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06ES34

Third Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Network Analysis

Time: 3 hrs. Max. Marks:100

Note : *Answer any FIVE full questions.*

1 a. Calculate the current through 2 ohm resistor in the network shown in figure Q1(a) by source transformation method. (06 Marks)

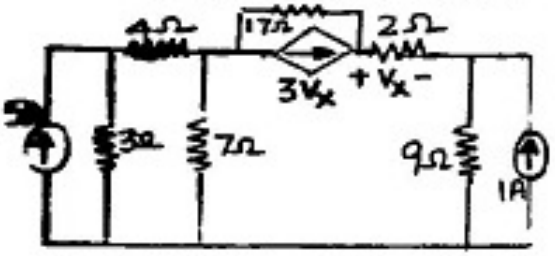

Fig. Q1 (a)

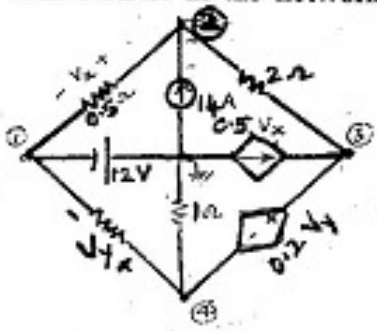

Fig. Q1 (b)

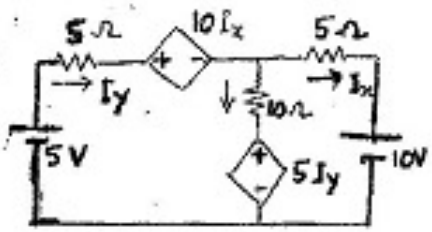

Fig. Q1 (c)

b. Find the voltages at nodes 1, 2, 3, 4 for the network shown in figure Q1 (b) using nodal analysis. (07 Marks)

c. Using mesh analysis find the current through 10 ohm resistor in the network shown in figure Q1 (c). (07 Marks)

2 a. Find the maximum possible number of trees for the network shown in figure Q2 (a).

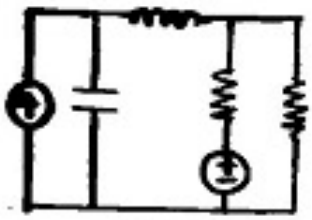

Fig. Q2 (a)

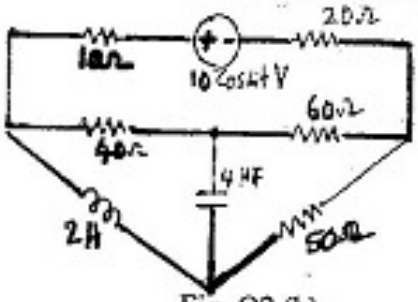

Fig. Q2 (b)

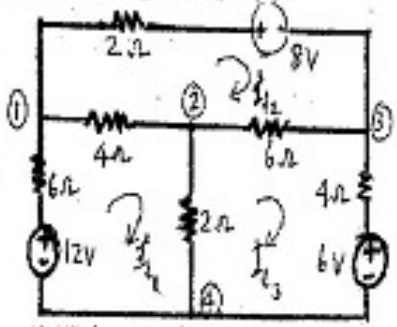

Fig Q 2(c)

b. Draw the dual of the network shown in figure Q2 (b). (06 Marks)

c. For the network shown in figure Q2 (c), calculate I_{l_1}, I_{l_2}, I_{l_3} using graph theory and network equilibrium equation based on KVL. (10 Marks)

3 a. Using superposition principle, find the current in 6 ohm resistor in the network shown in figure Q3 (a). (06 Marks)

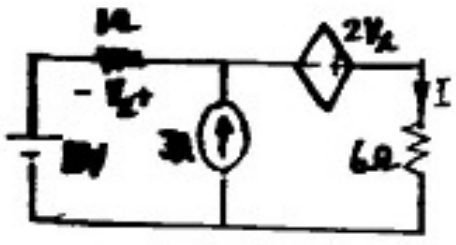

Fig. Q3 (a)

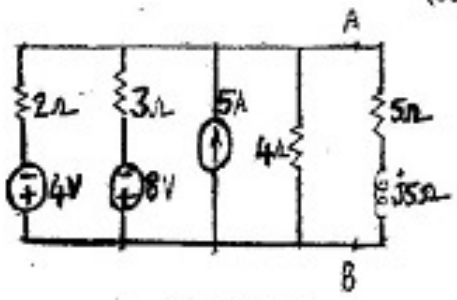

Fig. Q3 (c)

b. State and explain reciprocity theorem. (07 Marks)

c. Find Thevenin's equivalent circuit across AB using Millman's theorem and find the current through the load (5+J5)Ω shown in figure Q3 (c). (07 Marks)

4 a. Calculate Thevenin's equivalent circuit across AB for the network shown in figure Q4 (a). (07 Marks)

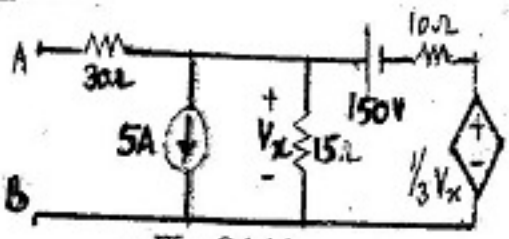

Fig. Q4 (a)

