USN

CBCS SCHEME

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.
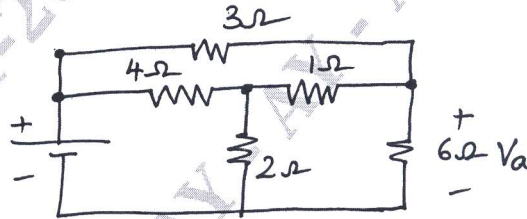

Fig.Q1(b)   **(10 Marks)**

OR

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

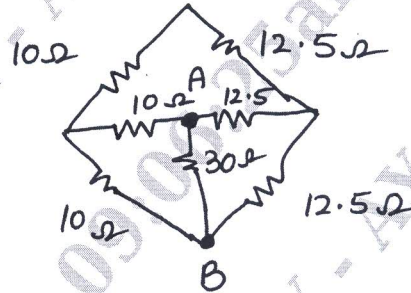Fig.Q2(a)   **(10 Marks)**

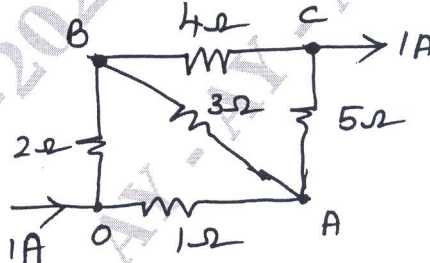   b. Find currents in all the branches of the network shown in Fig.Q2(b) using mesh analysis.

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)**

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Module-2
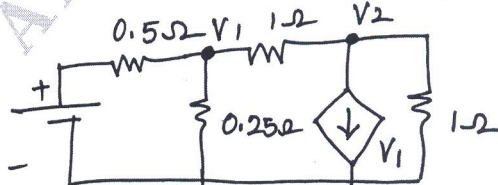
3   a. Obtain Thevenin's equivalent network for Fig.Q3(a).

Fig.Q3(a)   (08 Marks)
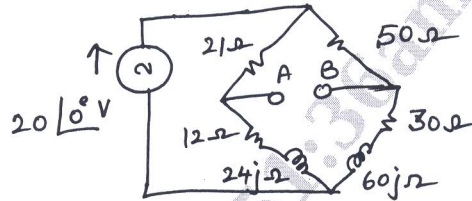
   b. State and prove Millman's theorem.   (06 Marks)
   c. For the circuit shown in Fig.Q3(c), find the voltage V_x and verify reciprocity theorem.
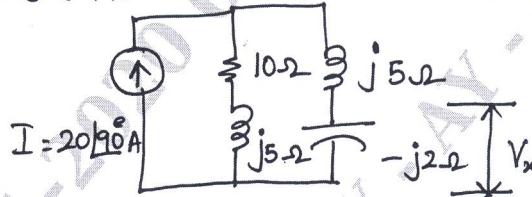

Fig.Q3(c)   (06 Marks)

OR

4   a. State and prove maximum power transfer theorem for AC circuits (when R_L and X_L are varying)   (10 Marks)
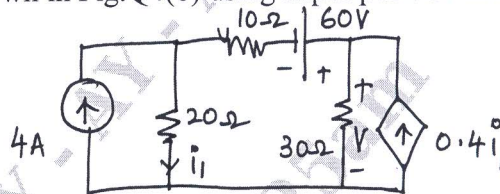   b. Find 'V' in the circuit shown in Fig.Q4(b) using super position theorem.

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^+, $i_1 = i_2 = \dfrac{-V}{R_1 + R_2 + R_3}$ and $i_3 = 0$.
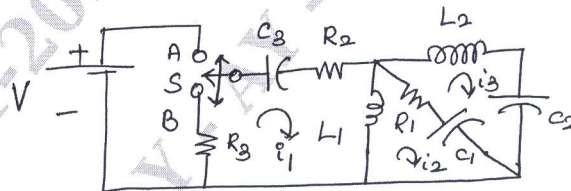

Fig.Q5(b)   (10 Marks)

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

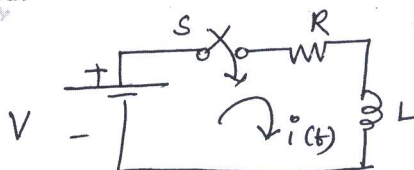Fig.Q5(c)   (05 Marks)

OR

6   a.   Obtain Laplace transform of:
       (i)   Step function
       (ii)   Ramp function
       (iii)   Impulse function   **(10 Marks)**

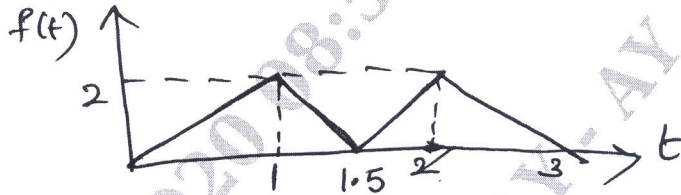   b.   Find the Laplace transform of the waveform shown in Fig.Q6(b).

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 $C = \dfrac{L}{R^2 + X_L^2}$.
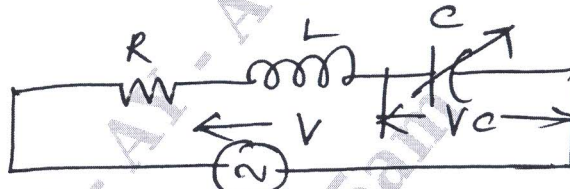

Fig.Q7(b)   **(10 Marks)**

OR

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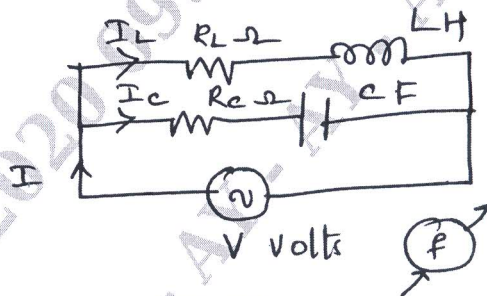

Fig.Q8(a)   **(10 Marks)**

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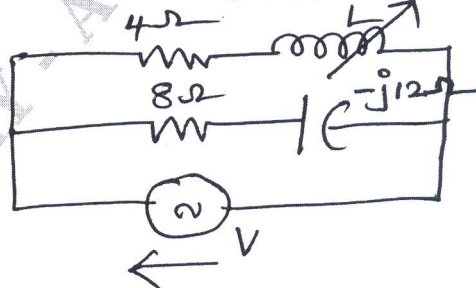

Fig.Q8(b)   **(10 Marks)**

Module-5

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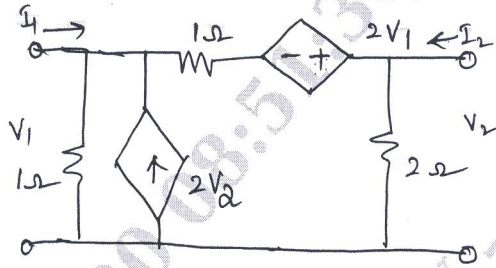   b. Determine Y and Z parameters for the network shown in Fig.Q9(b).

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).
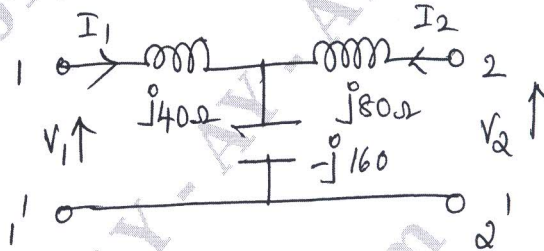

Fig.Q10(b) **(10 Marks)**

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