CBCS SCHEME

USN

17EC35

Third Semester B.E. Degree Examination, Jan./Feb. 2023
Network Analysis

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. What is dependent sources? Draw the symbolic representation of all four dependent sources. **(04 Marks)**

b. Reduce the network shown in Fig.Q.1(b) into a single voltage source with series resistance between A and B. **(08 Marks)**

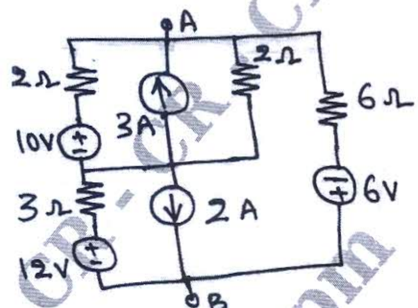

Fig.Q.1(b)

c. Using Mesh analysis, calculate the current I_1 shown in Fig.Q.1(c). **(08 Marks)**

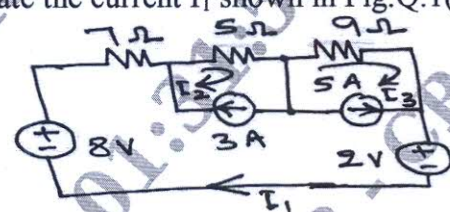

Fig.Q.1(c)

OR

2 a. With the help of example, explain the concept of super node. **(04 Marks)**

b. Derive the expressions for converting star to delta transformation. **(08 Marks)**

c. Determine the current through the branch AB of the network shown in Fig.Q.2(c). **(08 Marks)**

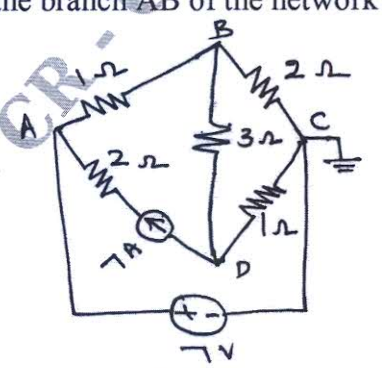

Fig.Q.2(c)

Module-2

3 a. State the Reciprocity and Norton's theorem. **(04 Marks)**

b. Using superposition theorem, find I_x for the circuit shown in Fig.Q.3(b). **(08 Marks)**

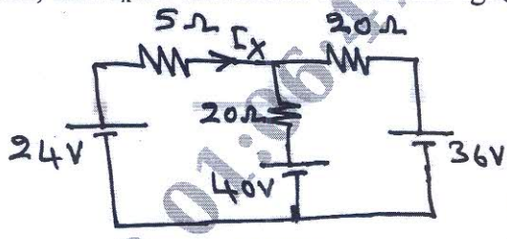

Fig.Q.3(b)

c. Obtain the Thevenin's equivalent circuit across the terminal AB of the network shown in Fig.Q.3(c). **(08 Marks)**

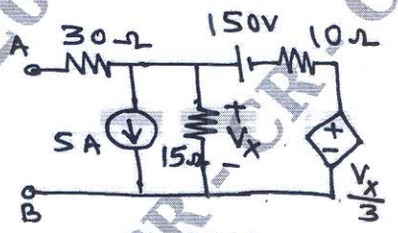

Fig.Q.3(c)

OR

4 a. State superposition theorem and mention the steps to be followed for solving the problems. **(04 Marks)**

b. Prove that $P_{max} = \frac{|V_{th}|^2}{8R_{th}}$ for maximum power transfer of a ac circuits. **(08 Marks)**

c. Verify Reciprocity Theorem for the circuit shown in Fig.Q.4(c). **(08 Marks)**

Fig.Q.4(c)

Module-3

5 a. Draw the behavior representation of inductor and capacitor at t = 0, t = 0^+ and at t = ∞. **(04 Marks)**

b. For the network shown in Fig.Q.5(b), the switch 's' is closed at t = 0, determine i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(08 Marks)**

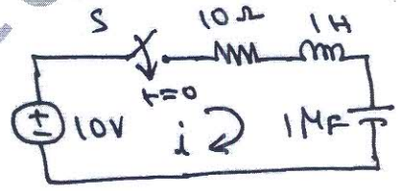

Fig.Q.5(b)

c. Find the Laplace transform of the waveform shown in Fig.Q.5(c). **(08 Marks)**

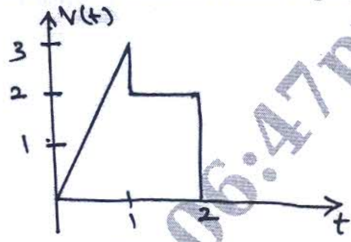

Fig.Q.5(c)

OR

6 a. What is the need for evaluating initial conditions and also write the procedure for evaluating initial conditions. **(04 Marks)**

b. For the network shown in Fig.Q.6(b), a steady state is reached with the switch 'K' open. At t = 0 the switch is closed. Determine the value of $V_x(0^+)$ and $V_x(0^-)$. **(08 Marks)**

