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06ES34

Third Semester B.E. Degree Examination, June-July 2009
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full question, selecting atleast two question from each part.***

Part A

1 a. Three impedances are connected in star. Obtain expressions for their delta connected equivalent. Also find the star equivalent of the following circuit shown in figure Q1 (b). **(09 Marks)**

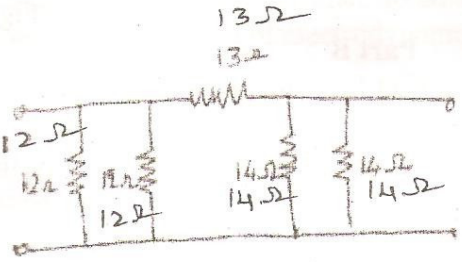

Fig. Q1 (a)

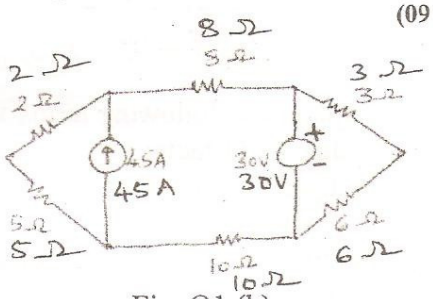

Fig. Q1 (b)

b. Reduce the network shown in figure Q1 (c) to a single voltage source in series with a resistance using source shift and source transformation. **(06 Marks)**

c. Solve for $i_0(t)$ using mesh analysis in the network shown in figure Q1 (c). **(05 Marks)**

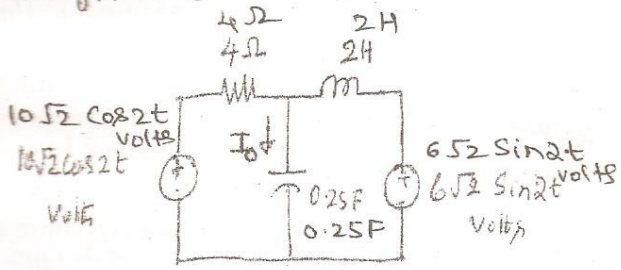

Fig. Q1 (c)

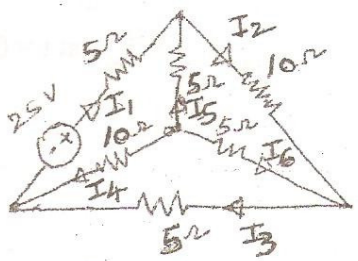

Fig. Q2 (c)

2 a. Define the following terms as applied to network topology with suitable examples,
i) tree and co-tree. ii) Planar and non-planar graphs. **(04 Marks)**

b. The reduced incidence matrix of a graph is given below. Draw the oriented graph corresponding to the same. **(03 Marks)**

$$\begin{bmatrix} -1 & 1 & 0 & 0 & 0 & -1 \\ 0 & -1 & -1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & -1 & 1 \end{bmatrix}$$

c. For the network shown in figure Q2 (c), write the tie-set schedule selecting center star as tree and find all branch currents by solving equilibrium equation. **(09 Marks)**

d. Define the term duality as applied to networks. Give suitable example. **(04 Marks)**

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

b. Find the current through load impedance $Z_L = 15\angle -30\Omega$ using Millmans theorem in the circuit shown in figure Q3 (b). **(06 Marks)**

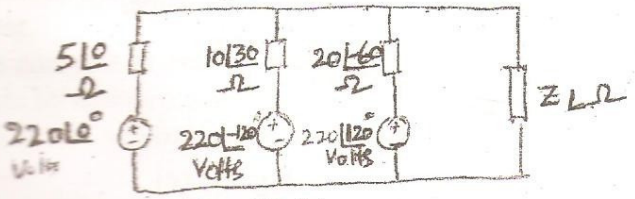

Fig. Q3 (b)

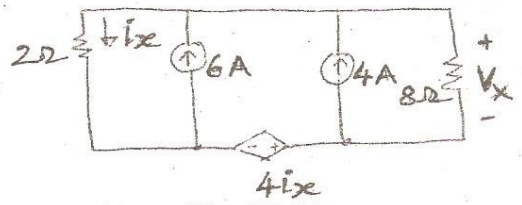

Fig. Q3 (c)

c. Use Superposition theorem to find Vx in the circuit shown in figure Q3 (c). **(08 Marks)**

