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17EC35

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020 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. Derive the expression for: (i) Δ to Y transformation (ii) Y to Δ transformation (10 Marks)
 b. Calculate the voltage across the 6Ω resistor in the network of Fig.Q1(b) using source shifting technique.

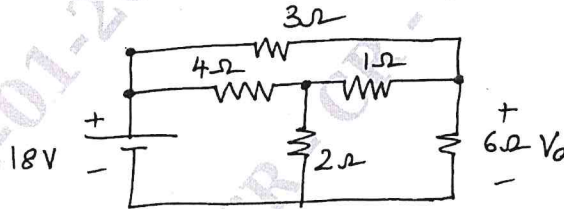


Fig.Q1(b)

(10 Marks)

OR

- 2 a. Determine the resistance between the terminals A and B of the network shown in Fig.Q2(a).

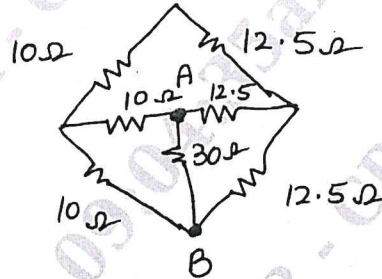


Fig.Q2(a)

(10 Marks)

- b. Find currents in all the branches of the network shown in Fig.Q2(b) using mesh analysis.

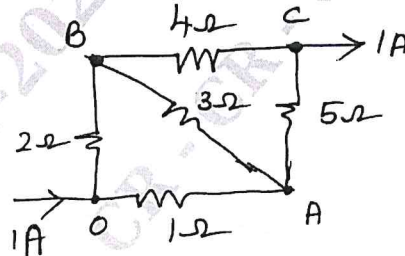


Fig.Q2(b)

(05 Marks)

- c. Find voltages V_1 and V_2 in the network shown in Fig.Q2(c) using node analysis method.

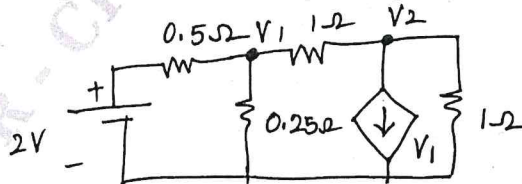


Fig.Q2(c)

(05 Marks)

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-2

- 3 a. Obtain Thevenin's equivalent network for Fig.Q3(a).

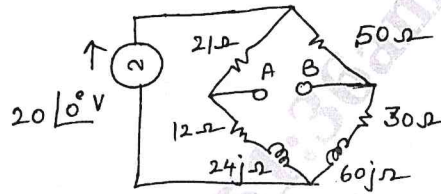


Fig.Q3(a)

(08 Marks)

- b. State and prove Millman's theorem.

(06 Marks)

- c. For the circuit shown in Fig.Q3(c), find the voltage V_x and verify reciprocity theorem.

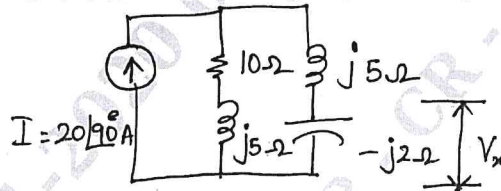


Fig.Q3(c)

(06 Marks)

OR

- 4 a. State and prove maximum power transfer theorem for AC circuits (when R_L and X_L are varying)

(10 Marks)

- b. Find 'V' in the circuit shown in Fig.Q4(b) using super position theorem.

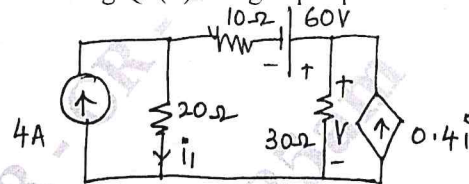


Fig.Q4(b)

(10 Marks)

Module-3

- 5 a. What is the significance of initial conditions? Write a note on initial and final conditions for basic circuit elements.

(05 Marks)

- b. In the network shown in Fig.Q5(b) switch 'S' is changed from A to B at $t = 0$ having already established a steady state in position A shown that at $t = 0^+$, $i_1 = i_2 = \frac{-V}{R_1 + R_2 + R_3}$ and $i_3 = 0$.

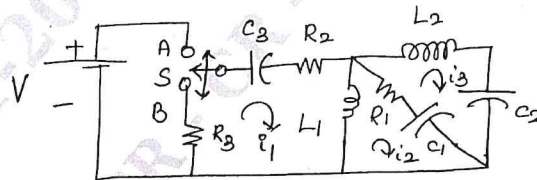


Fig.Q5(b)

(10 Marks)

- c. In the network of Fig.Q5(c) switch 'S' is closed at $t = 0$ with zero initial current in the inductor. Find i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$ if $R = 10 \Omega$, $L = 1 \text{ H}$ and $V = 10 \text{ Volts}$.

