

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)

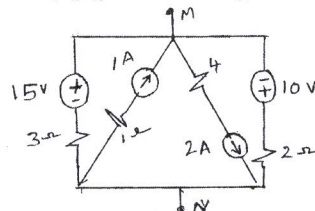


Fig. Q1(a)

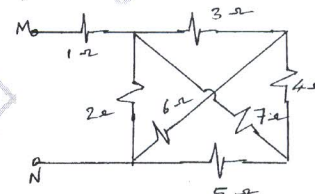


Fig. Q1(b)

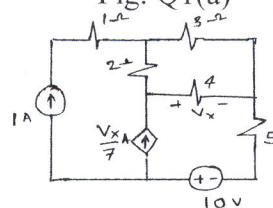


Fig. Q1(c)

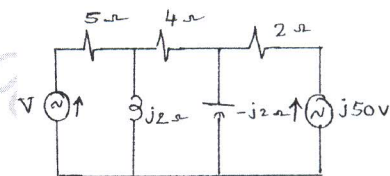


Fig. Q1(d)

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)

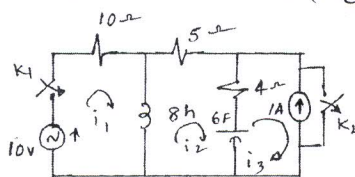


Fig. Q2(a)

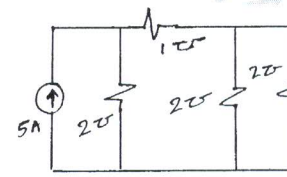


Fig. Q2(b)

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

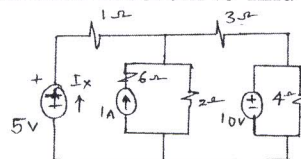


Fig. Q3(a)

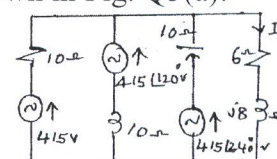


Fig. Q3(b)

- b. For the circuit shown in Fig. Q3(b), find current 'I' using Millman'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)

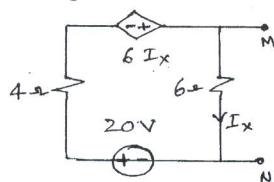


Fig. Q4(b)

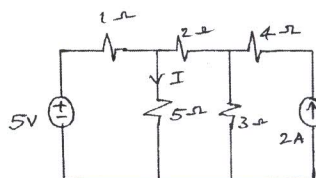


Fig. Q4(c)

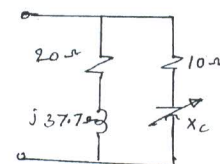


Fig. Q5(c)

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)

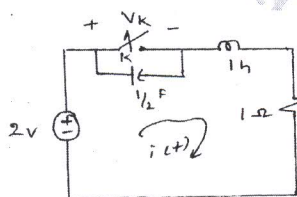


Fig. Q6(b)

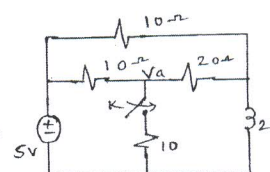


Fig. Q6(c)

- 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 $i(t)$ 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 $V_0(t)$ for $t \geq 0$. (06 Marks)

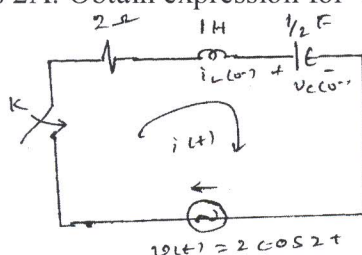


Fig. Q7(a)

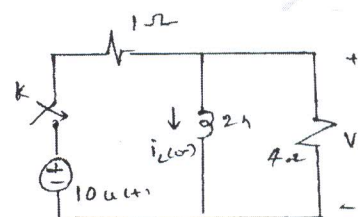


Fig. Q7(b)

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

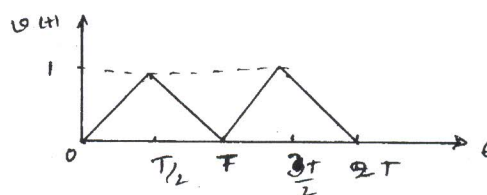


Fig. Q7(c)

- 8 a. Obtain transmission parameters in terms of hybrid parameters.
b. For the network shown in Fig. Q8(b). Find the z - parameters.

(06 Marks)

(08 Marks)

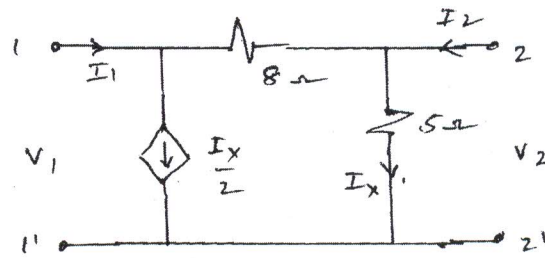


Fig. Q8(b)

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

- i) With output short circuited : $I_1 = 5 \text{ mA}$; $I_2 = -0.3 \text{ mA}$ and $V_1 = 25 \text{ V}$
ii) With input short circuited : $I_1 = -5 \text{ mA}$; $I_2 = +10 \text{ mA}$ and $V_2 = 30 \text{ V}$.

Determine Y - parameters.

(06 Marks)
