CBCS SCHEME

USN | | | | | | | | | |

15EC34

Third Semester B.E. Degree Examination, Jan./Feb.2021
Network Analysis

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define the terms with an example,
(i) Linear and non linear elements.
(ii) Lumped and distributed elements.
(iii) Unilateral and Bilateral elements.
(iv) Active and Passive elements. **(08 Marks)**

b. Find the current in 28 Ω resistor using mesh analysis in Fig. Q1 (b). **(08 Marks)**

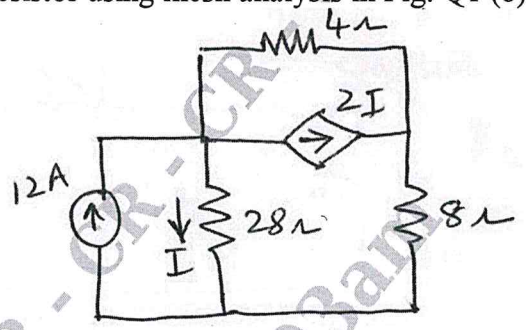

Fig. Q1 (b)

OR

2 a. Reduce the network in Fig. Q2 (a) to a single voltage source in series with a resistance using source shift and source transformation.

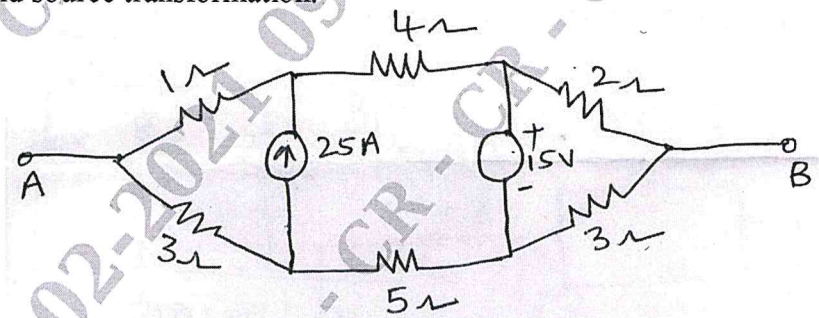

Fig. Q2 (a)

(08 Marks)

b. The node voltage equations of a network are,

$$\left[\frac{1}{5}+\frac{1}{j2}+\frac{1}{4}\right]V_1-\frac{1}{4}V_2=\frac{50\angle 0^0}{5}$$

and

$$-\frac{1}{4}V_1+\left[\frac{1}{4}+\frac{1}{-2j}+\frac{1}{2}\right]V_2=\frac{50\angle 90^0}{2}.$$

Derive the network. **(08 Marks)**

Module-2

3 a. State and prove superposition theorem. **(08 Marks)**

b. For the circuit shown in fig. Q3 (b), find the current through R_L using Thevenins theorem. **(08 Marks)**

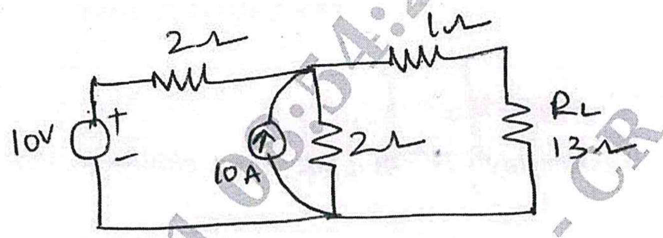

Fig. Q3 (b)

OR

4 a. State and prove Millers theorem. **(08 Marks)**

b. Find the value of Z_L for which power transferred to the load is maximum and also determine the maximum power for the circuit shown in Fig. Q4 (b). **(08 Marks)**

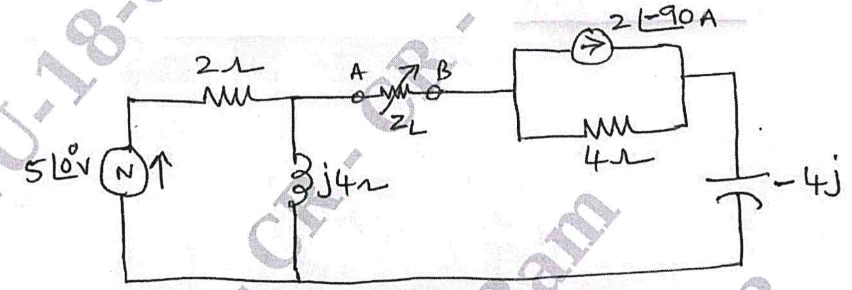

Fig. Q4 (b)

Module-3

5 a. In the circuit of Fig. Q5 (a). Switch K is opened at t = 0. Find the value of V, $\frac{dV}{dt}$ and $\frac{d^2V}{dt^2}$ at $t = 0^+$. **(08 Marks)**

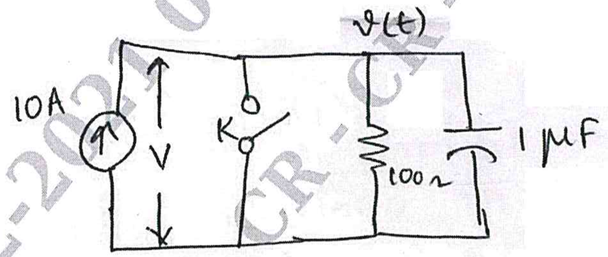

Fig. Q5 (a)

b. Obtain the Laplace transform of the square wave shown in Fig. Q5 (b). **(08 Marks)**

