   (b) Verify reciprocity theorem for the voltage V and Current I in the network shown in figure 6b. [6+10]

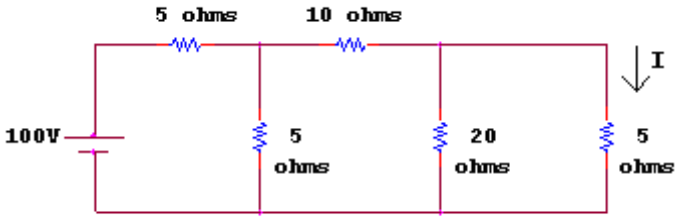

Figure 6b

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

8. Two identical sections of the network shown in figure 8 are connected in parallel. Obtain the Y parameters of the resulting n/w and verify the result by direct calculation. [6+10]

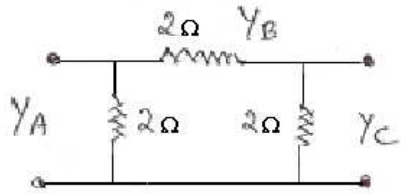

Figure 8

⋆ ⋆ ⋆ ⋆ ⋆

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

I B.Tech Supplimentary Examinations, Aug/Sep 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

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Find the power drawn by each element in the network as shown in figure 1a.

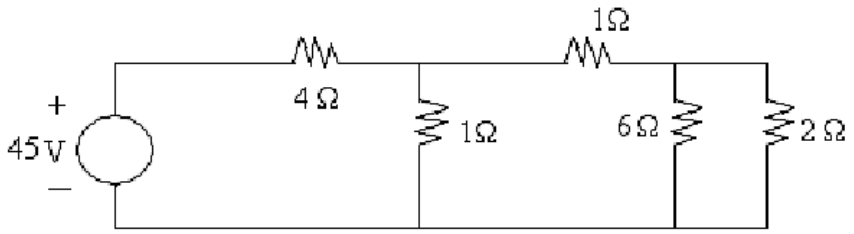

Figure 1a

(b) Find the current through each element in the network as shown in figure 1b by network reduction technique. [8+8]

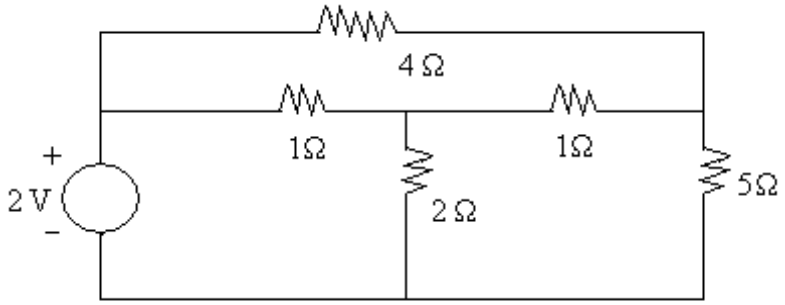

Figure 1b

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. Calculate the form factor and peak factor of a triangular wave in which the voltage rises uniformly from 0 to V volts in time T seconds and completes the cycle by falling instantly back to zero. [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) State properties of trees.

(b) State the properties of complete incidence matrix. [6+10]

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

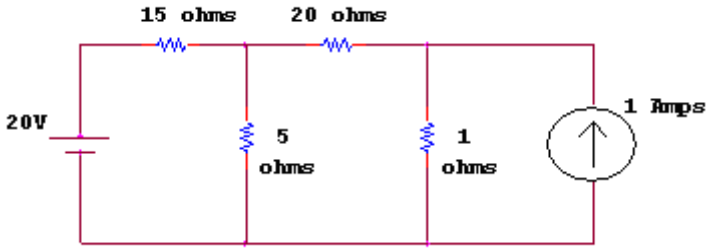

Figure 6a

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

7. 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]

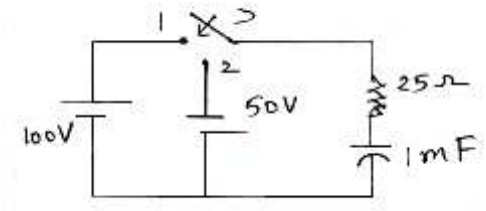

Figure 7

8. (a) Find the h - parameter of the n/w shown in figure 8a:

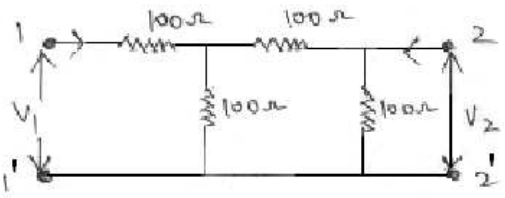

Figure 8a

(b) Find the transformed ABCD parameters of the n/w as shown in figure 8b. [8+8]

