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06ES34

Third Semester B.E. Degree Examination, Dec.09/Jan.10
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Write the mesh equations for the circuit shown in Fig.1 and solve for currents i_1, i_2 and i_3. **(10 Marks)**

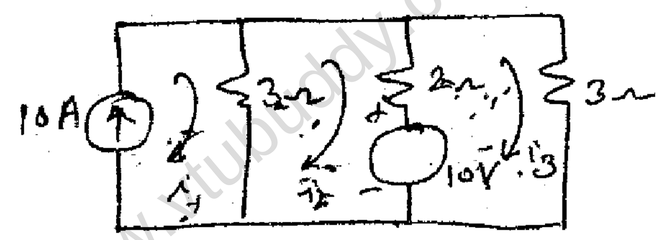

Fig.1(a)

b. The node voltage equations of a network are

$$\left(\frac{1}{5}+\frac{1}{2}j+\frac{1}{4}\right) v_1 - \frac{1}{4} v_2 = \frac{50\angle 0^\circ}{5} \text{ and } -\frac{1}{4} v_1 + \left(\frac{1}{4}-\frac{1}{j2}+\frac{1}{2}\right) v_2 = \frac{50\angle 90^\circ}{2}.$$ Derive the network.

(10 Marks)

2 a. Define the following terms with respect to the network topology. Give examples.
i) Tree ; ii) Graph ; iii) Sub graph ; iv) Tieset ; v) Cutset. **(08 Marks)**

b. For the network shown in Fig.2(b), write the graph and obtain the tieset schedule considering j_1, j_2, j_5 as tree branches. Also calculate all branch currents. **(12 Marks)**

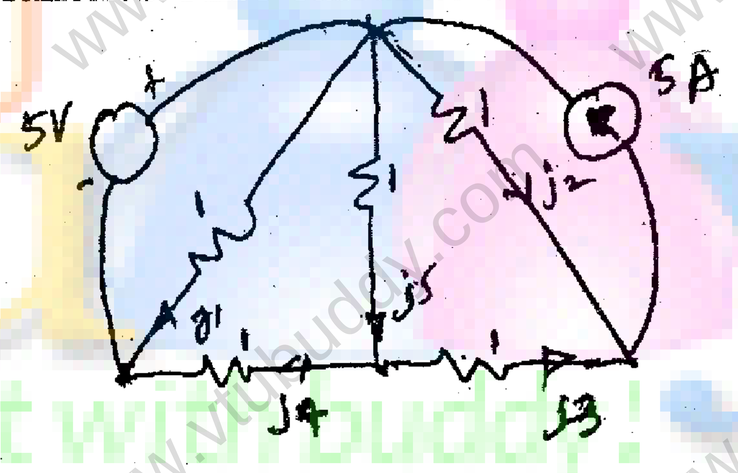

Fig.2(b)

3 a. In the circuit shown in Fig.3(a), find v_x and prove reciprocity theorem. **(10 Marks)**

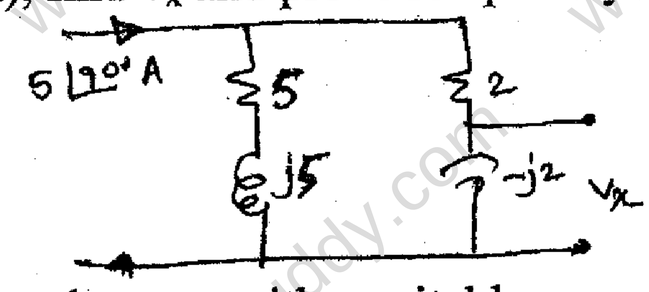

Fig.3(a)

b. State and explain super position theorem with a suitable example. **(10 Marks)**

4 a. Obtain the Thevenin's equivalent network for the circuit in Fig.4(a) between the terminals X and Y. **(10 Marks)**

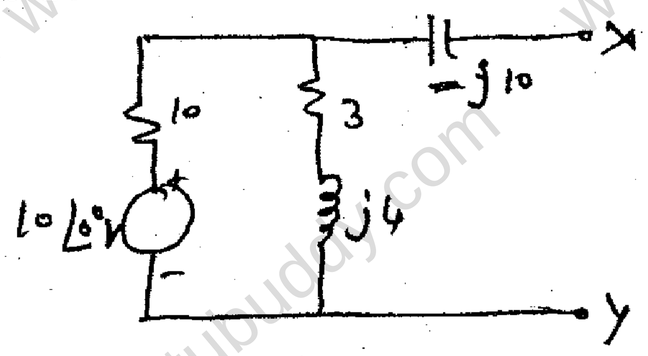

Fig.4(a).

