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10ES34

Third Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
Network Analysis

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Find the equivalent resistance at AB using Y - Δ transformation technique for the circuit shown in Fig. Q1(a). (All the resistors connected are 30 Ω each). **(05 Marks)**

b. Find 'i_x' and 'V_x' for the circuit shown in Fig. Q1(b) by Mesh analysis. **(05 Marks)**

c. For the network given in Fig. Q1(c), find 'I_0' using nodal analysis. **(10 Marks)**

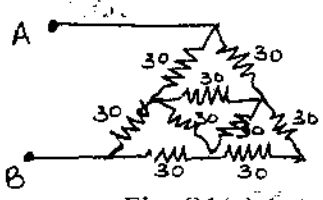

Fig. Q1(a)

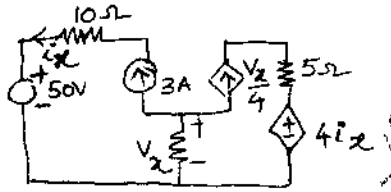

Fig. Q1(b)

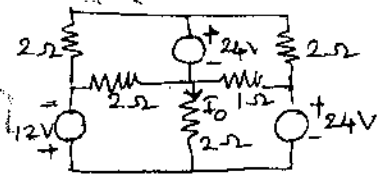

Fig. Q1(c)

2 a. Write the tie – set schedule for the network shown in Fig. Q2(a), and using the tie set schedule determine all branch currents. (Take outer resistors as tree branch elements). **(10 Marks)**

b. For the network shown in Fig. Q2(b), draw the dual circuit. Also write the nodal equations for the dual circuit. **(10 Marks)**

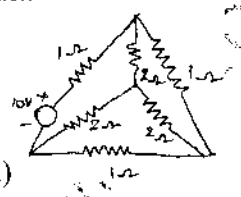

Fig. Q2(a)

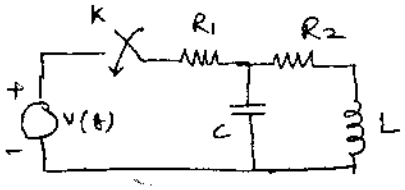

Fig. Q2(b)

3 a. Find the voltage 'V' across 3Ω resistor using superposition theorems for the circuit sown in the Fig. Q3(a). **(10 Marks)**

b. State Millman's theorem. Using Millman's theorem find current through the load resistor R_L for the circuit shown in Fig .Q3(b). **(10 Marks)**

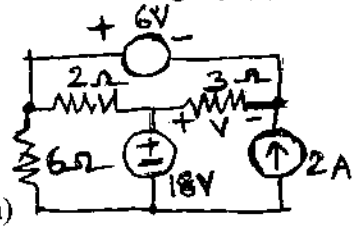

Fig. Q3(a)

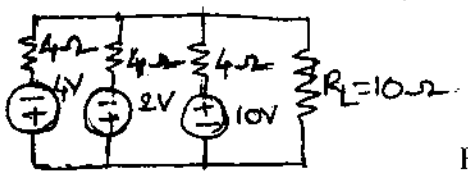

Fig. 3(b)

4 a. Find the Thevenin's equivalent of the network shown in Fig. Q4(a). **(10 Marks)**

b. State maximum power transfer theorem. For the circuit shown in Fig. Q4(b), what should be the value of 'R' such that maximum power transfer can take place from the rest of the network to 'R'. Obtain the amount of this power. **(10 Marks)**

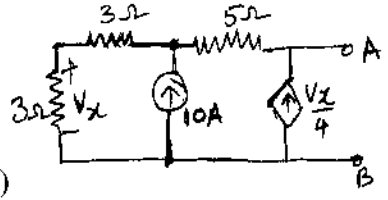

Fig.Q4(a)

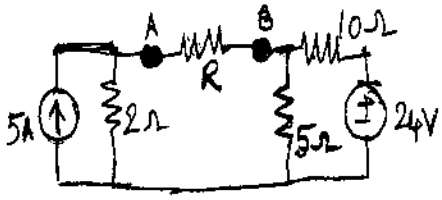

Fig.Q4(b)

