CBCS Scheme

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15EE32

Third Semester B.E. Degree Examination, June/July 2017
Electric Circuit 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. Transform the network given in Fig Q1(a) in to a single voltage source using source transformation technique. **(05 Marks)**

b. Find the currents i_1, i_2 and i_3 in the network given Fig Q1(b)using mesh analysis. **(06 Marks)**

c. Find current through 0.5Ω resistance in the Fig Q1(c) using node analysis. **(05 Marks)**

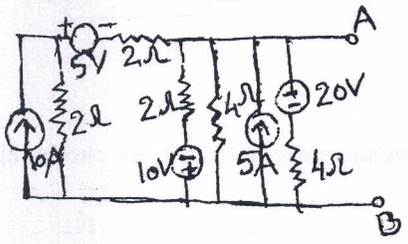

Fig Q1(a)

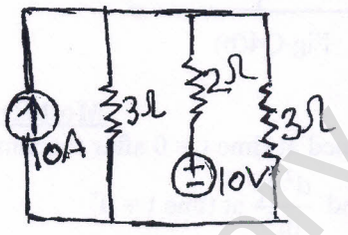

Fig Q1(b)

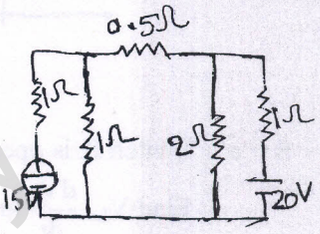

Fig Q1(c)

OR

2 a. Determine the equivalent resistance between the terminals A and B in the network in the Fig Q2 (a) using star Delta, transformation. **(06 Marks)**

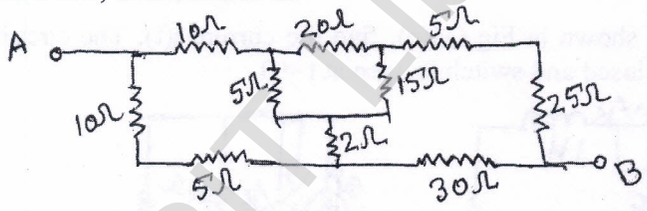

Fig Q2(a)

b. Derive expression for resonant frequency in series RLC circuit. **(05 Marks)**

c. Give the comparison between series and parallel resonance. **(05 Marks)**

Module-2

3 a. State and explain superposition theorem. **(05 Marks)**

b. Obtain the current I_x in the circuit shown in Fig Q3(b) using Thevenin's theorem. **(05 Marks)**

c. Find the Norton's equivalent circuit at the terminals A and B in the network given in Fig Q3(c). **(06 Marks)**

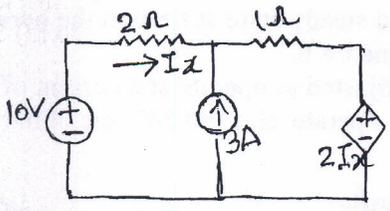

Fig Q3(b)

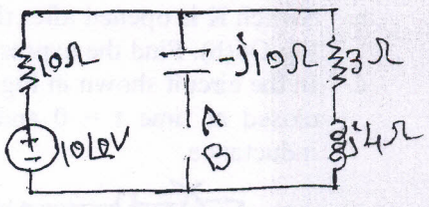

Fig Q3(c)

OR

4 a. State and explain Millman's theorem. **(05 Marks)**

b. Verify Reciprocity theorem for the network given in Fig Q4(b). **(05 Marks)**

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c. Find the value of load resistance R_L for maximum power to be transferred to the load and also find maximum power for the network shown in Fig Q4(c) **(06 Marks)**

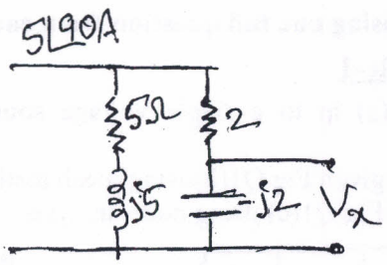

Fig Q4(b)

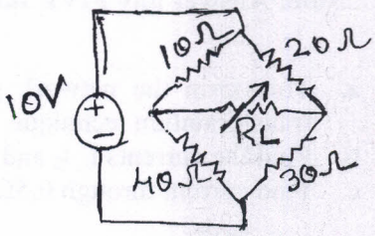

Fig Q4(c)

Module-3

5 a. Switch K is opened at time t = 0 after reaching steady state in the circuit shown in Fig Q5(a). Find V_k, $\frac{dV_k}{dt}$ and $\frac{d^2v_k}{dt^2}$ at time $t = 0^+$ **(05 Marks)**

b. In the circuit shown in Q5 (b) switch is opened at time t = 0. Find the values of V, $\frac{dV}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$ **(05 Marks)**

c. In the circuit shown in Fig Q5(c), find the current i(t). The circuit has reached steady state with switch closed and switch is open at t = 0. **(06 Marks)**

