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06ES34

Third Semester B.E. Degree Examination, June/July 2013
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Standard notations are used.***
3. ***Missing data be suitably assumed.***

PART – A

1 a. Find the voltage to be applied across AB in order to drive the current of 10 A into the circuit using star-delta transformation Fig. Q1 (a). **(06 Marks)**

b. Use mesh analysis to evaluate current I in the circuit shown in Fig.1 (b). **(06 Marks)**

c. Determine the current and voltage across each resistor using node voltage method for the network shown in Fig. Q1 (c). **(08 Marks)**

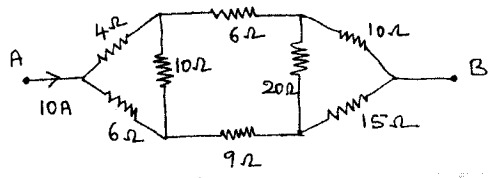

Fig. Q1 (a)

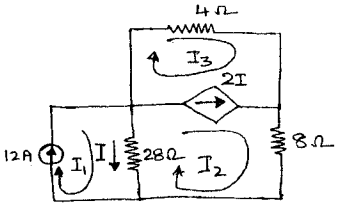

Fig. Q1 (b)

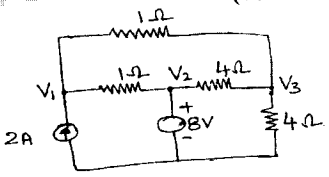

Fig. Q1 (c)

2 a. Explain briefly graph, trees, links and co-trees of the network with suitable examples. **(04 Marks)**

b. Write the tie-set schedule for the network shown in Fig. Q2 (b), using tie set schedule obtain the equilibrium equations on loop current basis. **(08 Marks)**

c. Explain "Duality as applied to network, for the network shown in Fig. Q2 (c), draw the dual network. **(08 Marks)**

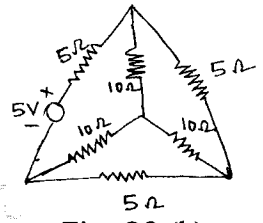

Fig. Q2 (b)

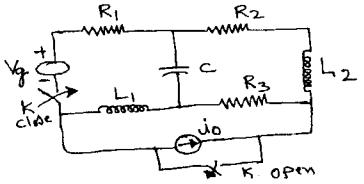

Fig. Q2 (c)

3 a. State and explain Millman's theorem. **(04 Marks)**

b. Using superposition theorem determine the current I in the network shown in Fig. Q3 (b) given $V = 10\cos(10^5 t + 45)$, $i_1 = 10\sqrt{2}\sin 10^5 t$ and $i_2 = 10\cos 10^5 t$ **(10 Marks)**

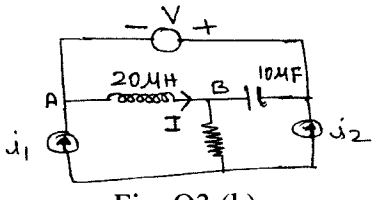

Fig. Q3 (b)

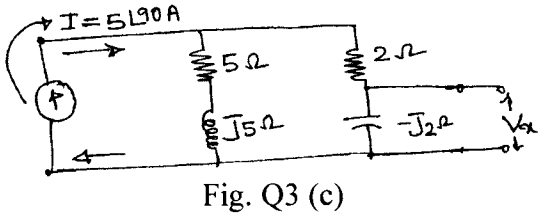

Fig. Q3 (c)

c. In the single current source circuit shown in Fig. Q3 (c), find the voltage V_x inter change the current source and resulting voltage V_x, is the reciprocity theorem verified? **(06 Marks)**

4 a. State and explain Nortons theorem. **(04 Marks)**

b. Prove that an alternating voltage source transfer maximum power to the load when the load impedance is the complex conjugate of the source impedance. **(06 Marks)**

4 c. For the circuit shown in Fig. Q4 (c), find the value of z that will receive maximum power also determine this power. **(10 Marks)**

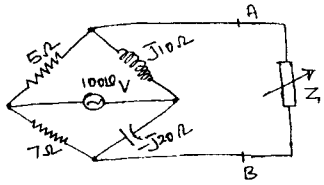

Fig. Q4 (c)

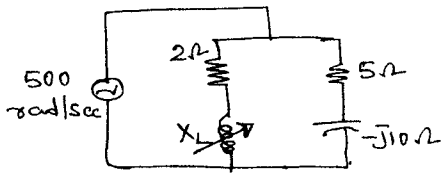

Fig. Q5 (b)

PART – B

5 a. Define Q of a series resonant circuit, obtain half power frequencies in terms of Q and show that the resonance frequency is the geometric mean of the half power frequencies. **(10 Marks)**

b. Find the values of L for which the circuit shown in Fig. Q5 (b) resonant at a frequency of 500 rad/sec. **(06 Marks)**

c. A fixed condenser is placed in parallel with a fixed resistance connected in series with a variable inductor show that for resonance $X = \frac{X_C}{2} \pm \sqrt{\frac{X_C^2}{2} - R^2}$. **(04 Marks)**

6 a. In the network shown in Fig. Q6 (a), a steady state is reached with the switch K is open at t = 0. The switch is closed. For the element values given determine the values of Va(0 –) and Va(0 +) **(10 Marks)**

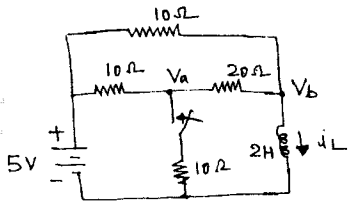

Fig. Q6 (a)

b. Why we need to study initial conditions? A parallel R – L circuit is energized by a current source of 1 A. The switch across the source is opend at t = 0 solve for V, $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ all at $t = 0^+$ if R = 100 Ω, L = 1 H. **(10 Marks)**

7 a. Derive z-parameters in terms of Y parameters. **(07 Marks)**

b. Find z-parameters for the two-port network shown in Fig. Q7 (b). **(06 Marks)**

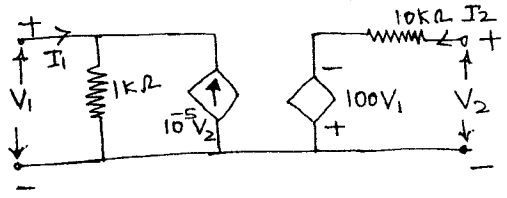

Fig. Q7 (b)

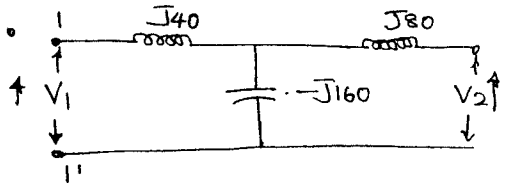

Fig. Q7 (c)

c. Find ABCD constants and show that AD – BC = 1 for the network shown in Fig.Q7 (c). **(07 Marks)**

8 a. Synthesize the periodic wave form shown in Fig. Q8 (a) and find its Laplace transform and prove any formula used. **(10 Marks)**

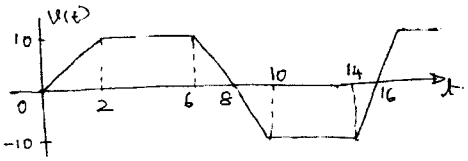

Fig. Q8 (a)

b. Using convolution theorem find the Laplace inverse of $F(s) = \frac{s}{(s+1)(s+2)(s+3)}$. **(10 Marks)**

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