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10ES34

Third Semester B.E. Degree Examination, Dec.2014/Jan.2015
Network Analysis

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. For the network shown in Fig. Q1(a). Find the potential difference between M and N using source transformation. **(04 Marks)**

b. Using star/ delta transformation, determine the resistance between M and N of network shown in Fig. Q1(b). **(04 Marks)**

c. For the network shown in Fig. Q1(c), find power supplied by 10V source using mesh current analysis. **(06 Marks)**

d. For the network shown in Fig. Q1(d), find the magnitude of source voltage such that current in 4 ohm is zero. Use node voltage analysis. **(06 Marks)**

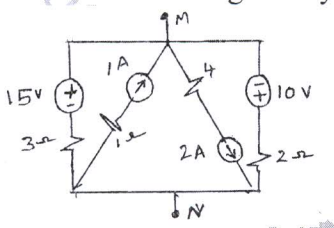

Fig. Q1(a)

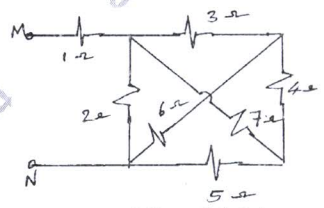

Fig. Q1(b)

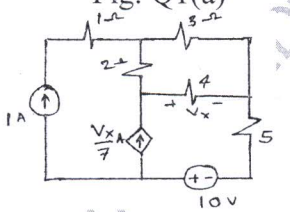

Fig. Q1(c)

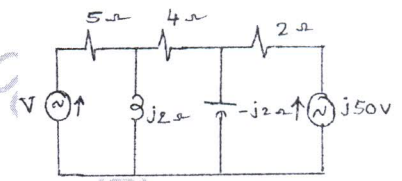

Fig. Q1(d)

2 a. Explain element – node incidence matrix with example. List the properties of the element node incidence matrix. **(06 Marks)**

b. For the network shown in Fig. Q2(b). Determine branch voltages. On voltage basis. **(08 Marks)**

c. Write KVL equation for the network shown. Draw the dual of this a write KCL equation and show that these two networks are dual. (Fig. Q2(c)). **(06 Marks)**

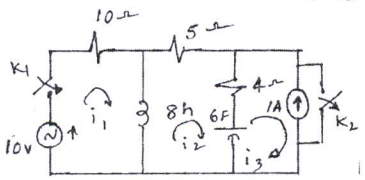

Fig. Q2(c)

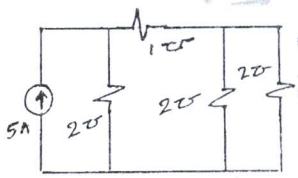

Fig. Q2(b)

3 a. Use superposition theorem to find I_x of the network shown in Fig. Q3(a). **(08 Marks)**

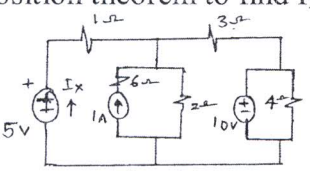

Fig. Q3(a)

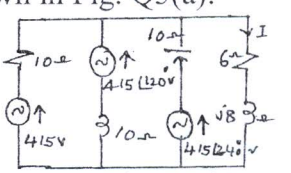

Fig. Q3(b)

b. For the circuit shown in Fig. Q3(b), find current 'I' using Millimun's theorem. **(06 Marks)**

c. State and prove reciprocity theorem. **(06 Marks)**

4 a. State and explain maximum power transfer theorem when load impedance consisting of variable resistance and variable reactance. **(08 Marks)**

b. For the network shown in Fig. Q4(b). Draw the Thevenin's equivalent circuit. **(05 Marks)**

c. Using Norton's theorem, find the current 'I' of the network shown in Fig. Q4(C). **(07 Marks)**

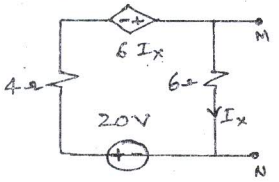

Fig. Q4(b)

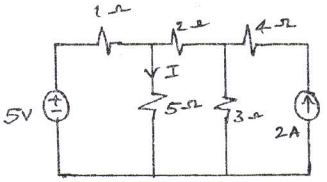

Fig. Q4(c)