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 – B

5 a. A 220 V, 100 Hz AC source supplies a series RLC circuit with a capacitor and a coil. If the coil has 50 m Ω resistance and 5 mH inductance, find at a resonance frequency of 100 Hz what is the value of capacitor. Also calculate the Q factor and half power frequencies of the circuit. **(10 Marks)**

b. Find the value of R_1 such that the circuit given in Fig. Q5(b) is resonant. **(06 Marks)**

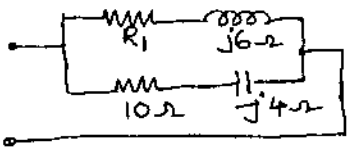

Fig. Q5(b)

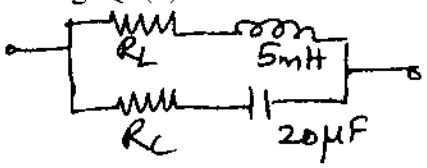

Fig. Q5(c)

c. Determine R_L and R_C that causes the circuit to be resonant at all frequencies for the circuit shown in Fig. Q5(c). **(04 Marks)**

6 a. In the network shown in Fig. Q6(a) the switch is closed at t = 0. Determine i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(10 Marks)**

b. For the circuit shown in Fig. Q6(b), the switch 'K' is changed from position – 1 to position – 2 at t = 0 steady – state condition having been reached at position – 1. Find the values of i, $\frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t = 0^+$. **(10 Marks)**

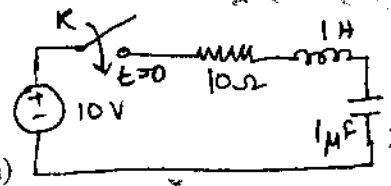

Fig. Q6(a)

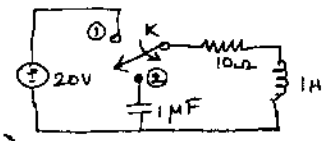

Fig. Q6(b)

7 a. In the Fig. Q7(a), the battery voltage '10'V is applied for a steady state period with switch 'K' open. Obtain the complete expression for the current after closing the switch K. Use Laplace transforms. **(10 Marks)**

b. Referring to the Fig. Q7(b), solve for $i_L(t)$, using Laplace transformation. **(10 Marks)**

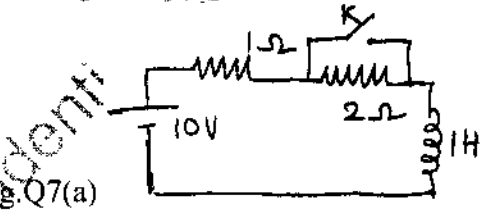

Fig.Q7(a)

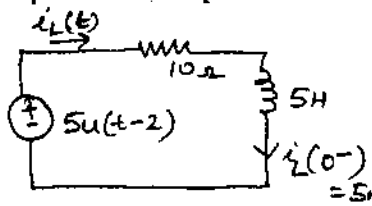

Fig.Q7(b)

8 a. Find the 'z' parameters of the circuit shown in Fig. Q8(a). **(10 Marks)**

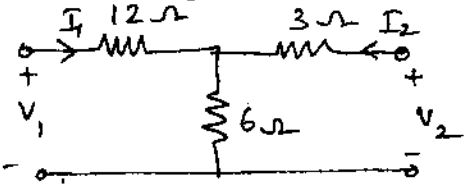

Fig. Q8(a)

b. Following are the hybrid parameters for a network

$$\begin{bmatrix} h_{11} & h_{12} \\ h_{21} & h_{22} \end{bmatrix} = \begin{bmatrix} 5 & 2 \\ 3 & 6 \end{bmatrix}.$$

Determine the Y parameters for the network. **(10 Marks)**

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