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06ES34

Third Semester B.E. Degree Examination, December 2010
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. Standard notations are used.
3. Missing data may be suitably assumed.

PART – A

1 a. Use the node analysis and find the value of V_x in the circuit shown in Fig.Q1(a), such that the current through the impedance $(2 + j3)\Omega$ is zero. **(10 Marks)**

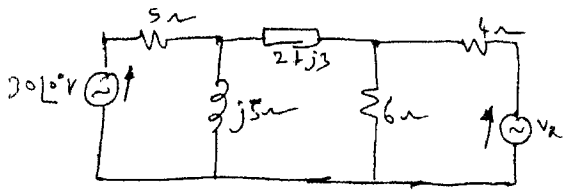


Fig.Q1(a)

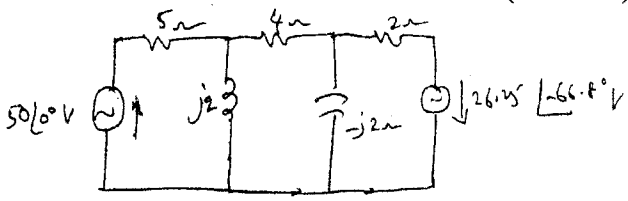
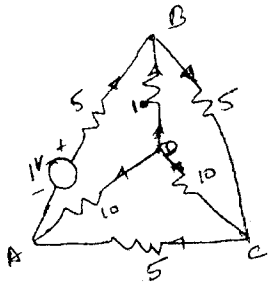


Fig.Q1(b)

b. Find the current through the 4Ω resistor, using the loop current method, in the circuit shown in Fg.Q1(b). **(10 Marks)**

2 a. Explain the following terms with reference to network topology :
i) Tree ii) Branch iii) Cut set matrix iv) Tie set matrix **(08 Marks)**

b. For the given resistance network, write a tie set schedule and obtain equilibrium equations on current basis. Calculate the values of branch voltages. Assume inner branches as tree branches. [Refer Fig.Q2(b)] **(12 Marks)**



All resistances in ohms

Fig.Q2(b)

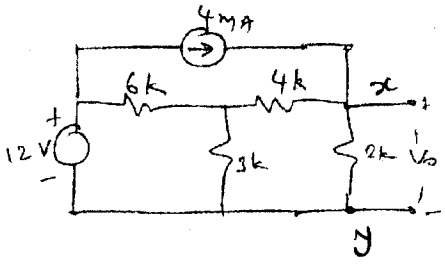


Fig.Q3(b)

3 a. State and explain the Thevenin's theorem. **(06 Marks)**

b. Obtain the Thevenin's equivalent of the network shown in Fig.Q3(b) between the terminals x and y. Also find V_o. **(06 Marks)**

c. Using Worton's theorem, find the current through the load impedance *Zl* in Fig.Q3(c). **(08 Marks)**

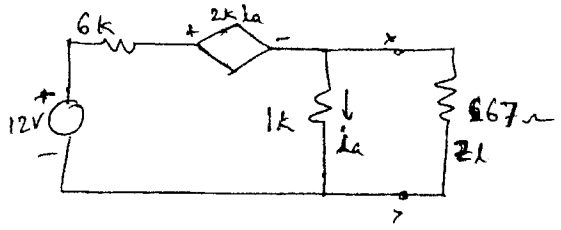


Fig.Q3(c)

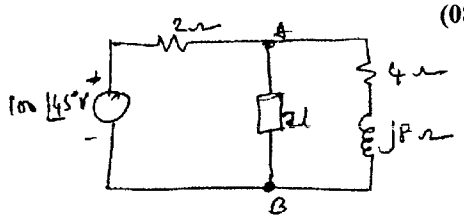


Fig.Q4(b)

4 a. Derive the condition or maximum power transfer across a load from a source as applied to a simple A.C. circuit. Assume a suitable circuit for your mathematical derivation. **(08 Marks)**

4 b. Find the load impedance to be connected across the terminals AB for the maximum power transfer. The network is shown in Fig.Q4(b). Also find the maximum power delivered to the load. **(06 Marks)**

c. Write a note on superposition theorem as applied to a dc circuit. **(06 Marks)**

PART – B

5 a. Show that a two branch parallel resonant circuit is resonant at all the frequency, if $R_l = R_C = \sqrt{\frac{L}{C}}$ where R_l = resistance in the inductor branch, R_C = capacitor in the capacitor branch. **(08 Marks)**

b. Derive for a resonant circuit, the resonant frequency $f_o = \sqrt{f_1 f_2}$, where, f_1 and f_2 are the two half power frequencies. **(08 Marks)**

c. An RLC series circuit has R = 1 KΩ, L = 100 mH, C = 10μF. If a voltage of 100 V is applied across series combination, determine :
i) Resonant frequency ii) Q-factor and iii) Half power frequencies. **(04 Marks)**

6 a. What is the significance of initial conditions? Write a note on initial conditions in basic circuit elements. **(04 Marks)**

b. How is time constant of an RL circuit is defined? Explain its importance in transient analysis, with a suitable example. **(08 Marks)**

c. In the circuit shown in Fig.Q6(c), the switch K is changed from position 1 to position 2 at t = 0, the steady state having been reached before switching. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0. **(08 Marks)**

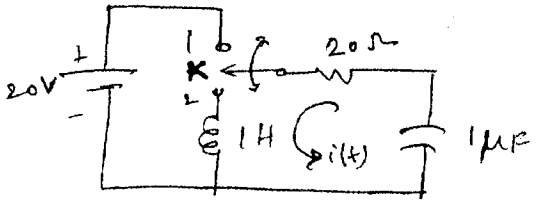


Fig.Q6(c)

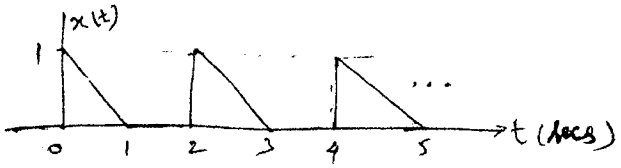


Fig.Q7(a)

7 a. Find the Laplace transform of the periodic signal x(t) shown in Fig.Q7(a). **(06 Marks)**

b. Determine the response current i(t) in the circuit shown in Fig.Q7(b) using Laplace transform. **(06 Marks)**

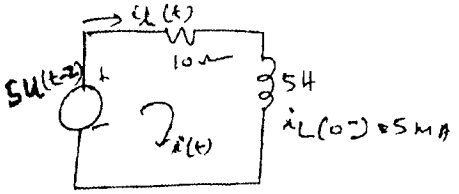


Fig.Q7(b)

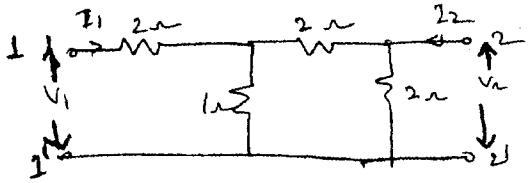


Fig.Q8(b)

c. Find the convolution of h(t) = t and f(t) = $e^{-\alpha t}$ for t > 0, using Laplace transform techniques. **(08 Marks)**

8 a. Obtain the relationship between 'h' and 'y' parameters of a two port network. **(10 Marks)**

b. Determine the z parameters for the circuit shown in Fig.Q8(b). **(06 Marks)**

c. Write a note on ABCD parameters. **(04 Marks)**

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