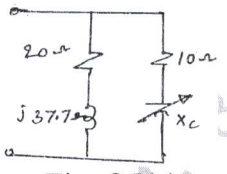

Fig. Q5(c)

PART – B

5 a. What is resonance? Derive an expression for cut-off frequencies. **(08 Marks)**

b. Calculate half power frequencies of series resonant circuit where the resonance frequency is 150 KHz and band width is 75 KHz. **(04 Marks)**

c. For the circuit shown in Fig. Q5(c), find two values of capacitor for the resonance. Derive the formula used Take f = 50 Hz. **(08 Marks)**

6 a. What is initial and final condition? Explain the behaviour of R, L and C for the initial condition. **(06 Marks)**

b. For the circuit shown in Fig. Q6(b), switch k is opened at t = 0, after reaching the steady state condition. Determine voltage drop across switch and its first and second derivative at $t = 0^+$. **(08 Marks)**

c. In the circuit shown, in Fig. Q6(c), switch k is closed at t = 0. Find $v_a(0-)$ and $V_a(0+)$. **(06 Marks)**

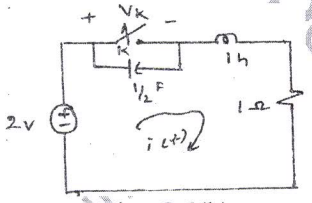

Fig. Q6(b)

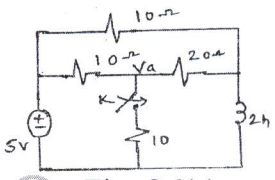

Fig. Q6(c)

7 a. For the circuit shown in Fig. Q7(a), switch 'k' is closed at t = 0. The initial current through inductance is 1A and initial voltage across the capacitor is 1V. Obtain expression for current i(+) for $t \geq 0$. **(08 Marks)**

b. For the circuit shown in Fig. Q7(b) switch is closed at t = 0. The initial current through an inductance is 2A. Obtain expression for $V_0(+)$ for $t \geq 0$. **(06 Marks)**

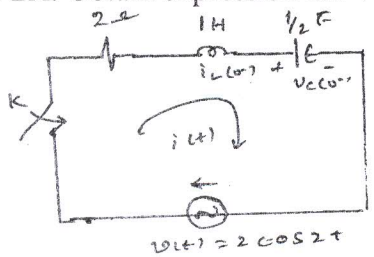

Fig. Q7(a)

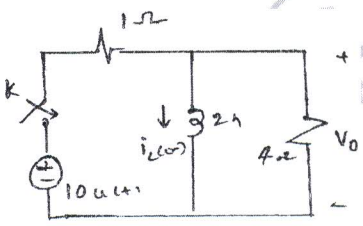

Fig. Q7(b)

c. Synthesis the waveform shown in Fig. Q7(c) and find the Laplace transform of the periodic waveform. **(06 Marks)**

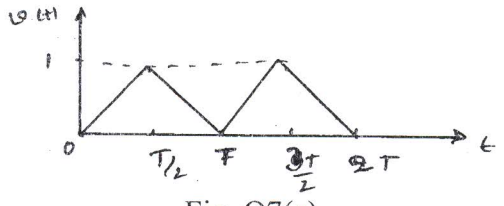

Fig. Q7(c)

8 a. Obtain transmission parameters in terms of hybrid parameters. **(06 Marks)**

b. For the network shown in Fig. Q8(b). Find the z – parameters. **(08 Marks)**

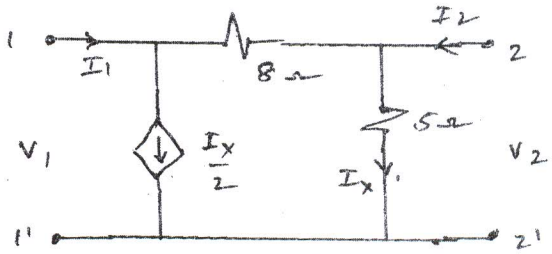

Fig. Q8(b)

c. Following short circuit currents and voltages are obtained experimentally for a two port network :

i) With output short circuited : $I_1 = 5$ mA ; $I_2 = -0.3$ mA and $V_1 = 25$ V

ii) With input short circuited : $I_1 = -5$ mA ; $I_2 = +10$mA and $V_2 = 30$ V.

Determine Y – parameters. **(06 Marks)**

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