4 a. State and prove Thevenins theorem. Show that Thevenins equivalent circuit is the dual of Nortons equivalent circuit. **(10 Marks)**

b. Find the value of R_L for which power transferred to the load is maximum and maximum power. Also establish the condition for maximum power transfer. **(10 Marks)**

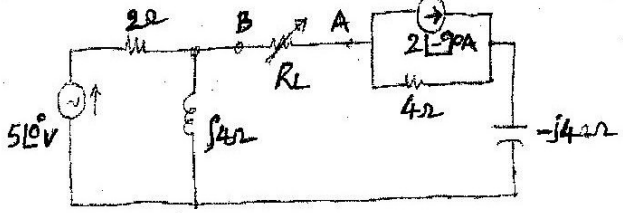

Fig. Q4 (b)

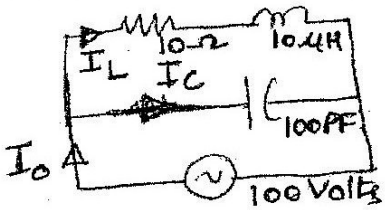

Fig. Q5 (c)

Part B

5 a. Explain the following terms with respect to series resonant circuit i) Selectivity and Band width ii) Q-factor. **(05 Marks)**

b. In a series resonant circuit, show that resonant frequency is equal to the geometric mean of half power frequencies. **(07 Marks)**

c. For the parallel resonant circuit shown in figure Q5 (c), find I_O, I_L, I_C, f_O and dynamic resistance. **(08 Marks)**

6 a. Explain the transient behaviour of the resistance, inductance and capacitance. Also explain the procedure for evaluating transient behaviour. **(08 Marks)**

b. For the circuit shown in figure Q6 (b), the switch 'K' is changed from position 1 to position 2 at t = 0, steady state condition having been reached in position 1. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0. **(07 Marks)**

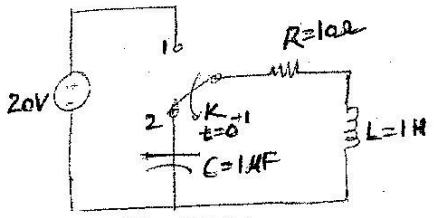

Fig. Q6 (b)

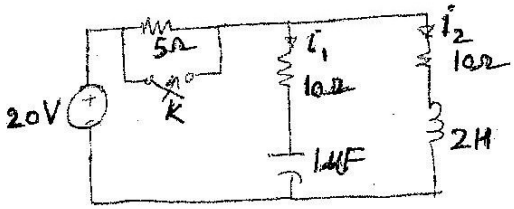

Fig. Q6 (c)

c. In the network shown in figure Q6 (c), the switch 'K' is opened at t = 0 after the network has attained steady state the switch is closed. Find i_1, i_2 at t = 0+ **(05 Marks)**

7 a. State and prove initial and final value theorem with suitable examples. **(08 Marks)**

b. Find the Laplace transform of the waveform shown in Fig. Q7 (b). **(06 Marks)**

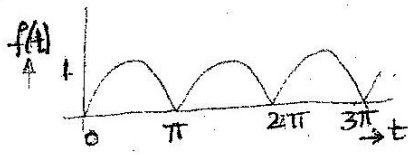

Fig. Q7 (b)

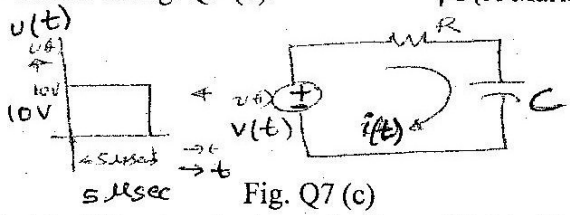

Fig. Q7 (c)

c. A voltage pulse of 10 V magnitude is applied to RC network shown in figure Q7 (c). Find the current i(t) of R = 10 Ω and C = 0.05 μF for the circuit. **(06 Marks)**

8 a. Express h – parameters in terms of z-parameters and establish the same. **(08 Marks)**

b. Explain symmetry and reciprocity property of two port networks. **(04 Marks)**

c. Find the z-parameters of the network shown in figure Q8 (c). **(08 Marks)**

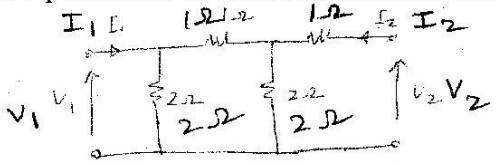

Fig. Q8 (c)