CBCS SCHEME

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15EC34

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Network Analysis

Time: 3 hrs. Max. Marks: 80

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

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.

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. **(08 Marks)**

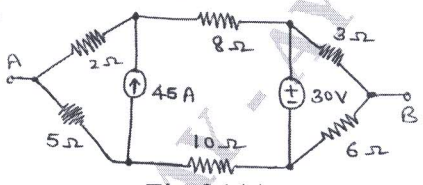

Fig.Q1(a)

b. Using star/delta transformation, determine the resistance between M and N for the network shown in Fig.Q1(b). **(08 Marks)**

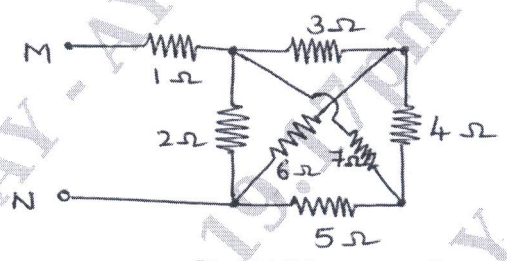

Fig.Q1(b)

OR

2 a. Find the power delivered by the dependent voltage source in the circuit shown in Fig.Q2(a) by Mesh current method. **(06 Marks)**

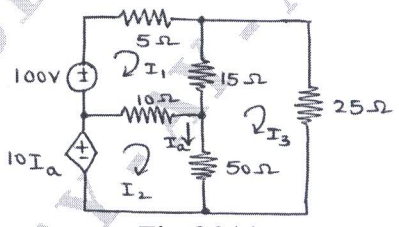

Fig.Q2(a)

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). **(08 Marks)**

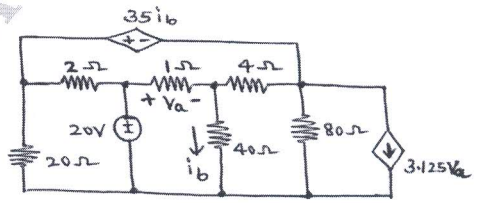

Fig.Q2(c)

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Module-2

3 a. Use superposition theorem to find v_x in the circuit shown in Fig.Q3(a). **(08 Marks)**

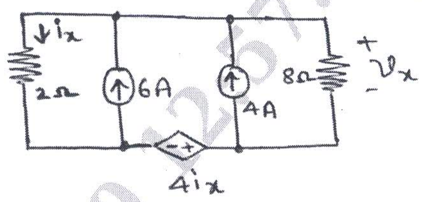

Fig.Q3(a)

b. State and prove reciprocity theorem. **(08 Marks)**

OR

4 a. State and prove Thevenin's theorem. **(06 Marks)**

b. Find the Norton's equivalent circuit across AB terminals for the network shown in Fig.Q4(b) and hence determine current through 5Ω resistor. **(06 Marks)**

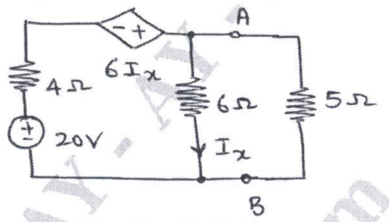

Fig.Q4(b)

c. Find the value of Z_L for which Maximum Power transfer occurs in the circuit shown in Fig.Q4(c). **(04 Marks)**

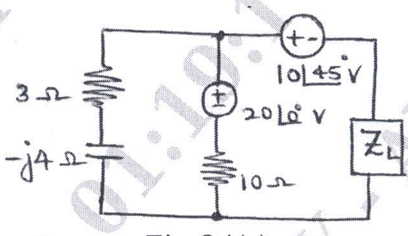

Fig.Q4(c)

Module-3

5 a. In the network shown in Fig.Q5(a), the switch k is closed at t = 0. Find the values of i_1, i_2 $\frac{d_i}{dt}$ and $\frac{d^2 i_2}{dt^2}$ at t = 0. **(08 Marks)**

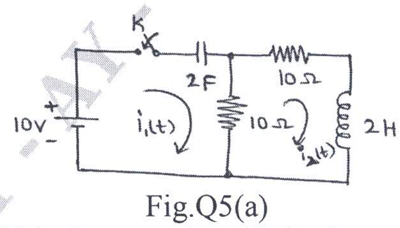

Fig.Q5(a)

b. In the circuit shown n Fig.Q5(b), the capacitor C_1 is charged to a voltage V_0 at t = 0, the switch is closed. Solve for the charge as a function of time. **(08 Marks)**

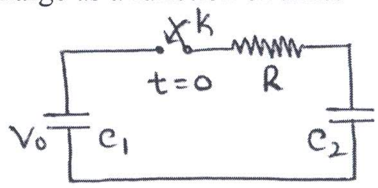

Fig.Q5(b)

OR

6 a. State and prove the following : i) Initial value theorem ii) Final value theorem. **(08 Marks)**

b. For the waveform shown in Fig.Q6(b), the equation of the waveforms is Sin(t) from 0 to π, and –sin(t) from π to 2π, show that the Laplace transform of this waveform is :

$$F(s) = \frac{1}{s^2+1}\cot h\left(\frac{\pi S}{2}\right).$$ **(08 Marks)**

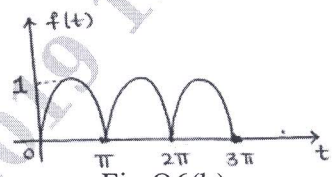

Fig.Q6(b)

Module-4

7 a. Define the following terms :
i) Resonance ii) Bandwidth. **(02 Marks)**

b. Prove that $f_0 = \sqrt{f_1 f_2}$ where f_1 and f_2 are the two half power frequencies of a resonant circuits. **(06 Marks)**

c. A series RLC circuit has R = 2Ω, L = 2 mH and C = 10μf calculate Q–factor, bandwidth, Resonant frequency and half power frequencies f_1 and f_2. **(08 Marks**

OR

8 a. Show that a two-branch parallel circuit is resonant at all frequencies if $R_L = R_C = \sqrt{\frac{L}{C}}$. **(08 Marks)**

b. Find the values of L for which the circuit given in Fig.Q8(b) resonates at w = 5000 r/sec. **(08 Marks)**

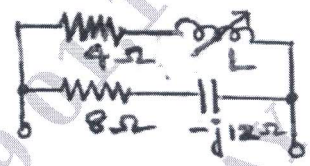

Fig.Q8(b)

Module-5

9 a. Express Z – parameters interms of Y-parameters. **(08 Marks)**

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

OR

10 a. For the network shown in Fig.Q10(a), contains an voltage controlled source and current controlled source, for the elemental values specified, determine Z and Y parameters. **(08 Marks)**

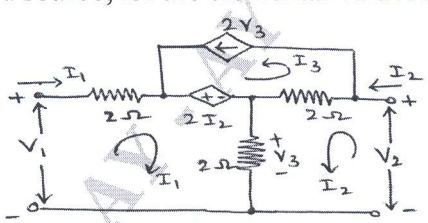

Fig.Q10(a)

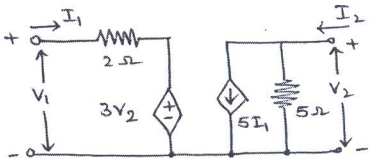

Fig.Q10(b)

b. Determine transmission parameters for the network shown in Fig.Q10(b). **(08 Marks)**

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