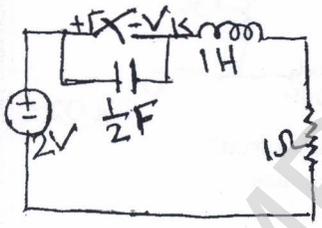

Fig Q5(a)

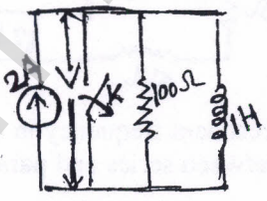

Fig Q5(b)

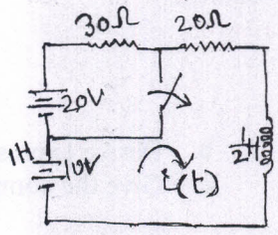

Fig Q5(c)

OR

6 a. Switch is closed at time t = 0 in the circuit shown in Fig.Q6(a). Find the values of i_1, i_2, $\frac{di_1}{dt}$, $\frac{di_2}{dt}$ at time $t = 0^+$. **(05 Marks)**

b. Switch K is opened after the circuit has reached steady state at t = 0 in the network shown in Fig.Q6(b). Find the expression for V_2 (t) for time t > 0. **(05 Marks)**

c. In the circuit shown in Fig.Q6(c) the relay is adjusted to operate at a current of 5A. Switch is closed at time t = 0 and relay is found to operate at t =0.347 sec. Find the value of inductance. **(06 Marks)**

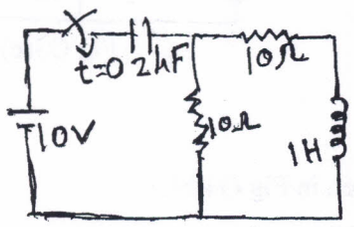

Fig.Q6(a)

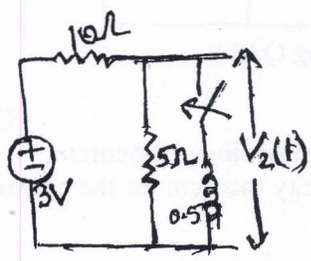

Fig.Q6(b)

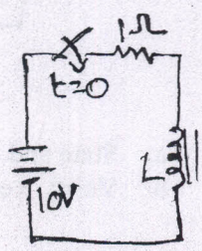

Fig.Q6(c)

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Module-4

7 a. Find Laplace transform of the following functions i) sin wt ii) cos wt iii) te^{-at}. **(05 Marks)**

b. State and prove initial value theorem. **(05 Marks)**

c. In the circuit shown in Fig Q7(c) find the expression for current if switch is closed at t =0. Assume initial charge on capacitance is zero. **(06 Marks)**

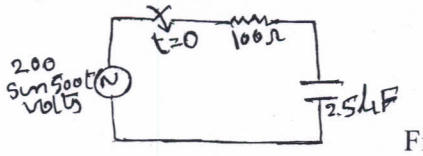

Fig Q7(c)

OR

8 a. Find inverse Laplace transform of the following functions.

i) $\frac{S^2+5}{S(S^2+4S+4)}$ ii) $\frac{2S+6}{S^2+6S+25}$ **(05 Marks)**

b. Using initial and final value theorems, where they apply, find f(0) and f(∞) for the following functions.

i) $\frac{S^3+7S^2+5}{S(S^3+3S^2+4S+2)}$ ii) $\frac{S(S+4)(S+8)}{(S+1)(S+6)}$ **(05 Marks)**

c. Find i(t) using Laplace transforms switch is closed at time t = 0 with zero initial conditions. **(06 Marks)**

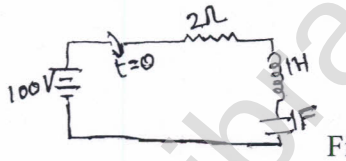

Fig Q8(c)

Module-5

9 a. Explain the method of analyzing a 3-ph star connected load by using Millman's theorem. **(05 Marks)**

b. A delta connected three phase load with impedance is connected across a 3-ph 230V, 50Hz symmetrical RYB supply. The impedances are (28 + j0)Ω, (25 + j45)Ω and (0 – j65)Ω. Find line and phase currents. **(06 Marks)**

c. Find z parameters of the circuit shown in Fig.Q9(c). **(05 Marks)**

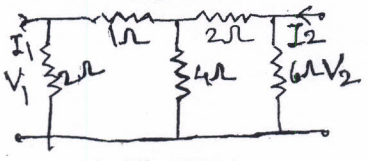

Fig Q9(c)

OR

10 a. A star connected load with (3+j0) Ω (2+j3) Ω and (2 – j1) Ω connected in 3-ph, 4 wires, Y connected system with phase sequence ACB. Find line currents and neural current. **(06 Marks)**

b. Explain the concept of unbalanced load. State various types of unbalanced loads. **(05 Marks)**

c. Find 'T' parameters of the circuit in Fig.Q10(c). **(05 Marks)**

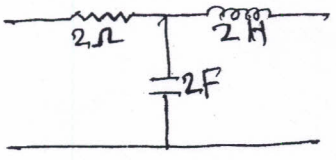

Fig Q10(c)

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