CBCS SCHEME

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15EC34

Third Semester B.E. Degree Examination, July/August 2021
Network Analysis

Time: 3 hrs. Max. Marks:80

Note: ***Answer any FIVE full questions.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

1 a. Calculate the voltage 'V' across 20Ω resistor for the circuit shown in Fig.Q1(a) using source transformation.

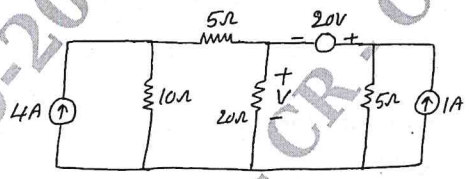

Fig.Q1(a) **(08 Marks)**

b. Find the value of a single resistor to replace the network between terminals A and B of the network shown in Fig.Q1(b) using star-delta transformation.

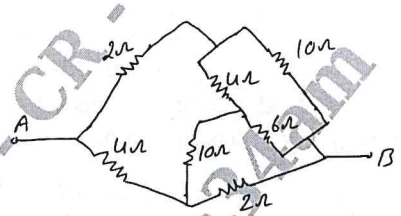

Fig.Q1(b) **(08 Marks)**

2 a. Determine the nodal voltages V_1, V_2, V_3 for the networks shown in Fig.Q2(a).

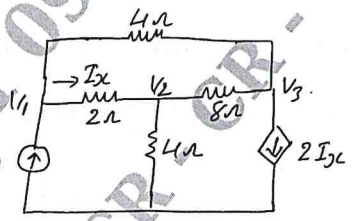

Fig.Q2(a) **(08 Marks)**

b. In the circuit shown in Fig.Q2(b), determine V_2, which results zero current through 4Ω resistor using Mesh analysis.

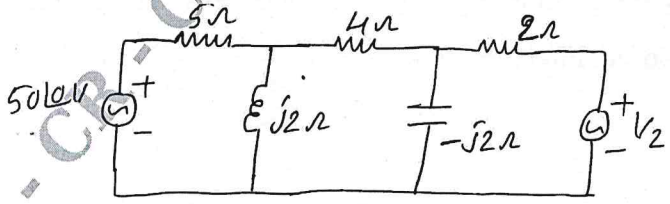

Fig.Q2(b) **(08 Marks)**

3 a. Using Millman's theorem find the current through $(2 + j3)\Omega$ impedance for the circuit shown in Fig.Q3(a).

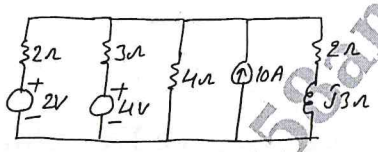

Fig.Q3(a) **(07 Marks)**

b. In the network shown in Fig.Q3(b), determine current in 5Ω resistor and then verify reciprocity theorem.

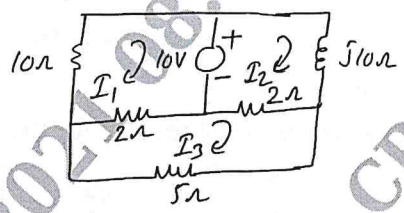

Fig.Q3(b) **(09 Marks)**

4 a. Find the current following through 7.5Ω resistor using superposition theorem in the networks shown in Fig.Q4(a).

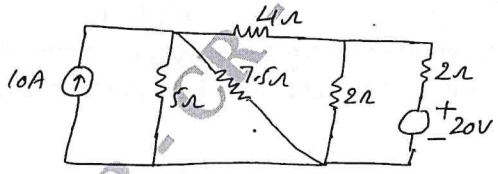

Fig.Q4(a) **(08 Marks)**

b. State Norton's theorem and find the current flowing through $Z_L = 10 - j7.5$ connected across AB in the circuit shown in Fig.Q4(b) using North's theorem.

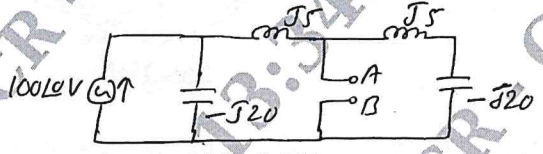

Fig.Q4(b) **(08 Marks)**

5 a. In the circuit shown in Fig.Q5(a) switch 'K' is changed from position 1 to 2 at t = 0. Steady state condition having reached before switching. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$.