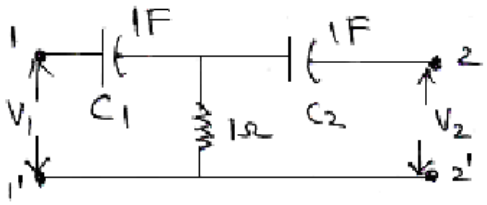

Figure 8b

⋆ ⋆ ⋆ ⋆ ⋆

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

I B.Tech Supplimentary Examinations, Aug/Sep 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

⋆ ⋆ ⋆ ⋆ ⋆

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) 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. Calculate the form factor and peak factor of a triangular wave in which the voltage rises uniformly from 0 to V volts in time T seconds and completes the cycle by falling instantly back to zero. [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) State properties of trees.
   (b) State the properties of complete incidence matrix. [6+10]

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

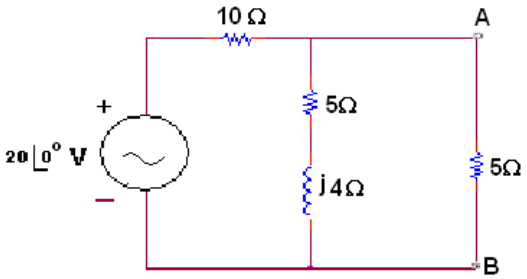

Figure 6a

(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. Compute the transformed Z and Y parameters for the circuit shown in figure 8. [8+8]

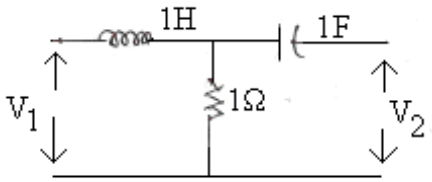

Figure 8

⋆ ⋆ ⋆ ⋆ ⋆

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

I B.Tech Supplimentary Examinations, Aug/Sep 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

⋆ ⋆ ⋆ ⋆ ⋆

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) 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. (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 balanced 3-phase system supplied from 400V, 50Hz supply has R, L and C elements connected parallel in each phase. The values of R, L and C are 10Ω, 1H and 100μF respectively. Calculate the line current, the power and power factor. [16]

5. (a) Write the tie - set schedule for the network shown in figure 5a.

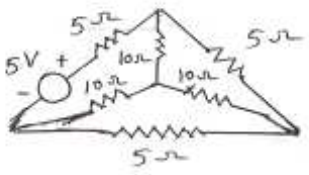

Figure 5a

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

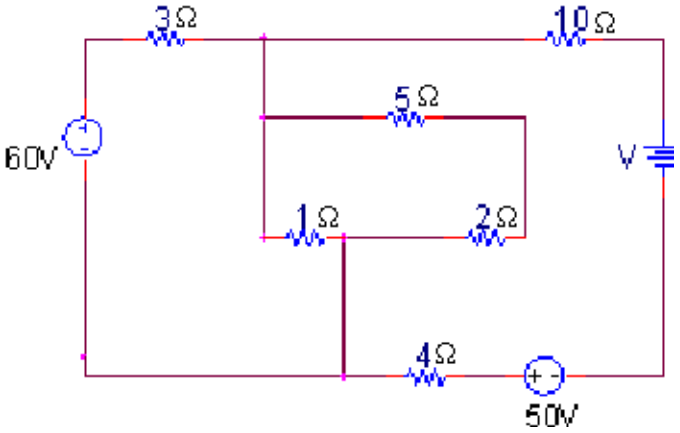

Figure 5b

6. (a) A load impedance of (20 - jX_c) ohms is supplied from a source of emf 10V rms and internal impedance (20 + j20) ohms. Find the value of X_c to give maximum power dissipation in the load and calculate the value of this power.

   (b) For the circuit of the figure 6b, find the value of current through PQ using Superposition theorem. [6+10]

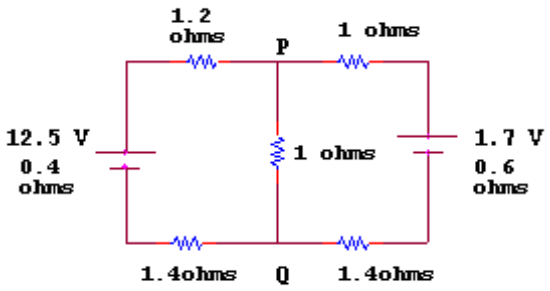

Figure 6b

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

8. For the two port n/w shown in the figure 8, the currents I_1 and I_2 entering at port 1 and 2 respectively are given by the equations.
   $I_1 = 0.5\ V_1$ - $0.2\ V_2$
   I_2 = - $0.2V_1 + V_2$

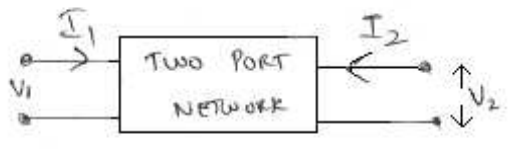

Figure 8

Where V_1 and V_2 are the port voltages at port 1 and 2 respectively. Find the Y, Z, ABCD parameters for the n/w. Also find its equivalent π network. [16]

⋆ ⋆ ⋆ ⋆ ⋆