CBCS SCHEME

USN | | | | | | | | | | |

15EC34

Third Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. Reduce the network shown in Fig.Q1(a) to a single voltage source in series with a resistance using source shift and source transformations.

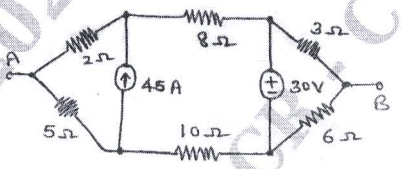

Fig.Q1(a)

(08 Marks)

b. Using star/delta transformation, determine the resistance between M and N for the network shown in Fig.Q1(b).

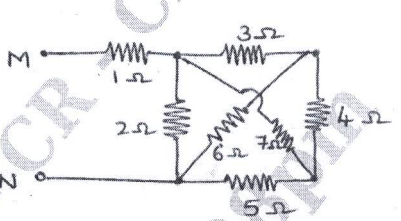

Fig.Q1(b)

(08 Marks)

OR

2 a. Find the power delivered by the dependent voltage source in the circuit shown in Fig.Q2(a) by Mesh current method.

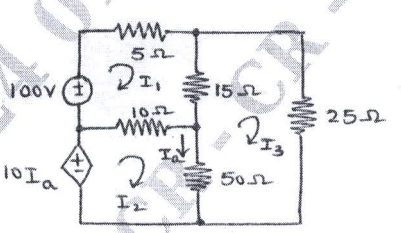

Fig.Q2(a)

(06 Marks)

b. Define super Mesh and super node. **(02 Marks)**

c. Use the node-voltage method to find the power developed by the 20V source in the circuit shown in Fig.Q2(c).

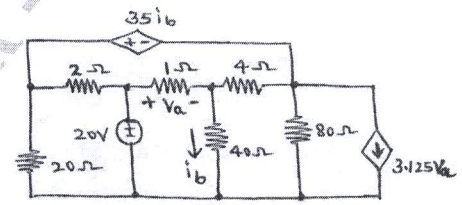

Fig.Q2(c)

(08 Marks)

Module-2

3 a. Using Millman's theorem, find the current through load resistance R_L for the circuit shown in Fig.Q3(a). **(08 Marks)**

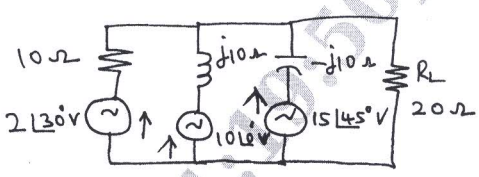

Fig.Q3(a)

b. State the maximum power transfer theorem and also prove that $P_{max} = \frac{V_{th}^2}{4R_L}$, where V_{th} = thevenins voltage. **(08 Marks)**

OR

4 a. Obtain the Thevenin's equivalent of the circuit shown in Fig.Q4(a). **(08 Marks)**

b. Using superposition theorem, find the current in 6Ω resistor in the network shown in Fig.Q4(b).

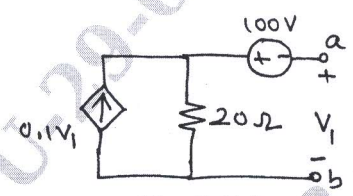

Fig.Q4(a)

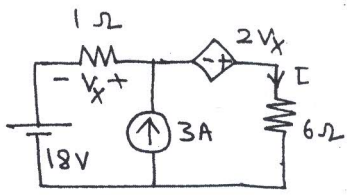

Fig.Q4(b)

(08 Marks)

Module-3

5 a. In the network shown in Fig.Q5(a), K is changed from position a to b at t = 0. Solve for i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$, if R = 1000Ω, L = 1H, C = 0.1μF and V = 100V. Assume that the capacitor is initially uncharged.

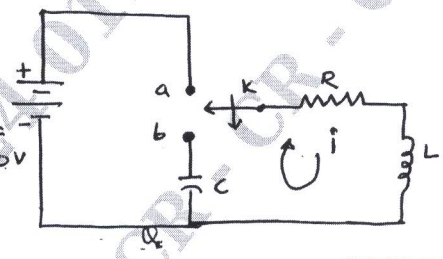

Fig.Q5(a)

(08 Marks)

b. Determine the response current i(t) in the circuit shown in Fig.Q5(b) using Laplace transform.