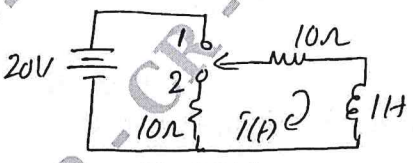

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Fig.Q5(a) **(08 Marks)**

b. For the circuit given in Fig.Q5(b) steady state is reached with switch 'K' open and at t = 0 switch is closed. Find the values of $i_1, i_2, \frac{di_1}{dt}$ and $\frac{di_2}{dt^2}$ at $t = 0^+$.

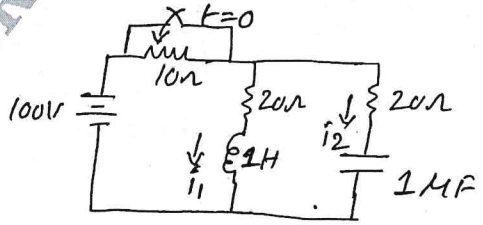

Fig.Q5(b) **(08 Marks)**

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6 a. For the circuit shown in Fig.Q6(a) obtain the equation for $i_1(t)$ and $i_2(t)$ when the switch is closed at t = 0. Use Laplace transforms.

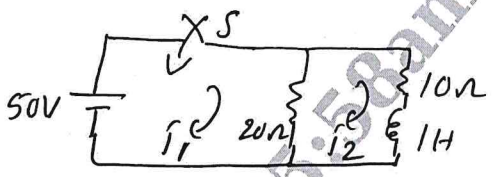

Fig.Q6(a) **(08 Marks)**

b. Obtain the Laplace transform of the function shown in Fig.Q6(b).

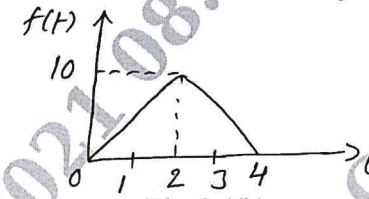

Fig.Q6(b) **(08 Marks)**

7 a. Define the following terms : i) Resonance ii) Q – Factor iii) Selectivity of series RLC circuit iv) Band width. **(08 Marks)**

b. A series RLC circuit consists of a 50Ω resistance, 0.2H inductance and 10μF capacitor with an applied voltage of 20V. Determine the resonant frequencies. Find the Q – factor of the circuit. Compute the lower and upper frequencies limit and also the Band width of the circuit. **(08 Marks)**

8 a. For the circuit shown in Fig.Q8(a). Find the two values of capacitor for the resonance. Derive the formula used consider f = 50Hz.

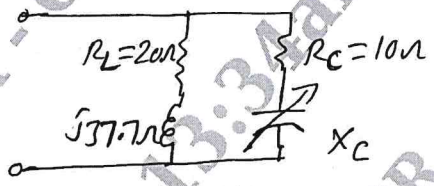

Fig.Q8(a) **(08 Marks)**

b. Determine the value of RC in the network shown in Fig.Q8(b).

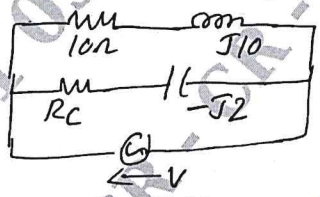

Fig.Q8(b) **(08 Marks)**

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9 a. Derive the Y-parameters in terms Z – parameters. **(08 Marks)**

b. Determine the admittance parameters of the 'T' networks shown in Fig.Q9(b).

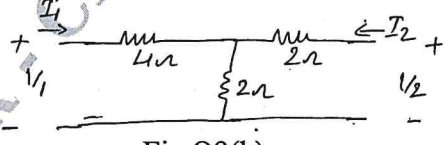

Fig.Q9(b) **(08 Marks)**

10 a. Obtain the expression of Z-parameters in terms of transmission parameters. **(08 Marks)**

b. Determine T – parameters interms of Z – parameters and hence show that AD – BC = 1. **(08 Marks)**

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