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06ES34

Third Semester B.E. Degree Examination, January 2013
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Find the equivalent voltage source across AB in network shown in Fig.Q.1(a) using source transformation. **(07 Marks)**

b. Compute the power delivered to the 4Ω resistor in Fig.Q.1(b) using loop current analysis. **(07 Marks)**

c. Find V_{CD} in Fig.Q.1(c) using nodal technique. **(06 Marks)**

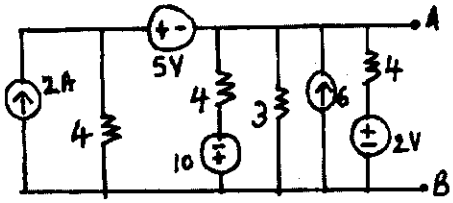

Fig.Q.1(a)

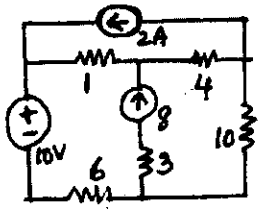

Fig.Q.1(b)

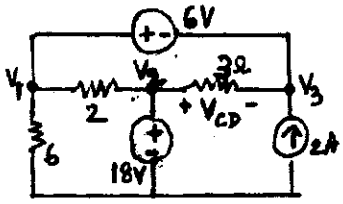

Fig.Q.1(c)

2 a. For the network shown in Fig.Q.2(a), draw a graph, an oriented graph, a tree, a connected graph and an unconnected graph. **(04 Marks)**

b. Obtain the dual of the circuit shown in Fig.Q.2(b) verify the results by formulating equilibrium equations. **(05 Marks)**

c. Formulate the tie-set matrix for the network shown in Fig.Q.2(c). Use 1, 2, 3 as tree branches and hence list the resulting f-loops. **(06 Marks)**

d. Develop the fundamental cut-set matrix for the network shown in Fig.Q.2(d). Use 1, 3, 4 as tree branches. **(05 Marks)**

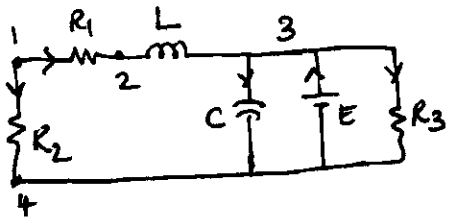

Fig.Q.2(a)

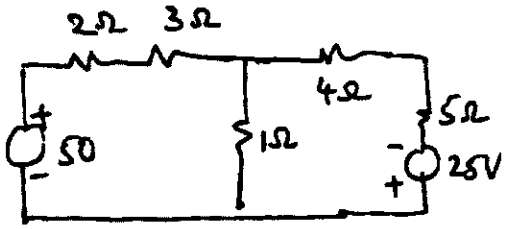

Fig.Q.2(b)

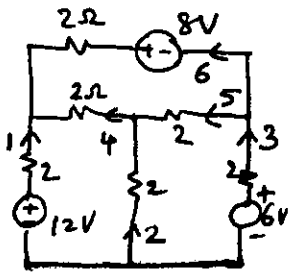

Fig.Q.2(c)

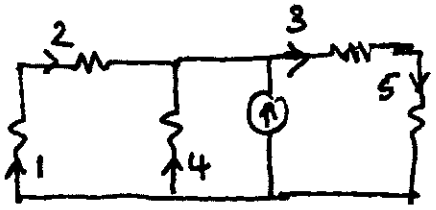

Fig.Q.2(d)

3 a. Using superposition theorem find the voltage 'V' across 3Ω in Fig.Q.3(a). **(09 Marks)**

b. State and explain reciprocity theorem. **(05 Marks)**

c. State and prove Millman's theorem for current sources in series. **(06 Marks)**

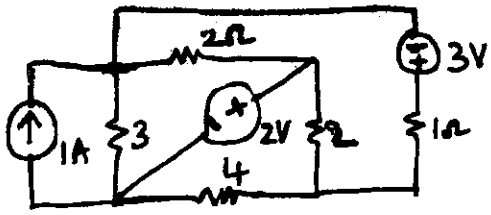

Fig.Q.3(a)

4 a. Applying Theremin's theorem find current in 2_L in Fig.Q.4(a). **(06 Marks)**

b. Find I_L in Fig.Q.4(b) using Norton's theorem. **(07 Marks)**

c. What is the value of R_L for maximum power transfer in Fig.Q.4(c)? Also find the maximum power. **(07 Marks)**

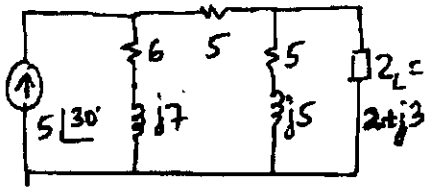

Fig.Q.4(a)

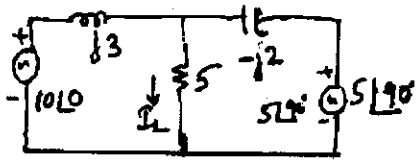

Fig.Q.4(b)

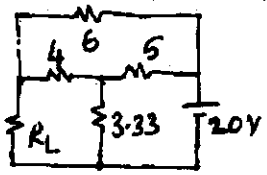

Fig.Q.4(c)

