USN

06ES34

Third Semester B.E. Degree Examination, December 2011
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. For the network shown in Fig. Q1(a), determine the voltage 'V' using source shift and /or source transformation techniques only. **(06 Marks)**

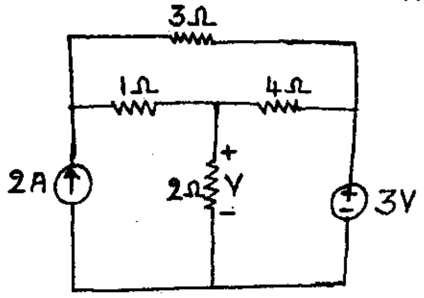

Fig. Q1(a)

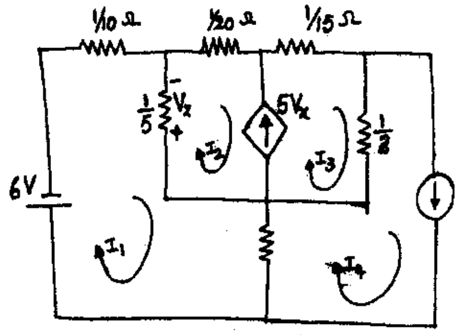

Fig. Q1(b)

b. Find I_1, I_2, I_3 and I_4 using mesh analysis in the network shown in Fig. Q1(b). **(07 Marks)**

c. Find the voltages at nodes 1, 2, 3 for the network shown in Fig. 1(c), using nodal analysis. **(07 Marks)**

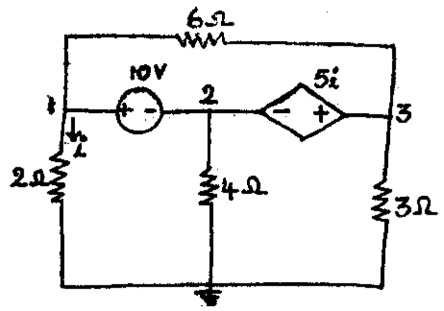

Fig.Q1(c)

2 a. Define with examples :
i) Oriented graph ii) Tree iii) Fundamental cut – set iv) Fundamental tie –set. **(06 Marks)**

b. For the network shown in Fig. Q2(b), write the graph of the network and obtain the tie – set schedule considering J_1, J_2, J_5 as tree branches. Calculate all the branch currents. **(07 Marks)**

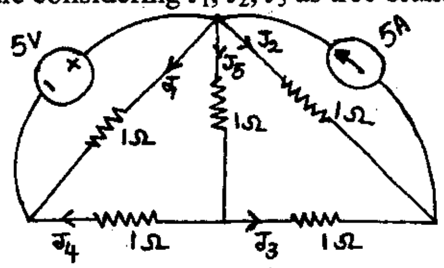

Fig. Q2(b)

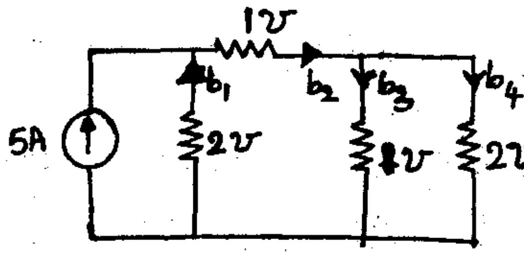

Fig. Q2(c)

c. For the network given in Fig. Q2(c), write the f – cutest matrix considering branches b_1 and b_3 as tree branches and hence, obtain the equilibrium equation on node basis and calculate the node voltages. **(07 Marks)**

3 a. State and prove the reciprocity theorem. **(06 Marks)**

b. Using the superposition theorem, obtain the response I for the network shown in Fig. 3(b). **(07 Marks)**

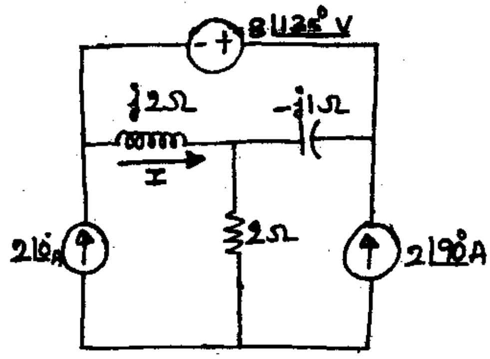

Fig. Q3(b)

c. Find the Thevenin's equivalent circuit across A, B using Millman's theorem and find the current through the load $(5 + j5)\ \Omega$, shown in Fig. 3(c). **(07 Marks)**

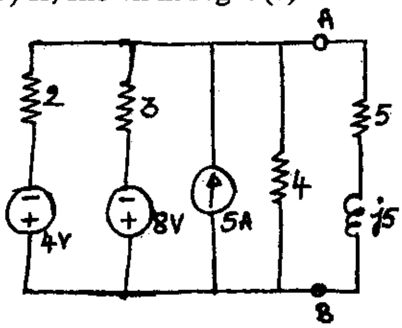

Fig. Q3(c)

4 a. State and prove Thevenin's theorem. **(06 Marks)**

b. Find the Thevenin's equivalent of the network shown in Fig. Q4(b). **(07 Marks)**

