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10ES34

Third Semester B.E. Degree Examination, June/July 2017
Network Analysis

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Calculate the current through 2Ω resistor in the network shown in Fig. Q1 (a) by source transformation method. **(06 Marks)**

b. Compute the resistance across the terminals A and B of the network shown in Fig. Q1(b) by star delta transformation. **(06 Marks)**

c. Use mesh analysis to determine what value of V_2 in the network shown in Fig. Q1(c). Cause voltage V = 0 across 20Ω resistor. **(08 Marks)**

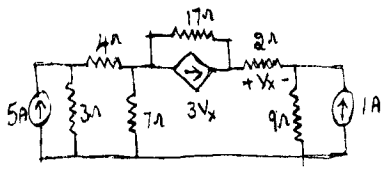

Fig. Q1(a)

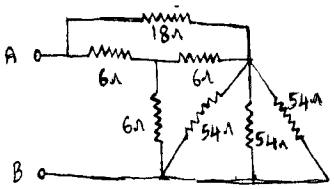

Fig. Q1(b)

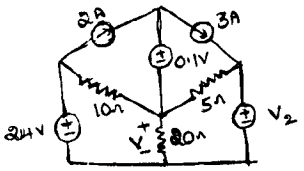

Fig. Q1(c)

2 a. Define with examples :
i) oriented graph ii) Tree iii) Cut set matrix iv) Tie set matrix. **(08 Marks)**

b. For the network shown in Fig. Q2(b) draw the graph. Select 2 and 4 as tree branches. Draw the tie set matrix. Write down the equilibrium equations with loop currents as variables. Solve these equations and find the various branch voltages and currents. The integers indicate branch numbers. Use matrix method. **(08 Marks)**

c. Draw the dual of the network shown in Fig. Q2(c). **(04 Marks)**

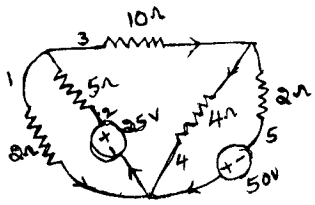

Fig. Q2(b)

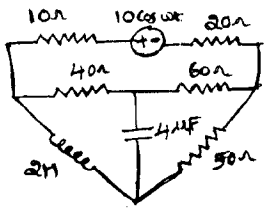

Fig. Q2(c)

3 a. Find V_a using superposition principle in the circuit shown in Fig. Q3(a). **(08 Marks)**

b. In the single current source circuit shown in Fig. Q3(b), find the voltge V_x. Interchange the current source and the resulting voltage V_x. Is the Reciprocity theorem verified? **(06 Marks)**

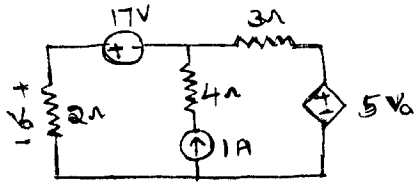

Fig. Q3(a)

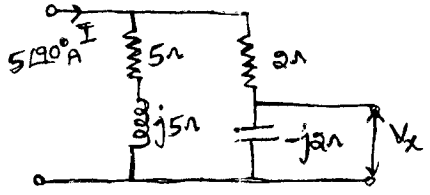

Fig. Q3(b)

c. State and explain Millman's theorem. **(06 Marks)**

4 a. For the network shown in Fig. Q4(a) , obtain the Thevinin's equivalent as seen from terminals p and q. **(08 Marks)**

b. Obtain Norton's equivalent circuit for the network shown in Fig. Q4(b). **(06 Marks)**

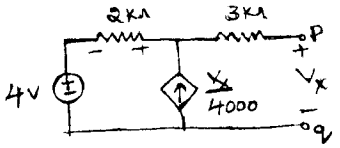

Fig. Q4(a)

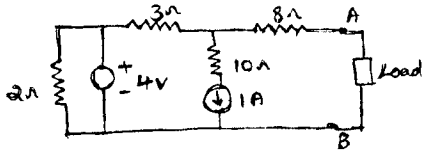

Fig. Q4(b)

c. Prove that an alternating voltage source transfers maximum power to a load when the load impedance is the conjugate of the source impedance. **(06 Marks)**

PART – B

5 a. Define quality factor and bandwidth. Also establish the relationship between them in a series resonance circuit. **(08 Marks)**

b. Show that resonant frequency of series resonance circuit is equal to the geometric mean of two half power frequencies. **(06 Marks)**

c. Find the value of R_L for which the circuit shown in Fig. Q5(c) is resonant. **(06 Marks)**

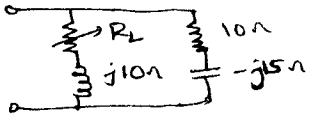

Fig. Q5(c)

6 a. Show that

i) The voltage of a capacitor cannot change instantaneously

ii) The current in an inductor cannot change instantaneously. **(10 Marks)**

b. In the circuit of Fig. Q6(b). Switch K is changed from 1 to 2 a t = 0 steady state having been attained in position 1. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0. **(10 Marks)**

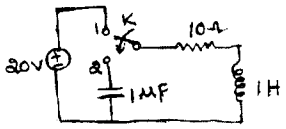

Fig. Q6(b)

7 a. State and prove i) Initial value theorem and ii) Final value theorem. **(10 Marks)**

b. Determine the response current i(t) in the circuit shown in Fig. Q7(b). Using Laplace transform. **(10 Marks)**

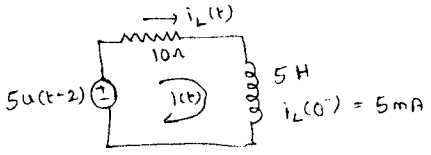

Fig. Q7(b)

8 a. Explain Z and Y parameters with equivalent circuit Also express Z parameters in terms of Y parameters. **(10 Marks)**

b. Obtain the Y parameters of the two port network shown in Fig. Q8(b). **(10 Marks)**

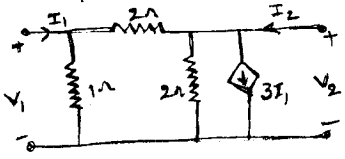

Fig. Q8(b)

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