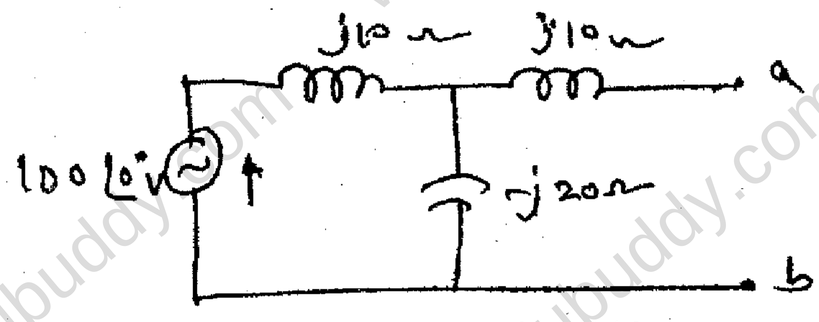

Fig.4(b).

b. What should be the value of pure resistive load to be connected across the terminals a and b in the network shown in Fig. 4(b), so that maximum power is transferred to the load? Calculate the maximum power. **(10 Marks)**

PART – B

5 a. Show that for a series RLC resonant circuit the selectivity $\varphi = \frac{f0}{f2-f1}$, where fo: resonate frequency, f1 and f2 are half power frequency. **(08 Marks)**

b. Determine R_L and R_C for which the circuit shown in Fig.6 resonates at all frequencies. **(06 Marks)**

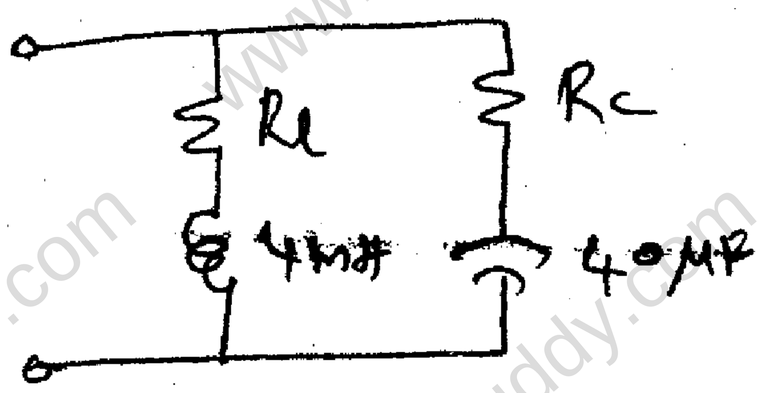

Fig.5(b)

c. It is required that a series RLC circuit should resonate at 1 MHz. Determine values of R, L and C if bandwidth of the circuit is 5 kHz and its impedance is 50 Ω at resonance. **(06 Marks)**

6 a. Explain the importance of study of initial conditions in electric circuit analysis. **(06 Marks)**

b. Explain the behaviour of R, L and C elements for transients. Mention their representation at the instant of switching. **(06 Marks)**

c. In the circuit shown in Fig.6(c), the switch is moved from 'a' to 'b' at t = 0. Find the values of i, $\frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t = 0^+$, if R = 1 Ω, L = 1 H, C = 0.1 μF and V = 100 V. Assume steady state is achieved when k is at 'a'. **(08 Marks)**

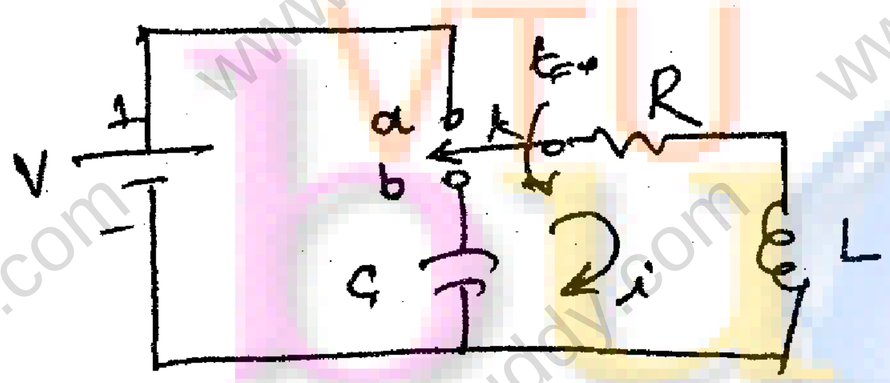

Fig.6(c).