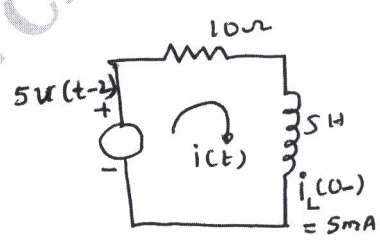

Fig.Q5(b)

(08 Marks)

OR

6 a. Synthesis the waveform shown in Fig.Q6(a) and find the Laplace transform of the periodic waveform. **(08 Marks)**

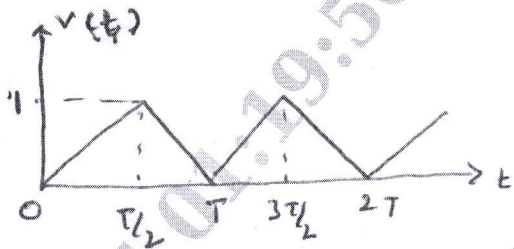

Fig.Q6(a)

b. Determine $v, \frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$ when the switch k is opened at t=0 in Fig.Q6(b).

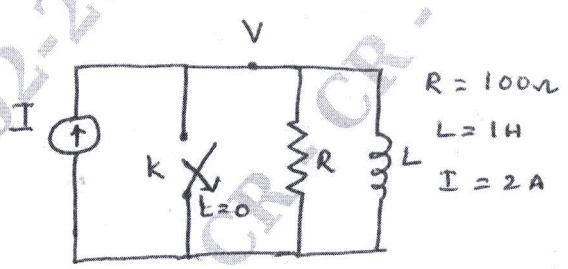

Fig.Q6(b)

(08 Marks)

Module-4

7 a. Derive the expressions of half power frequencies W_1 and W_2 and also bandwidth of a series resonance circuit. **(09 Marks)**

b. Find the values of L at which the circuit shown in Fig.Q7(b) resonates at a frequency of 500 r/s.

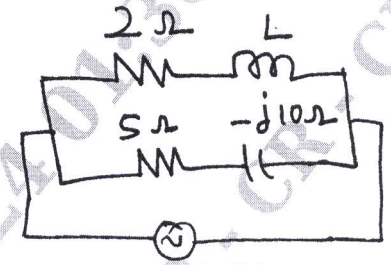

Fig.Q7(b)

(07 Marks)

OR

8 a. Derive the expressions of a resonance frequency and dynamic impedance of a parallel resonance circuit. **(09 Marks)**

b. A coil has a R = 20Ω, L = 80mH and C = 100pF are connected in series. Determine : i) impedance at resonance ii) resonance frequency iii) quality factor iv) circuit current if supply voltage is 50V. **(07 Marks)**

Module-5

9 a. Derive Y parameters and transmission parameters of a circuit interms of its z-parameters. **(08 Marks)**

b. Find the z-parameters for the network shown in Fig.Q9(b).

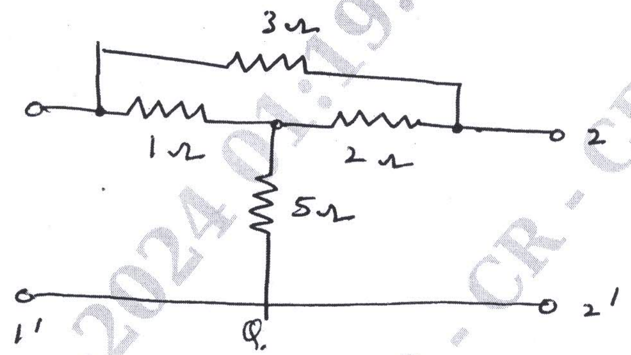

Fig.Q9(b)

(08 Marks)

OR

10 a. The z parameters of a two port network are $z_{11} = 20\Omega$, $z_{22} = 30\Omega$, $z_{12} = z_{21} = 10\Omega$. Find Y and ABCD parameters. **(08 Marks)**

b. Determine Y parameters of the two port network shown in Fig.Q10(b).

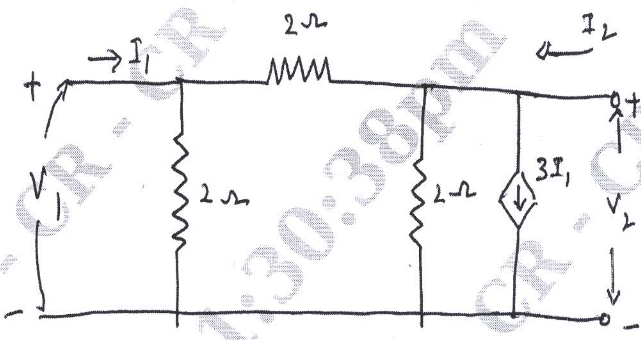

Fig.Q10(b)

(08 Marks)

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