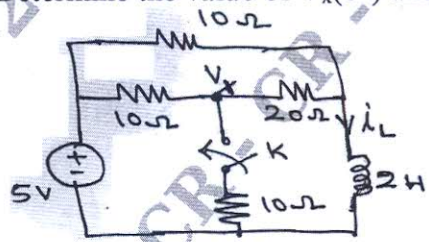

Fig.Q.6(b)

c. Find the Laplace transform of the periodic signal x(t) shown in Fig.Q.6(c). **(08 Marks)**

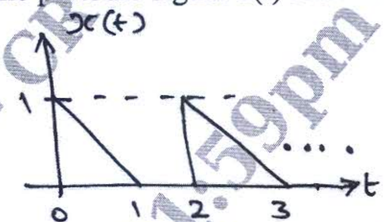

Fig.Q.6(c)

Module-4

7 a. Compare series and parallel resonance circuit. **(04 Marks)**

b. Starting from the fundamentals, show that Bandwidth $f_2 - f_1 = \frac{R}{2\pi L}$ of a series resonance circuit. **(08 Marks)**

c. A coil of R = 10Ω and L = 0.5H is connected in series with a capacitor. The current is maximum when f = 50Hz. A second capacitor is connected in parallel, with this circuit. What capacitances must it have so that the combination acts like a non-reactive circuit at 100Hz. Calculate the total current supplied in each case if the applied voltage is 220V. **(08 Marks)**

OR

8 a. What is the need for resonance circuits and mention its applications. **(04 Marks)**

b. Derive the expression of resonance frequency for the circuit shown in Fig.Q.8(b). **(08 Marks)**

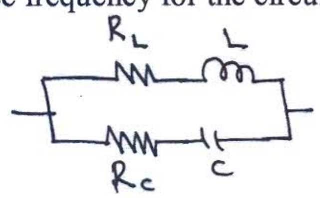

Fig.Q.8(b)

c. Determine the RLC parallel circuit parameters whose response curve is shown in Fig.Q.8(c). What are the new values of W_r and Bandwidth if 'C' is increases to 4 times? **(08 Marks)**

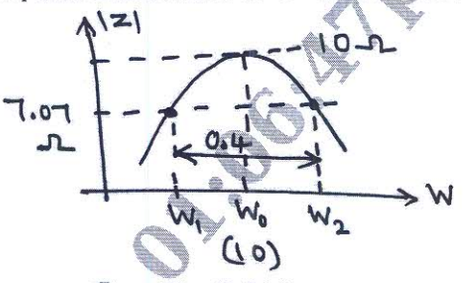

Fig.Q.8(c)

Module-5

9 a. Write the basic voltage equations of impedance parameter and also define all four parameters of Z. **(04 Marks)**

b. Obtain h-parameters interms of transmission and Z-parameters. **(08 Marks)**

c. For the network shown in Fig.Q.9(c), find Y and Z-parameters. **(08 Marks)**

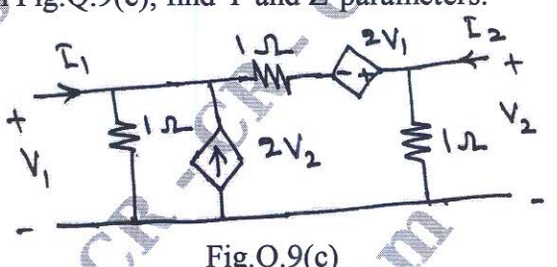

Fig.Q.9(c)

OR

10 a. What is hybrid parameters? And write the basic equations of h-parameter. **(04 Marks)**

b. Obtain the Y-parameters of the two networks shown in Fig.Q.10(b). **(08 Marks)**

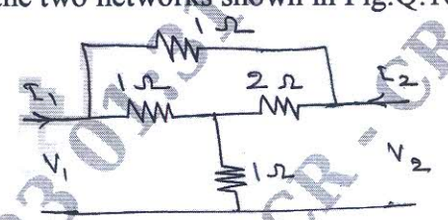

Fig.Q.10(b)

c. Find the T-parameters for the network shown in Fig.Q.10(c). **(08 Marks)**

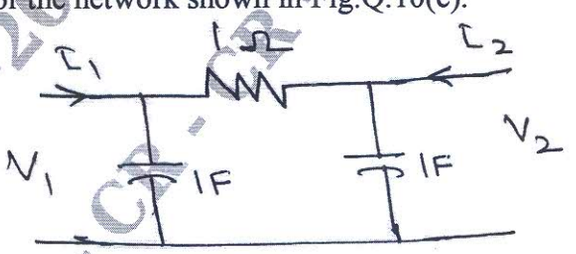

Fig.Q.10(c)

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