PART – B

5 a. A series RLC circuit has a bandwidth of $600H_z$ and quality factor of 10. If the value of L is 0.05H, find the value of C. **(04 Marks)**

b. For a two branch RL-RC parallel resonant circuit, determine the expression for resonant frequency. In this circuit for L = 0.4H and C = 40μF, obtain resonant frequency for the following values of R_L and R_C i) $R_L = R_C = 80\Omega$; ii) $R_L = 100$ and $R_C = 80$. **(08 Marks)**

c. Find band width of the antiresonant circuit shown in Fig.Q.5(c), with following conditions i) Q of the inductive branch = 100; ii) Frequency of unity power factor = 1MHz; iii) L = 100 μH and iv) Internal resistance of generator $R_g = 10\Omega$. **(08 Marks)**

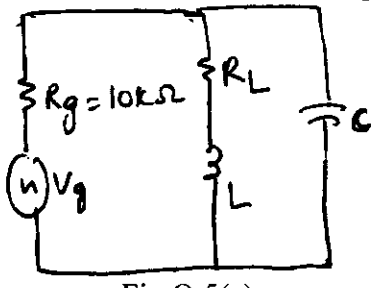

Fig.Q.5(c)

6 a. In the network shown in Fig.Q.6(a), the switch K is changed from position 1 to position 2 at t = 0, steady – state being established at position 1. Find : i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at t = 0+. **(08 Marks)**

b. The switch K is closed at t = 0 in Fig.Q.6(b). At t = 0- all capacitor voltages and inductor currents are zero. Three node to datum voltages are identified as V_1, V_2 and V_3. Find V_1, V_2, V_3, $\frac{dv_1}{dt}$, $\frac{dv_2}{dt}$, $\frac{dv_3}{dt}$ and $\frac{d^2v_3}{dt^2}$ at $t = 0+$. **(12 Marks)**

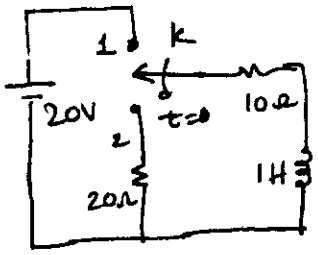

Fig.Q.6(a)

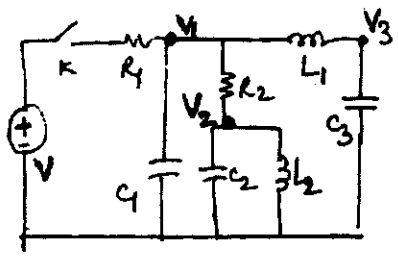

Fig.Q.6(b)

7 a. Find the Laplace transform of x(t) shown in Fig.Q.7(a). **(06 Marks)**

b. In Fig.Q.7(b), switch K is opened at t = 0, steady-state reached at t = 0. Using Laplace transform, find $I_L(s)$ and hence $i_L(t)$. Also find the value of $i_L(t)$ at t = 0.5 seconds. **(10 Marks)**

c. Find the initial and final values of f(t) when $F(s) = \frac{9s+10}{S(s+2)}$. **(04 Marks)**

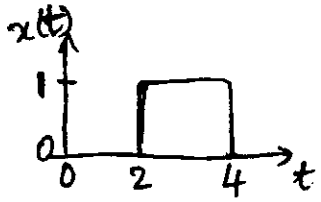

Fig.Q.7(a)

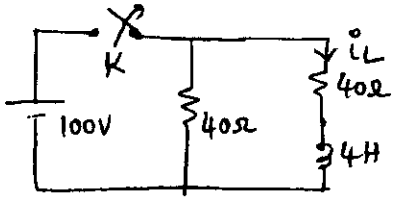

Fig.Q.7(b)

8 a. Compute V_1 and V_2 in Fig.Q.8(a) with admittance matrix $[y] = \begin{bmatrix} 0.3 & -0.1 \\ -0.1 & 0.15 \end{bmatrix}$. **(08 Marks)**

b. Obtain the open-circuit impedance parameters for the network shown in Fig.Q.8(b). **(08 Marks)**

c. Obtain T-parameters in terms of z-parameters. **(04 Marks)**

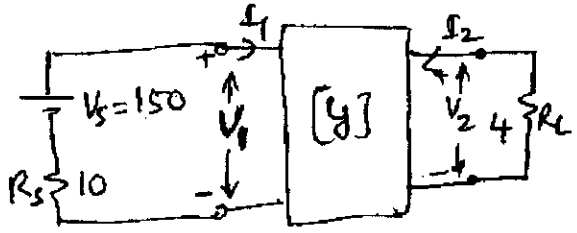

Fig.Q.8(a)

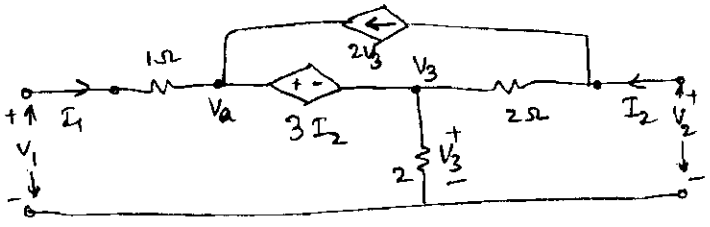

Fig.Q.8(b)

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