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NEW SCHEME

Third Semester B.E. Degree Examination, July 2007
EE / EC / TE / IT / BM / ML
Network Analysis

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

Note : *Answer any FIVE full questions.*

1 a. Compute the resistance across the terminals A and B of the network shown in fig.1(a) using star-delta transformation. **(06 Marks)**

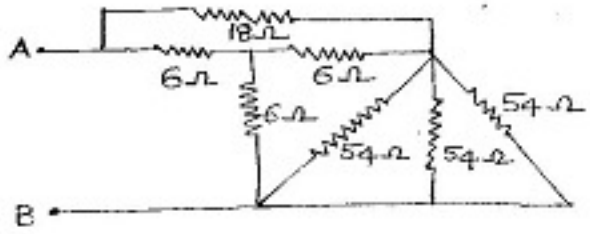

Fig.1(a)

b. In the circuit shown in fig.1(b), determine V_2 which results in zero current through 4Ω resistor. Use mesh current analysis. **(09 Marks)**

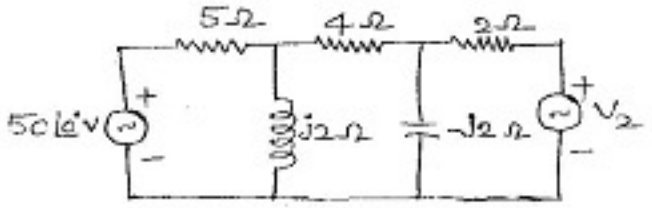

Fig.1(b)

c. Explain the following terms as applied to network topology. **(05 Marks)**
i) Orient graph ii) Tree iii) Link iv) Planar graph and non planar graph.

2 a. The reduced incidence matrix of a graph of a network is given below. Draw the oriented graph corresponding to it. **(05 Marks)**

$$\begin{bmatrix} -1 & +1 & 0 & 0 & 0 & -1 \\ 0 & -1 & -1 & +1 & 0 & 0 \\ 0 & 0 & +1 & 0 & -1 & +1 \end{bmatrix}$$

b. Determine the current in 10Ω resistor for the circuit shown in fig.2(b), using cut set schedule. **(10 Marks)**

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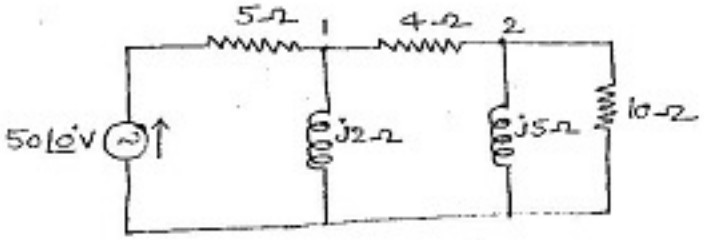

Fig.2(b)

c. Draw the dual network of the circuit shown in fig.2(c) **(05 Marks)**

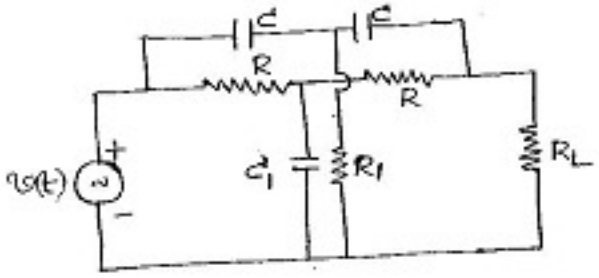

Fig.2(c)

3 a. State and prove Thevenin's theorem. **(08 Marks)**

b. Verify reciprocity theorem for the circuit shown in fig.3(b). **(06 Marks)**

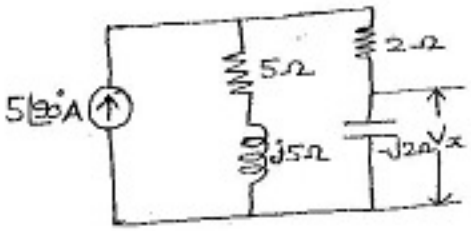

Fig.3(b)

c. For the circuit shown in fig.3(c), find the current "I" using super position theorem. **(06 Marks)**

