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10ES34

Third Semester B.E. Degree Examination, June 2012
Network Analysis

Time: 3 hrs. Max. Marks:100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Find the equivalent resistance at AB using Y - Δ transformation technique in Fig. Q1(a). **(05 Marks)**

b. Find the current I in 28 Ω resistor by Mesh analysis in Fig. Q1(b). **(05 Marks)**

c. Find the power dissipated in 10 Ω resistor by node voltage method in Fig. Q1(c). **(10 Marks)**

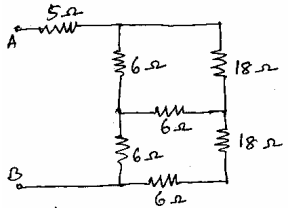

Fig. Q1(a)

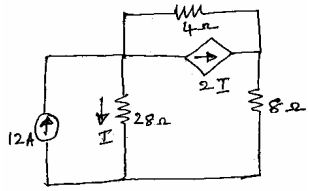

Fig. Q1(b)

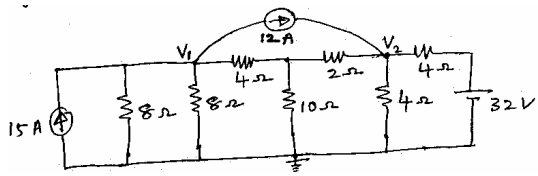

Fig. Q1(c)

2 a. Write the oriented graph of the network shown in Fig. Q2(a). The numerical values of resistances also indicate the branch numbers. Select a tree with branches 1, 2, 3 as the tree branches, write tieset and cutest schedule. **(10 Marks)**

b. For the network shown in Fig. Q2(b), draw the dual network and write the node equations. **(10 Marks)**

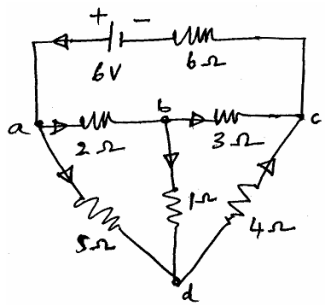

Fig. Q2(a)

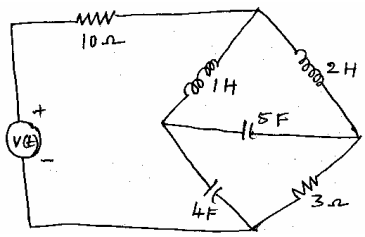

Fig. Q2(b)

3 a. Determine the current through 10 Ω resistance of the network shown in Fig.Q3(a), using superposition theorem. **(10 Marks)**

b. State Milliman's theorem. Using Milliman's theorem, find I_L through R_L for the network shown in Fig. Q3(b). **(10 Marks)**

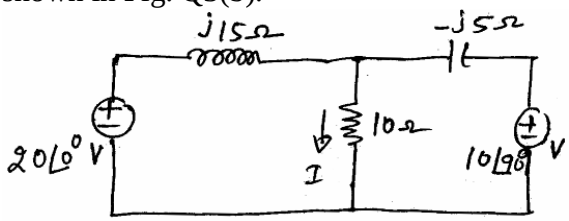

Fig. Q3(a)

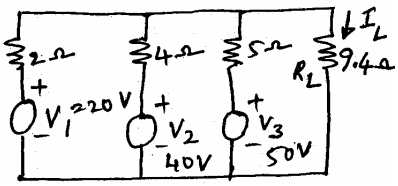

Fig. Q3(b)

4 a. State Thevenin's theorem. For the circuit shown in Fig. Q4(a), find the current through R_L using Thevenin's theorem. **(10 Marks)**

b. State maximum power transfer theorem. For the circuit shown in Fig. Q4(b), find the value of Z_L for which maximum power transfer occurs. Also find P_{max}. **(10 Marks)**

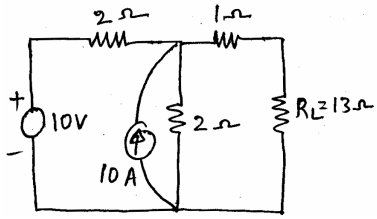

Fig. Q4(a)

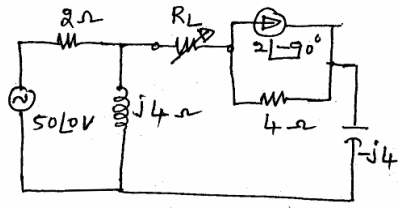

Fig. Q4(b)

PART – B

5 a. Define quality factor and bandwidth. Also establish the relationship between quality factor and bandwidth in a series resonance circuit and thereby prove that $Q = \frac{f_0}{BW}$, where f_0 is the resonance frequency. **(10 Marks)**

b. A series RLC circuit with R = 10 Ω, L = 10mH and C= 1μF has an applied voltage of 200 V at resonant frequency. Calculate the resonant frequency f_0, the current in the circuit at resonance, voltage across the elements at resonance. Also find quality factor and bandwidth. **(10 Marks)**

6 a. Determine : i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0+$ when the switch is closed at t = 0 in Fig. Q6(a). **(10 Marks)**

b. Determine : i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0 + when the switch K is moved from position 1 to 2 at t = 0 in the network shown in Fig. Q6(b), steady state having reached before switching. **(10 Marks)**

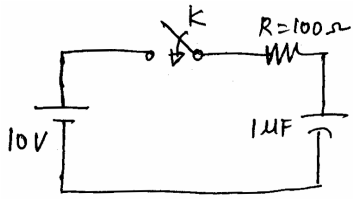

Fig. Q6(a)

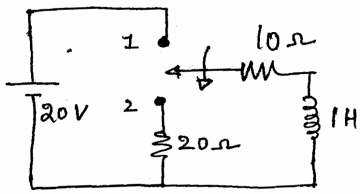

Fig. Q6(b)

7 a. Find the expression for the resultant current i(t) when switch K is closed at t = 0 in Fig. Q7(a). **(10 Marks)**

b. Find the Laplace transform of the given function $f(t) = 5 + 4e^{-2t}$. **(04 Marks)**

c. Find the L.T of the saw tooth waveform in Fig. Q7(c). **(06 Marks)**

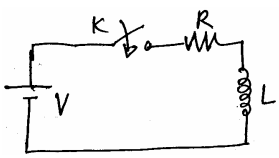

Fig. Q7(a)

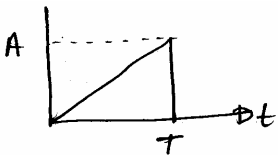

Fig. Q7(c)

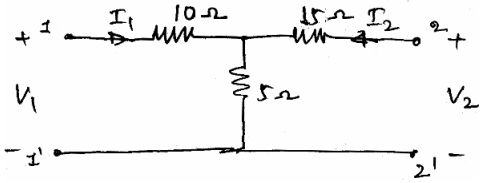

Fig. Q8(a)

8 a. Find the z-parameters for the network shown in Fig. Q8(a). **(10 Marks)**

b. The z-parameters of a two port network are z_{11} = 20 Ω, z_{22} = 30 Ω, $z_{12} = z_{21}$ = 10Ω. Find Y and ABCD parameters of the network. **(10 Marks)**

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