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10ES34

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***1.Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Missing data may be assumed suitably.

PART – A

1 a. Using source transformation and shifting, obtain the power consumed in 8Ω resistance of the network shown in Fig.Q1(a). **(06 Marks)**

b. Determine all the node voltages of the circuit shown in Fig.Q1(b) using nodal analysis. **(06 Marks)**

c. Find the value of Vs such that the current in –j11Ω is zero, use mesh analysis assuming all the loop currents are in clockwise directions. Refer Fig. 1(c). **(08 Marks)**

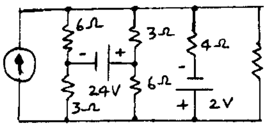

Fig. Q1(a)

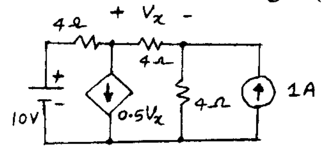

Fig. Q1(b)

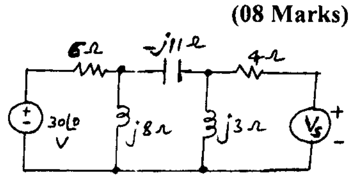

Fig. Q1(c)

2 a. Draw the dual of the network shown in Fig. 2(a). Write the corresponding equations for both networks. **(08 Marks)**

b. Draw the graph of the network shown in Fig. Q2(b), select links as the branches containing voltage sources. Write tie-set schedule and there from obtain all the branch currents and voltages. **(12 Marks)**

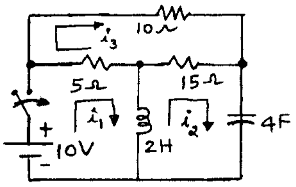

Fig.Q2(a)

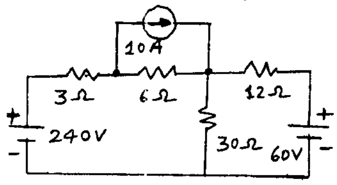

Fig. Q2(b)

3 a. Determine the current and voltage across 4Ω resistance of the network shown in Fig. Q3(a), using superposition theorem. **(06 Marks)**

b. Apply Millman's theorem to find V_0 and I_0 for the circuit shown in Fig. 3(b). **(08 Marks)**

c. State and explain the reciprocity theorem. **(06 Marks)**

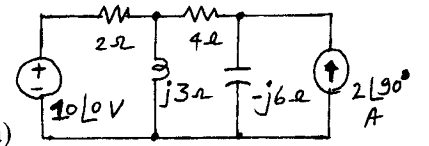

Fig.Q3(a)

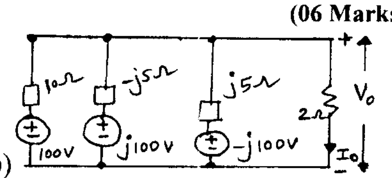

Fig.Q3(b)

4 a. A linear bilateral network consisting of passive elements is shown in Fig. 4(a), with V_s = 10V, V_{ab} is 5V. If 'ab' is shorted, I_{ab} = 1A for V_s = 15V. Determine the current when R_{ab} = 2.5Ω with V_s = 12V. **(04 Marks)**

b. Determine the Norton's equivalent of the circuit shown in Fig. 4(b). **(08 Marks)**

c. What value of impedance Z_L results in maximum power transfer condition for the network shown in Fig. Q4(c)? Also determine the corresponding power. **(08 Marks)**

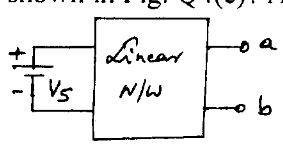

Fig. Q4(a)

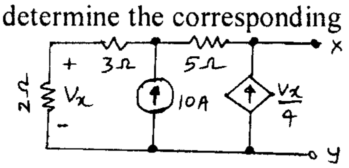

Fig. Q4(b)

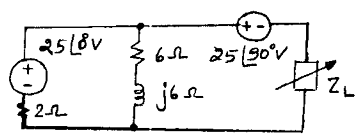

Fig. Q4(c)

PART – B

5 a. A series R – L – C circuit is fed with 50 V rms supply. At resonance, the current through the circuit is 25A and the voltage across inductor is 1250 volts. If G = 4 μF, determine the values of R, L Q, resonant frequency, bandwidth and half power frequencies. **(12 Marks)**

b. Obtain the condition for resonance of elements as shown in Fig. 5(b). Derive the expression for total impedance at resonance. **(08 Marks)**

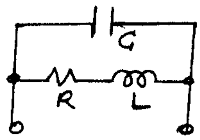

Fig. Q5(b)

6 a. The switch 'K' in the circuit shown in Fig. 6(a) is in open position for a long time and at time t = 0, it is closed. Determine the values of i_1 and i_2 along with their first and second derivatives at t = 0+. **(10 Marks)**

b. The switch 'S' is changed from position 1 to 2 at time t = 0. The circuit was under steady state before this action. Determine the value of v and i at t = 0+ and their first and second derivatives also. Refer Fig. 6(b). **(10 Marks)**

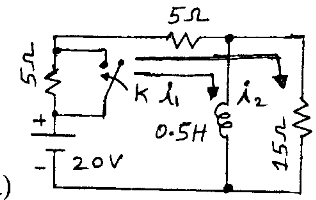

Fig. Q6(a)

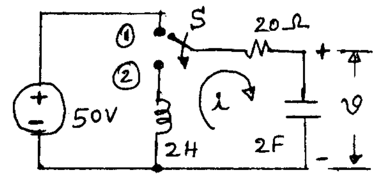

Fig. Q6(b)

7 a. Using Laplace transformation method obtain the expression for i(t). The capacitor charge is zero initially. Also obtain the expression for capacitor voltage in 'S' domain, refer Fig. 7(a) **(10 Marks)**

b. Using standard waveforms, express the waveform given (periodic) in Fig. 7(b) and obtain its Laplace transform. **(10 Marks)**

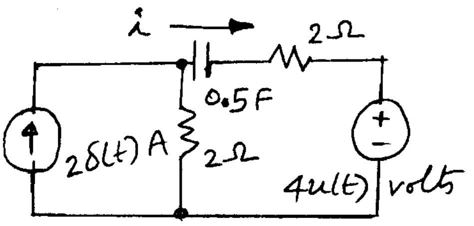

Fig. Q7(a)

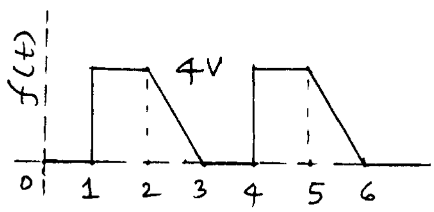

Fig. Q7(b)

8 a. Determine the Y–parameters of the network shown in Fig. Q8(a), **(10 Marks)**

b. Replace the circuit shown in Fig. 8(b) with its hybrid parameter equivalent network. **(10 Marks)**

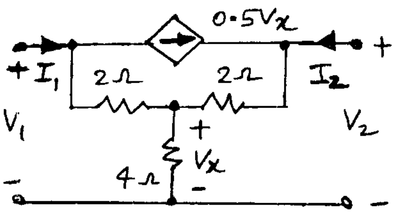

Fig. Q8(a)

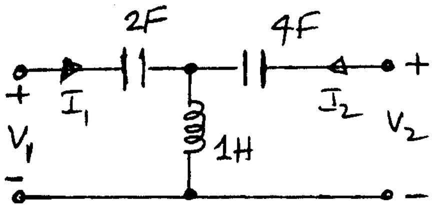

Fig. Q8(b)

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