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06ES34

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Network Analysis

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the following terms with reference to network topology.
i) tree ii) graph iii) cut-set matrix iv) tie set matrix. **(08 Marks)**

b. Write a note on duality in network topology. **(02 Marks)**

c. For the network shown in Fig.Q1(c), determine the node voltage. **(10 Marks)**

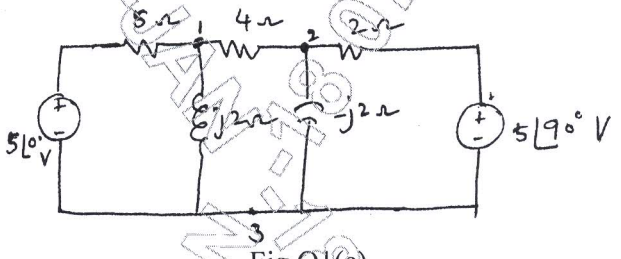

Fig.Q1(c)

2 a. State and explain Thevnin's theorem as applied to AC circuit. **(08 Marks)**

b. Using Thevnin's theorem, find the current through the coil (5 + j4)Ω is the bridge circuit shown in Fig.Q2(b). **(08 Marks)**

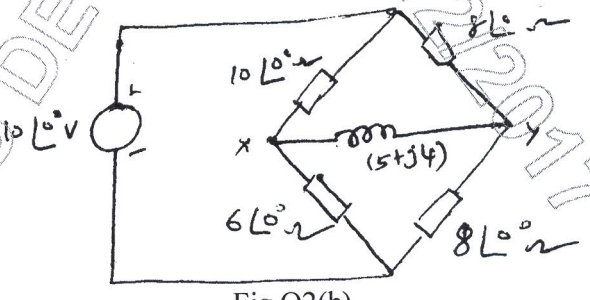

Fig.Q2(b)

c. Using Norton's theorem find the current through RL in the circuit shown in Fig.Q2(c). **(04 Marks)**

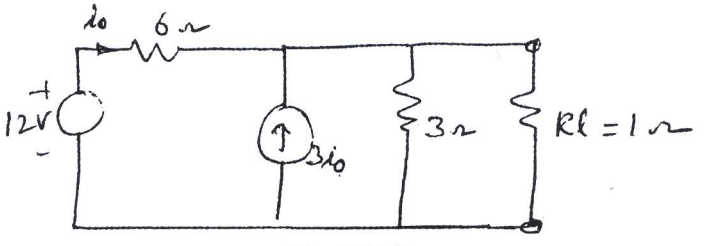

Fig.Q2(c)

3 a. State and explain maximum power transfer theorem. **(06 Marks)**

b. Find the value of ZL to have maximum power transfer from the $10\angle 0°$ voltage source. Also determine the amount of maximum power is eth circuit shown in Fig.Q3(b). **(08 Marks)**

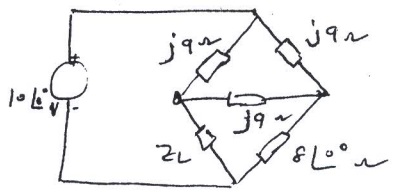

Fig.Q3(b)

c. Find the current through capacitor (–j5)Ω reactance in the circuit shown in Fig.Q3(c), using super position theorem. **(06 Marks)**

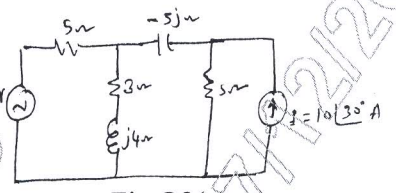

Fig.Q3(c)

4 a. Explain the following terms with reference to a resonant circuit :
i) bandwidth ii) quality factor iii) selectivity curve. **(06 Marks)**

b. In the circuit shown in Fig.Q4(b), the current is at maximum value I_m with capacitor value C = 100 μF and $I_m/\sqrt{2}$ with C = 12.5 μF. Find the value of Q of the coil at W = 1000 rad/sec. **(07 Marks)**