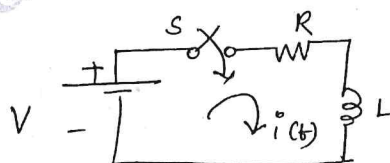


Fig.Q5(c)

(05 Marks)

OR

6. a. Obtain Laplace transform of:
 (i) Step function
 (ii) Ramp function
 (iii) Impulse function

(10 Marks)

- b. Find the Laplace transform of the waveform shown in Fig.Q6(b).

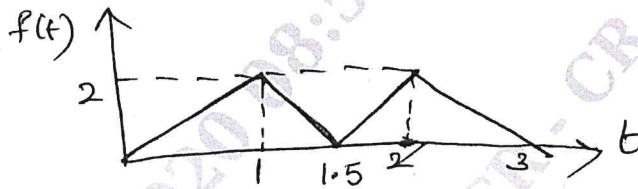


Fig.Q6(b)

(10 Marks)

Module-4

7. a. Derive the relation between bandwidth and quality factor $B.W = f_0/Q$. (10 Marks)
 b. Show that the value of capacitance for max voltage across the capacitor in case of capacitor tuning series resonance is given by $C = \frac{L}{R^2 + X_L^2}$.

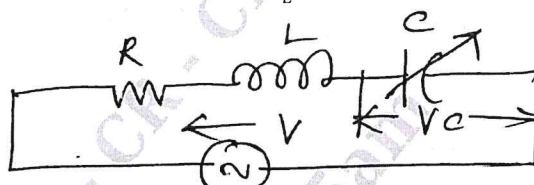


Fig.Q7(b)

(10 Marks)

OR

8. a. Derive for f_0 for parallel resonance circuit when the resistance of the capacitance is considered.

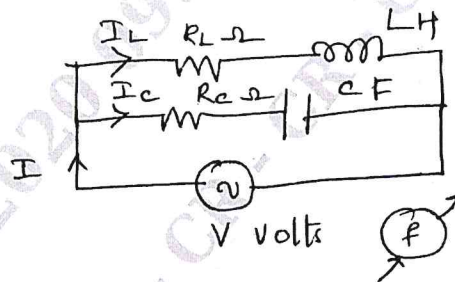


Fig.Q8(a)

(10 Marks)

- b. Find the value of L for which the circuit in Fig.Q8(b) resonates at $\omega = 5000$ rad/sec.

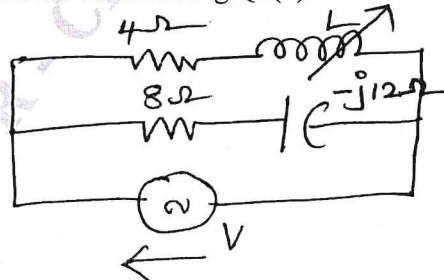


Fig.Q8(b)

(10 Marks)

Module-5

- 9 a. Derive the expression of Z parameters in terms of Y parameters. (10 Marks)
 b. Determine Y and Z parameters for the network shown in Fig.Q9(b).

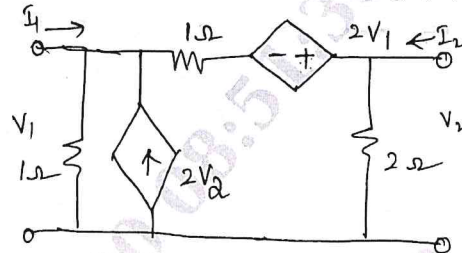


Fig.Q9(b)

(10 Marks)

OR

- 10 a. Derive the expression of h parameters in terms of ABCD parameters. (10 Marks)
 b. Find ABCD constants and show that $AD - BC = 1$ for the network shown in Fig.Q10(b).

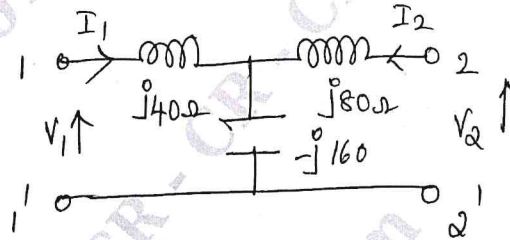


Fig.Q10(b)

(10 Marks)
