EE34

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NEW SCHEME

Third Semester B.E. Degree Examination, July 2006
EE / EC / IT / TC / BM / ML
Network Analysis

Time: 3 hrs.] [Max. Marks:100

Note: 1. ***Answer any FIVE full questions.***
2. ***Justify any assumptions made.***

1 a. In the circuit shown in figure Q1 (a) determine V2, which results in zero current through the 4 Ω resistor. Use mesh analysis. **(10 Marks)**

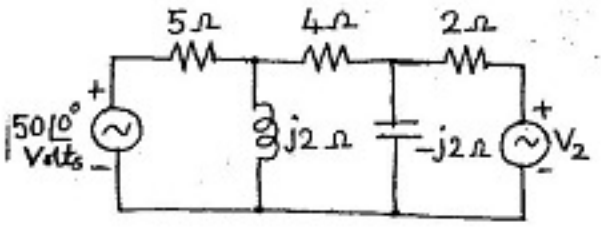

Fig. Q1 (a)

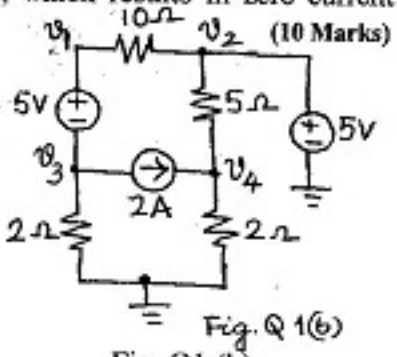

Fig. Q1 (b)

b. For the network shown in figure Q1 (b) determine the node voltages V_1, V_2, V_3 and V_4 using nodal analysis. **(10 Marks)**

2 a. In figure Q2 (a) determine the equivalent resistance Req by using star delta transformation. **(10 Marks)**

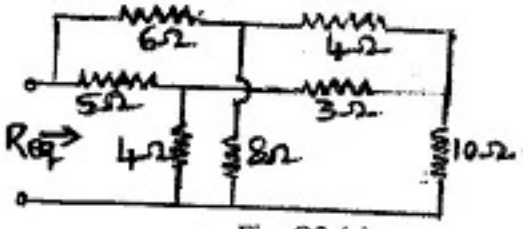

Fig. Q2 (a)

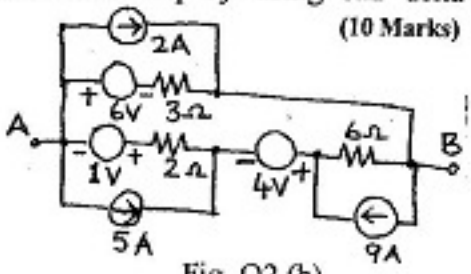

Fig. Q2 (b)

b. Obtain the Thevenin's and Norton's equivalent circuits across terminals A and B for the circuit shown in figure Q2 (b). **(10 Marks)**

3 a. State and explain Millman's theorem. **(05 Marks)**

b. For the circuit shown in figure Q3 (b) find the current *i* using superposition theorem. **(07 Marks)**

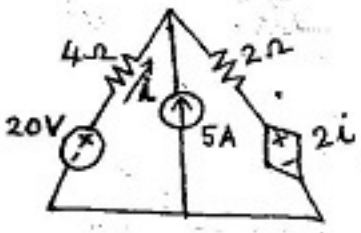

Fig. Q3 (b)

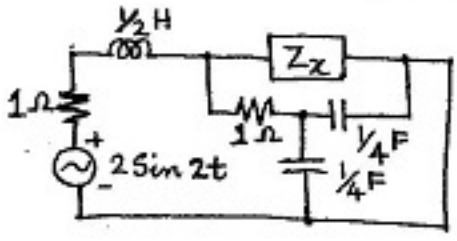

Fig. Q3 (c)

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3 c. For the network shown in figure Q3 (c), determine the impedance Z_x such that maximum power is transferred from the source to the load of impedance Z_x. **(08 Marks)**

4 a. For the oriented graph shown in figure Q4 (a), write the complete incidence matrix. Also write the cutset and tieset matrices considering branches 4, 5 and 6 as twigs. **(10 Marks)**

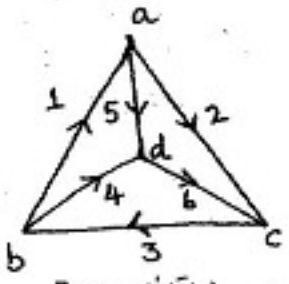

Fig. Q4 (a)