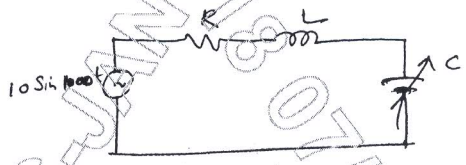

Fig.Q4(b)

c. In the network shown in Fig.Q4(c), find the value of C for resonance to take place at W = 500 rad/sec. Also determine the branch currents. **(07 Marks)**

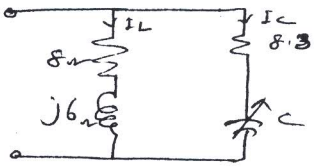

Fig.Q4(c)

PART – B

5 a. Why initial conditions are essential? Write a note on initial conditions in basic current elements. **(04 Marks)**

b. Define time constant. Explain time constants in case of series RL and series RC circuit. Explain their importance is switching circuits. **(06 Marks)**

c. In the network of the Fig.Q5(c), the switch K is closed at t = 0 with the capacitor uncharged. Find the values for i, di/dt and di^3/dt^2 at $t = 0^+$. **(10 Marks)**

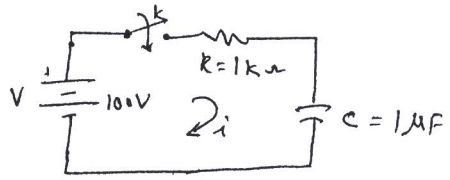

Fig.Q5(c)

6 a. In the network shown in the Fig.Q6(a) a steady state is reached with the switch 'k' open. At $t = 0$ the switch is closed. For the element values given, determine the values of $V_a(0-)$ and $V_a(0+)$. **(10 Marks)**

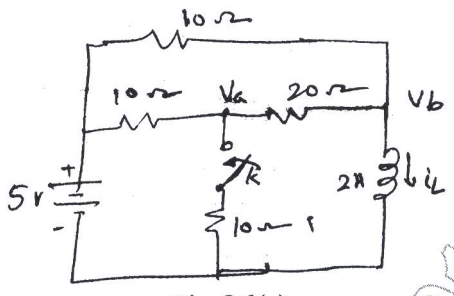

Fig.Q6(a)

b. Discuss with switch examples the shifting and scaling properties of the Laplace transform. **(10 Marks)**

7 a. Find the Laplace increase of the following function using convolution theorem :

i) $F_1(s) = \frac{1}{s}$ $F_2 = \frac{1}{(s+1)}$

ii) $F_1(s) = \frac{1}{s(s+1)}$ $F_1(s) = \frac{1}{(s+2)}$ **(10 Marks)**

b. The waveform shown is Fig.Q7(b) is a sweep voltage used to deflect a beam is a CRO. Show that the Laplace transform of this function is $f(s) = \frac{1}{as^2} - \frac{e^{-as}}{s(1-e^{-as})}$. **(10 Marks)**

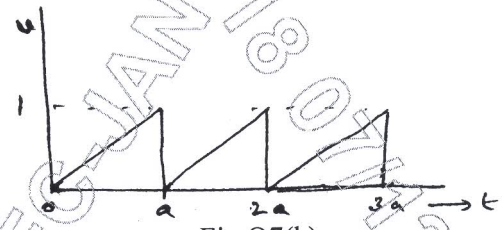

Fig.Q7(b)

8 a. Derive equations for the relationship between 'h' and 'y' parameters of a two port network. **(10 Marks)**

b. Determine the ABCD parameters for the network shown in Fig.Q8(b). **(10 Marks)**

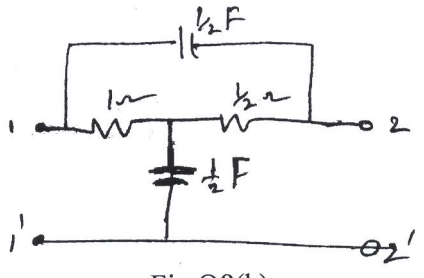

Fig.Q8(b)

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