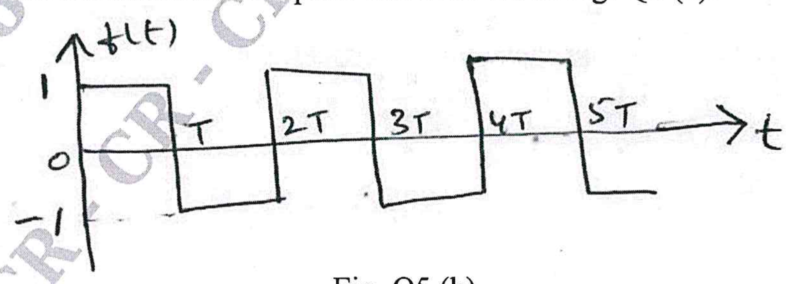

Fig. Q5 (b)

OR

6 a. State and prove initial value and final value theorem. **(08 Marks)**

b. For the network shown in Fig. Q6 (b) the switch is moved from position 1 to position 2 at t = 0 the steady state has been reached before switching. Calculate i, $\frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t = 0^+$. **(08 Marks)**

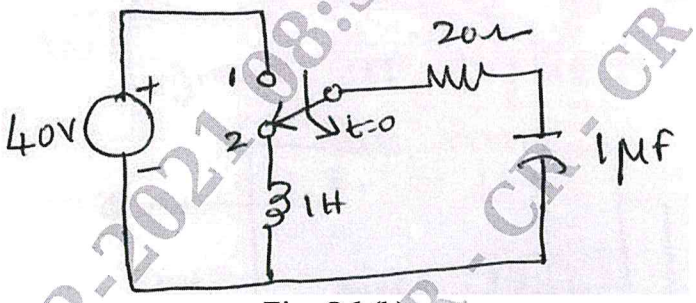

Fig. Q6 (b)

Module-4

7 a. Define the following terms :
(i) Resonance
(ii) Q-factor
(iii) Bandwidth
(iv) Selectivity. **(04 Marks)**

b. Derive an expression for frequency of resonance of a parallel resonant circuit containing resistance in both the branches. **(06 Marks)**

c. It is required that a series RLC circuit should resonate at 500 kHz. Determine the values of R, L and C if the bandwidth of the circuit is 10 kHz and its impedence is 100 Ω at resonance. Also find the voltages across L and C at resonance if the applied voltage is 75 volts. **(06 Marks)**

OR

8 a. Show that a two branch parallel resonant circuit is resonant at all the frequencies if $R_L = R_C = \sqrt{\frac{L}{C}}$ where R_L = Resistance in the inductor branch, R_C = Resistance in the capacitor branch. **(06 Marks)**

b. Give the comparison between series and parallel resonance. **(04 Marks)**

c. Find the value of R_1 such that the circuit given in Fig. Q8 (c) is resonant. **(06 Marks)**

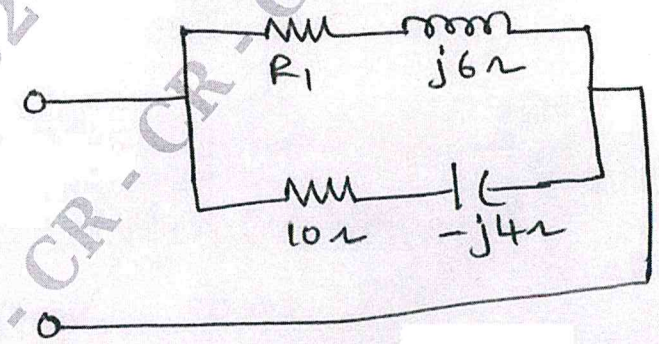

Fig. Q8 (c)

Module-5

9 a. Express Y parameters in terms of Z and T parameters. **(08 Marks)**

b. Find the transmission parameters for the network shown in Fig. Q9 (b). **(08 Marks)**

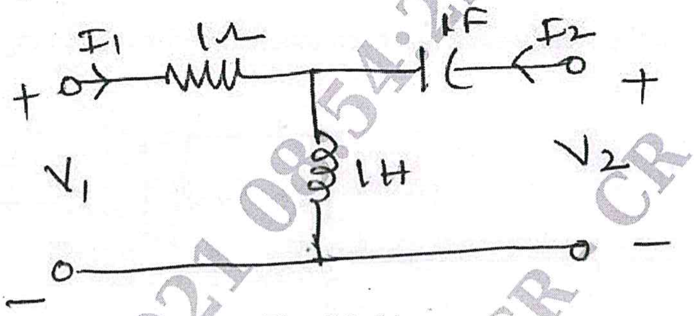

Fig. Q9 (b)

OR

10 a. Express ABCD parameters in terms of Y and h parameters. **(08 Marks)**

b. Find the h parameters of the network shown in Fig. Q10 (b). **(08 Marks)**

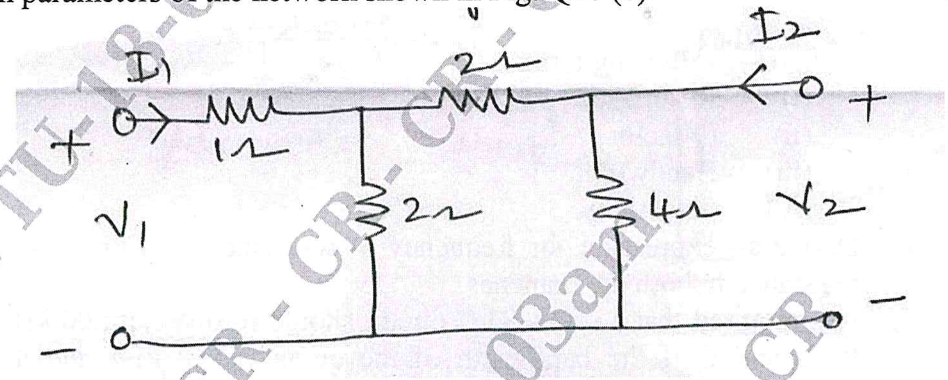

Fig. Q10 (b)

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