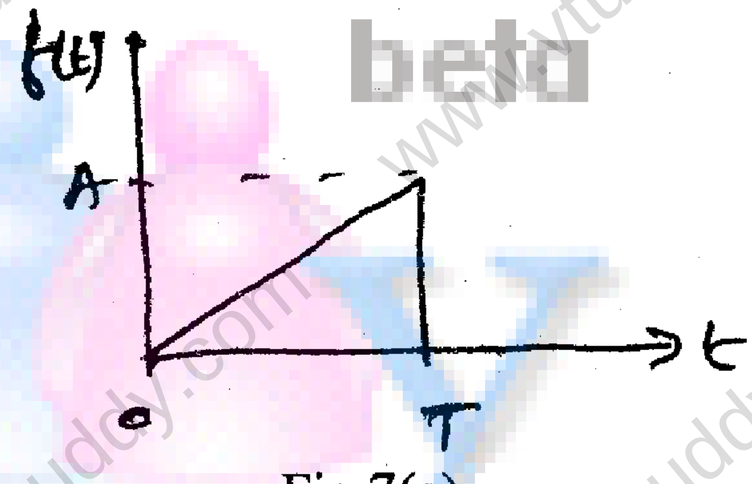

Fig.7(a).

7 a. Obtain the Laplace transform of saw took waveform shown in Fig.7(a). **(06 Marks)**

b. Find the Laplace transform of i) δ (t) ; ii) t ; iii) e^{-at}. **(06 Marks)**

c. Find f (o) and f (∞) using initial value and final value theorem for the function given below.

$$F(s) = \frac{s^3 + 7s^2 + 5}{s(s^3 + 3s^2 + 4s + 2)}.$$ **(08 Marks)**

8 a. Find y parameters for the network shown in Fig.8(a). **(08 Marks)**

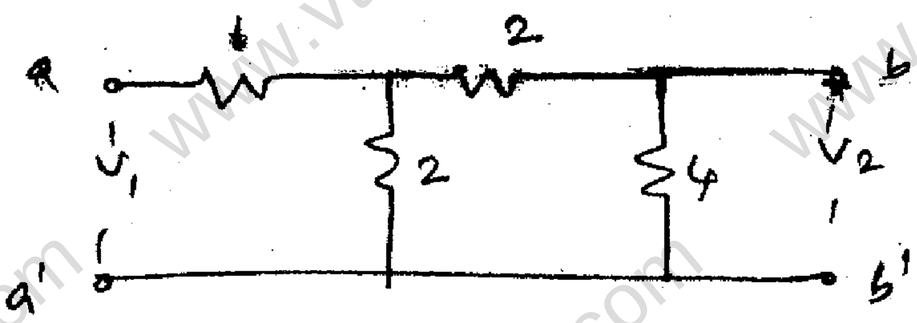

Fig.8(a).

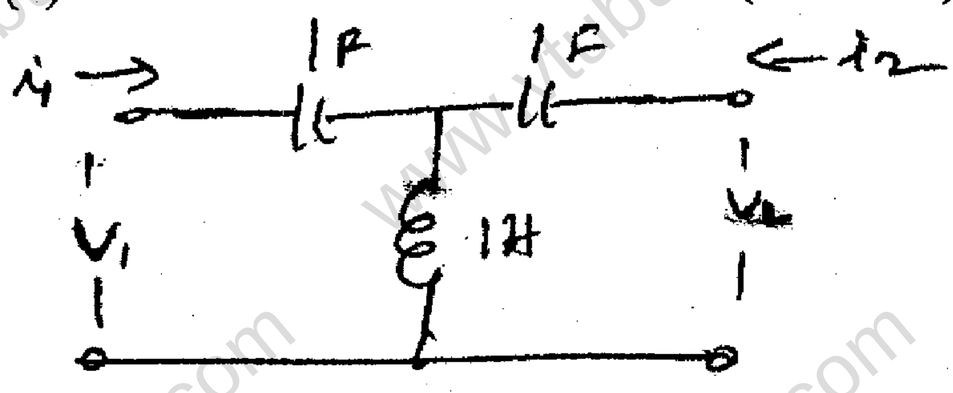

Fig.8(b)

b. Determine the 'h' parameters for the network shown in Fig.8(b). **(08 Marks)**

c. Mention the application of
i) Transmission parameters ; ii) 'h' parameters ; iii) 'z' parameters. **(04 Marks)**

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