EE34

NEW SCHEME

USN | | | | | | | | | | |

Third Semester B.E. Degree Examination, January/February 2005

Electrical & Electronics Engineering

# Network Analysis

Time: 3 hrs.] [Max.Marks : 100

**Note:** *Answer any FIVE full questions.*

1. (a) Obtain expressions for a set of equivalent
   i) Y connected impedances to replace a set of Δ connected impedances
   ii) Δ connected admittances to replace a set of Y connected admittances. (10 Marks)

   (b) For the network shown in Fig.1, determine the voltage V using source shift and / or source transformation techniques only. Then verify by node equations. (10 Marks)

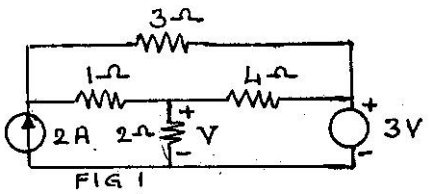

FIG 1

2. (a) Under what conditions do you consider topology for network analysis? For the graph shown in Fig.2, for a co-tree (4, 5, 7, 8), write tie set and cut set matrices. (10 Marks)

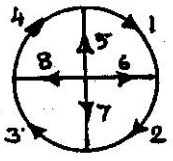

FIG 2.

   (b) For the network shown in Fig. 3, draw its dual. Write in integro differential form i) mesh equations for the given network ii) node equations for the dual. $V(t) = 10sin40t$. (10 Marks)

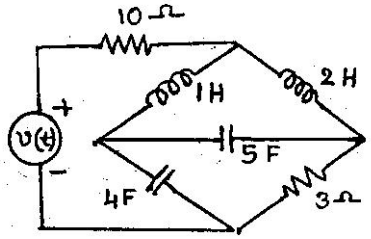

FIG 3

3. (a) Use mesh current method to determine the current in the capacitor of 6Ω of the bridge network shown in Fig.4 (10 Marks)

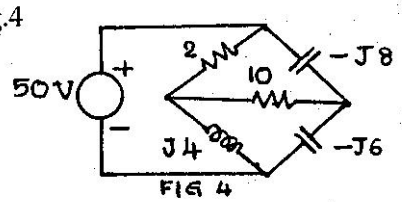

FIG 4

Contd.... 2

(b) Use node equations to determine what value of 'E' will cause $V_x$ to be zero, for the network shown in fig. 5. (10 Marks)

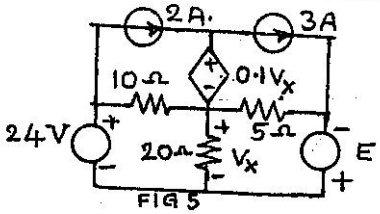

FIG 5

4. (a) State and explain i) Reciprocity theorem ii) Millmann's theorem. (10 Marks)

(b) When two networks A and B are connected as shown in fig. 6, $I_{ab} = 1A$ and $V_{aa'} = \sqrt{2} \angle -45^0$ $V$. When the same networks are connected as in Fig. 7, $I_{ab'} = 3A$ and $V_{aa'} = \sqrt{2} \angle 45^0$ $V$. Find the Thevinin's equivalents of each of these networks. (10 Marks)

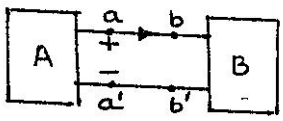

FIG 6

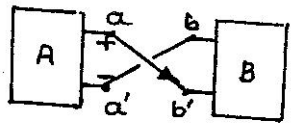

FIG 7.

5. (a) Define Q of a series resonant circuit. Obtain half power frequencies in terms of Q and show that the resonant frequency is the geometric mean of half power frequencies. (10 Marks)

(b) In a parallel resonant circuit R, L and C are all in parallel. Half power frequencies are 103 and 118 r/s respectively. The magnitude of impedance at 105 r/s is 10Ω. Find R, L and C. (10 Marks)

6. (a) $R = 1\Omega$, $L = 1H$ and $C = \frac{1}{2}F$ are in series with a switch across C 2V is applied to the circuit. At $t = 0-$ the switch is in closed position. At $t = 0$ the switch is opened. Find at t = 0+, the voltage across the switch, its first and second derivatives. (10 Marks)

(b) State and prove (i) initial value theorem and (ii) final value theorem as applied to L transform. What are the limitations of each theorem? (10 Marks)

7. (a) The current function i(t) shown in fig 8 is impressed on a capacitor C. What should be the strength A of the impulse so that the voltage across the C becomes zero for $t > 5secs$ (10 Marks)

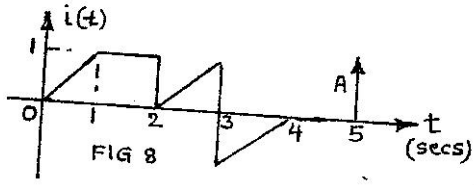

FIG 8

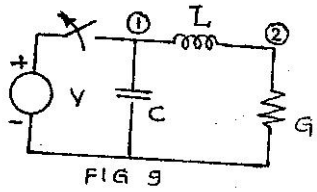

FIG 9

(b) In the circuit shown in fig. 9, the switch is opened at $t = 0$, with $V = 1V$, $C = 1F$, $L = \frac{1}{2}$ $H$, $G = 1$ ℧ find the node voltages $V_1(t)$ and $V_2(t)$ by L transform method. (10 Marks)

8. (a) Define h and T parameters and derive expressions for [h] in terms of [T]. (10 Marks)

(b) Find [z] and [y] for the two port network shown in fig.10. (10 Marks)

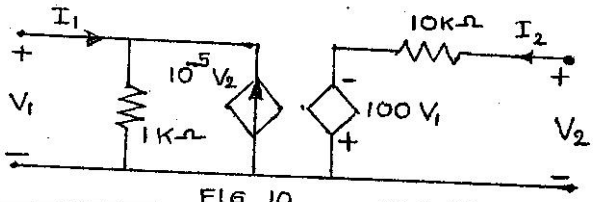

FIG 10

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