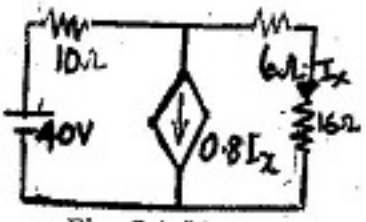

Fig. Q4 (b)

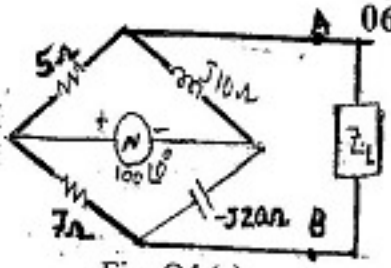

Fig. Q4 (c)

b. State Norton's theorem and find the current through 16 ohm resistor using Norton's theorem in figure Q4 (b). **(07 Marks)**

c. Find the value of Z_L for which maximum power is transferred to the load Z_L from the network in figure Q4 (c). **(06 Marks)**

5 a. A series RLC circuit has R = 50 Ω, L = 0.01 H and C = 0.04 μF and is connected to ac source of 100 V. Find the i) resonant frequency ii) Circuit impedance at resonant frequency iii) Maximum value of voltage across capacitance and the frequency at which it occurs iv) Voltage across inductance at resonance. **(06 Marks)**

b. For the network shown in figure Q5 (b) determine the following: i) f_o ii) Q iii) half power frequencies iv) Band width. **(07 Marks)**

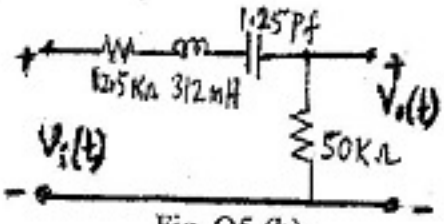

Fig. Q5 (b)

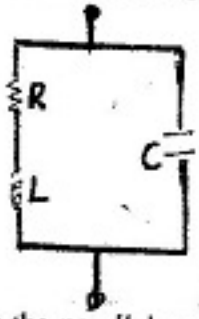

Fig. Q5 (c)

c. Derive the expression for resonant frequency for the parallel resonant circuit shown in figure Q5 (c). If R =25 Ω, L =0.5 H and C = 5μF, find W_o, Q and bandwidth for the circuit. **(07 Marks)**

6 a. For the network shown in figure Q6 (a), find i_1, i_2, $\frac{di_1}{dt}$, $\frac{di_2}{dt}$, $\frac{d^2i_2}{dt^2}$ at $t = 0^+$. The circuit was in steady state before the closure of the switch. Assume all initial conditions zero. **(10 Marks)**

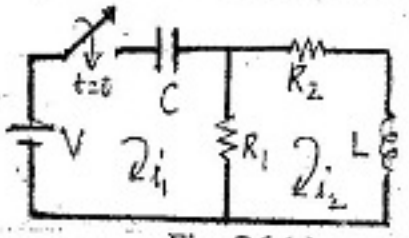

Fig. Q6 (a)

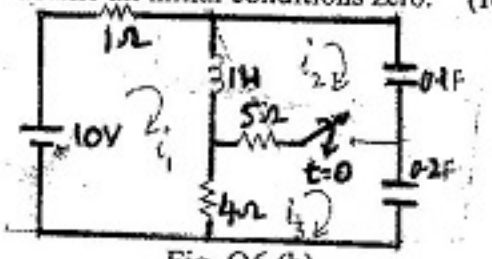

Fig. Q6 (b)

b. The network shown in figure Q6 (b) was in steady state before t = 0. The switch is closed at t = 0. Determine the three mesh currents i_1, i_2, i_3 at $t = 0^+$. **(10 Marks)**

7 a. The network shown in figure Q7 (a) was in steady state before t = 0. The switch is opened at t = 0. Find i(t) for t > 0 using Laplace transform. **(10 Marks)**

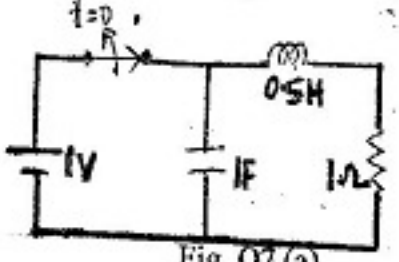

Fig. Q7 (a)

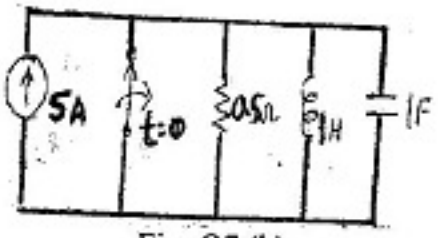

Fig. Q7 (b)

Fig. Q8 (a)

b. For the network shown in figure Q7 (b) find the voltage across 0.5 Ω resistor, when the switch is opened at t = 0. Assume all initial conditions zero. **(10 Marks)**

8 a. Determine the h-parameters for the network shown in figure Q8 (a). **(10 Marks)**

b. Z – parameters of a network are obtained from an experiment. Explain how Y-parameters and transmission parameters can be computed from the experimental data. **(10 Marks)**