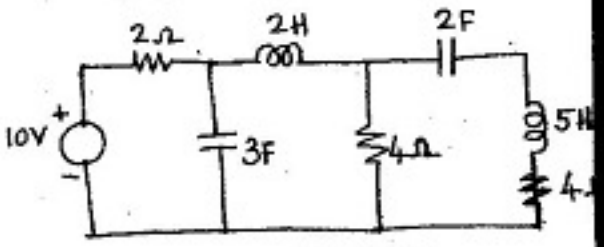

Fig. Q4 (b)

b. For the network shown in figure Q4 (b) draw its dual write in the integro-differential form

i) Mesh equations for the given network.

ii) Node equations for the dual. **(10 Marks)**

5 a. A constant voltage at a frequency of 1 MHz is applied to an inductor coil in series with a variable capacitor. When the capacitor is set at 500 pF, the current has its maximum value, while the current is reduced to one half when the capacitance is 600 pF. Find

i) The resistance and inductance of the coil.

ii) The Q factor of the inductor. **(10 Marks)**

b. Derive the expression for the resonant frequency of the circuit shown in figure Q5 (b). Also show that the circuit will resonate at all frequencies if $R_L = R_C = \sqrt{\frac{L}{C}}$. **(10 Marks)**

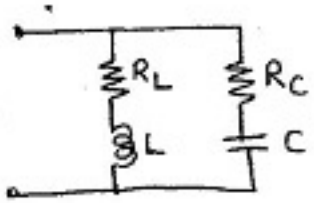

Fig Q5 (b)

6 a. In the network shown in figure 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)**

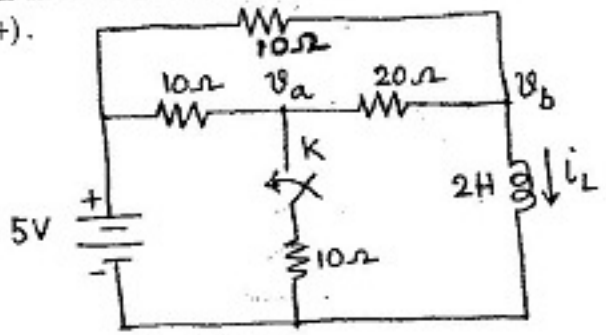

Fig Q6 (a)

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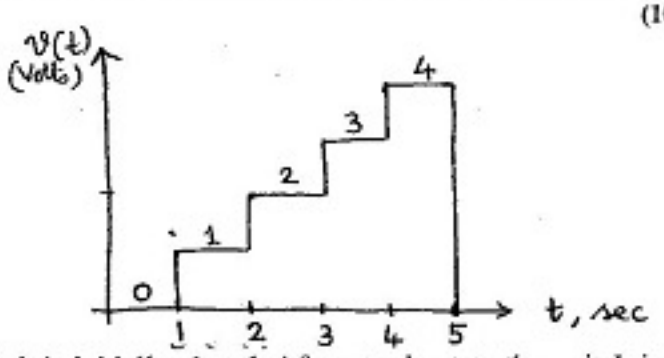
6 b. State and prove (i) initial value theorem and (ii) final value theorem as applied to Laplace transform. What are the limitations of each theorem? **(10 Marks)**

7 a. (i) Assuming that the stair case voltage waveform of figure Q7 (a) is not repeated find its Laplace transform.

(ii) If this voltage wave is applied to an R_L series circuit with $R = 1\,\Omega$ and $L = 1$ H find the current *i(t)*. **(10 Marks)**



b. In figure Q7 (b) the switch is initially closed. After steady state the switch is opened. Determine the nodal voltages $V_a(t)$ and $V_b(t)$ using Laplace transform method. **(10 Marks)**

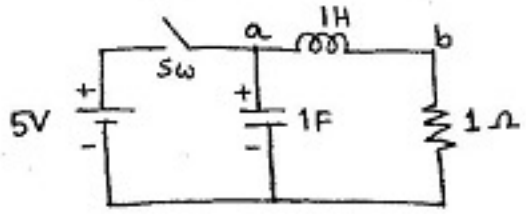


Fig Q7 (b)

8 a. Define h parameters. Show that the transmission matrix of a cascade of two-port networks is the product of transmission matrices of the individual two-port networks. **(10 Marks)**

b. Find z and y parameters for the two-port network shown in figure Q8 (b). **(10 Marks)**

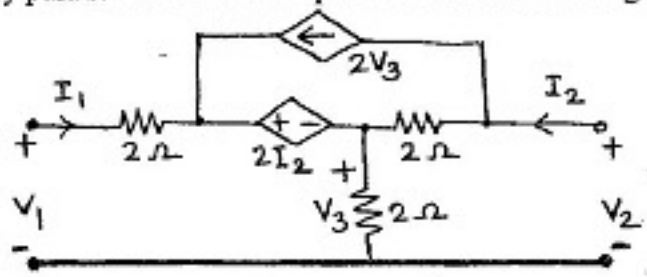


Fig Q8 (b)

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