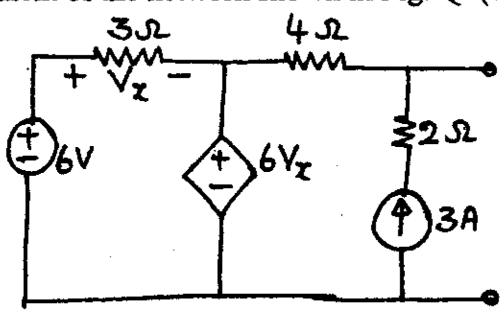

Fig. Q4(b)

c. What will be the value of R_L to get maximum power delivered to it? What is the value of this power? Refer the network shown in Fig. Q4(c). **(07 Marks)**

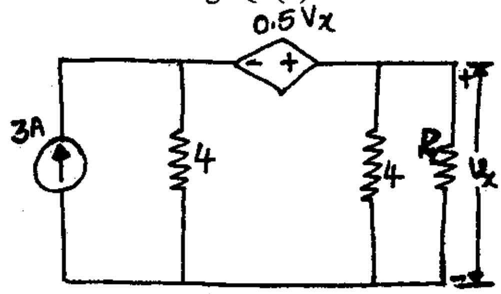

Fig. Q4(c)

PART – B

5 a. A series resonant circuit includes 1μF capacitor and a resistance of 16Ω. If the BW is 500 rad/sec, determine : i) W_r ii) Q iii) L. **(06 Marks)**

b. Derive the expression for parallel resonance circuit, containing resistance in both the branches. Also show that the circuit will resonate at all frequencies if $R_L = R_C = \sqrt{\frac{L}{C}}$. **(10 Marks)**

c. Give the comparison between the series resonance and parallel resonance. **(04 Marks)**

6 a. In the network shown in Fig. Q6(a), the switch is moved from position '1' to position 2 at t = 0, the steady – state having reached before switching. Calculate i, $\frac{di}{dt^2}$, and $\frac{d^2i}{dt^2}$ all at $t = 0^+$. **(10 Marks)**

b. In the network shown in Fig. 6(b), a steady state is reached with the switch K open. At t = 0, the switch K is closed. Obtain the initial values of

i) i ii) i_2 iii) v_c iv) $\frac{di_1}{dt}$ v) $\frac{di_2}{dt}$ and $\frac{di_1}{dt}$ at t = ∞. **(10 Marks)**

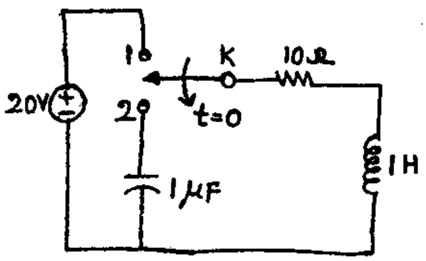

Fig. Q6(a)

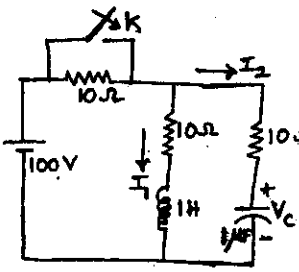

Fig. Q6(b)

7 a. In the circuit of Fig. Q7(a), the source voltage is v(t) = 50 sin 250 t. Using Laplace transforms, determine the current, when switch K is closed at t = 0. **(10 Marks)**

b. In the network shown in Fig. 7(b), the switch K is closed and the steady state is reached. At t = 0, the switch is opened. Find the expression for the current in the inductor using Laplace transform. **(10 Marks)**

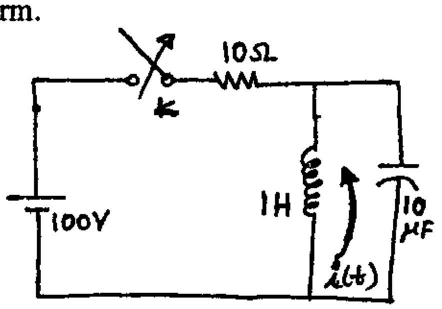

Fig. Q7(a)

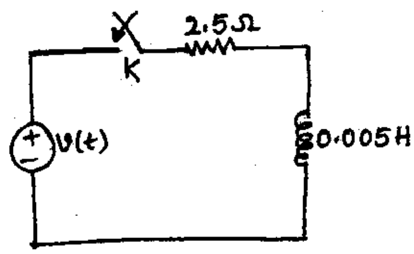

Fig. Q7(b)

8 a. Derive Y – parameters and transmission parameters in terms of Z – parameters. **(10 Marks)**

b. Find the transmission parameters for the given R – C network shown in Fig. 8(b). **(10 Marks)**

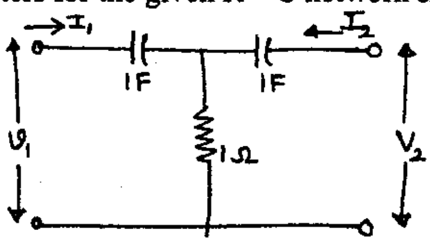

Fig. Q8(b)

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