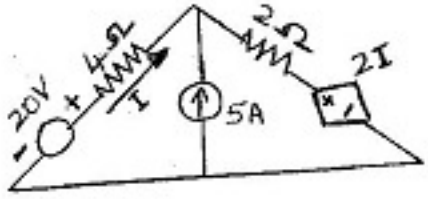

Fig.3(c)

4 a. Derive the expression for the resonant frequency of the circuit shown in fig.4(a). Also show that the circuit will resonate at all frequencies if $R_L = R_C = \sqrt{\frac{L}{C}}$ **(10 Marks)**

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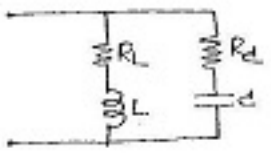

Fig.4(a)

b. A constant voltage at a frequency of 1MHz 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 the following.
i) The resistance and induction of the coil ii) The Q factor of the coil. **(10 Marks)**

5 a. Explain the behavior of resistor, Inductor and capacitor elements under transient conditions. **(06 Marks)**

b. In the network shown in fig.5(b), $v_1(t) = e^{-t}$ for $t \geq 0$ and is zero for all $t < 0$. if the capacitor is initially uncharged, determine the values of $\frac{d^2v_2}{dt^2}$ and $\frac{d^3v_2}{dt^3}$ at $t = 0^+$. **(10 Marks)**

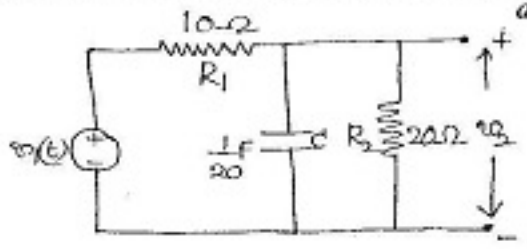

Fig.5(b)

c. Sketch the waveforms :
i) $t\,u(t-T)$; ii) $(t-T)\,u(t-T)$; iii) $u(-t)$ iv) $t\,u(t+T)$ **(04 Marks)**

6 a. State and prove Initial and final value theorems. **(06 Marks)**

b. For the circuit shown in fig.6(b), determine the voltage across the capacitor for $t \geq 0$. The capacitor was initially charged to the extent of 2V, before the switch k is closed at $t = 0$. **(10 Marks)**

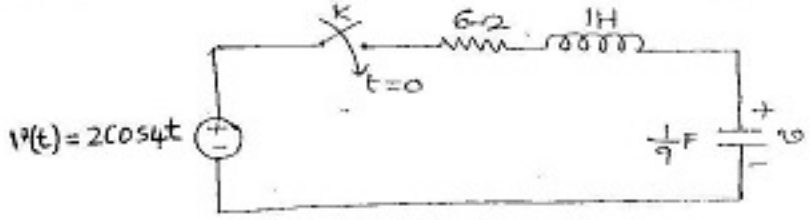

Fig.6(b)

c. Explain step, ramp and impulse functions. **(04 Marks)**

7 a. Obtain the Laplace transform of the function shown in fig.7(a). **(08 Marks)**

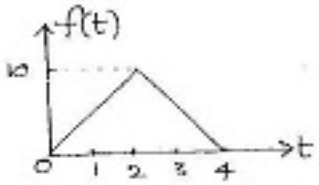

Fig 7(a)

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b. Using initial and final value theorems, determine f (0) and f (∞) for the following.

i) $F(S) = \dfrac{s^3 + 7s^2 + 5}{s(s^3 + 3s^2 + 4s + 2)}$ ii) $F(S) = \dfrac{s(s+4)(s+8)}{(s+1)(s+6)}$ **(06 Marks)**

c. State and prove convolution theorem. **(06 Marks)**

8 a. Obtain ABCD parameters in terms of impedance (Z) parameters and hence show that AD – BC = 1. **(08 Marks)**

b. Determine Y parameters of the two-port network shown in fig. 8(b). **(08 Marks)**

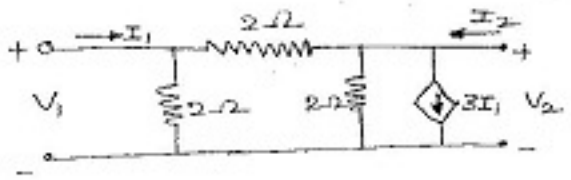

Fig.8(b)

c. A two port network has the following z-parameters :