CBCS Scheme

USN

15EC34

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
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. Briefly explain the classification of electrical networks. **(08 Marks)**

b. Use source transformation to convert the circuit in Fig.Q1(b) to a single current source in parallel with a single resistor. **(08 Marks)**

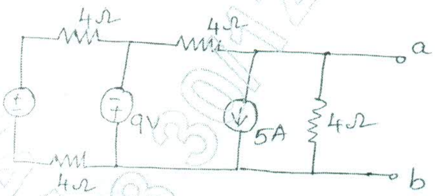

Fig.Q1(b)

OR

2 a. Determine the loop currents I_1, I_2, I_3 and I_4 for the network shown in Fig.Q2(a). **(08 Marks)**

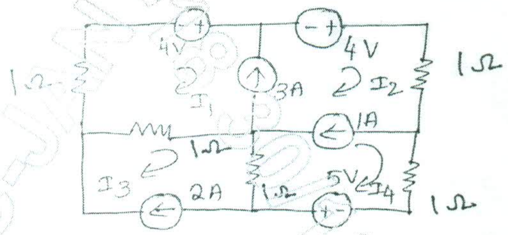

Fig.Q2(a)

b. Find the value of 'V' such that current through 4Ω resistor is zero, using nodal analysis, for the Fig.Q2(b). **(08 Marks)**

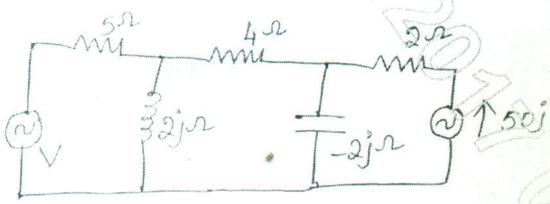

Fig.Q2(b)

Module-2

3 a. State and prove reciprocity theorem. **(07 Marks)**

b. Explain the procedure to find Norton's equivalent resistance in a network which has both dependent and independent sources with an example. **(03 Marks)**

c. Obtain the Thevenin's equivalent for the network shown in Fig.Q3(c). **(06 Marks)**

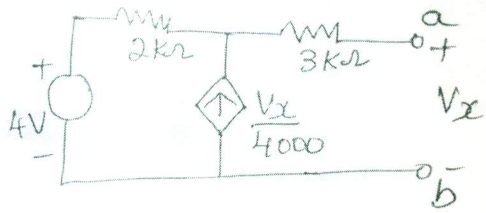

Fig.Q3(c)

OR

4 a. State and prove Miller's theorem. **(08 Marks)**

b. Find the value of Z_x for which maximum power transfer occurs. Also find maximum power for the network shown in Fig.Q4(b). **(08 Marks)**

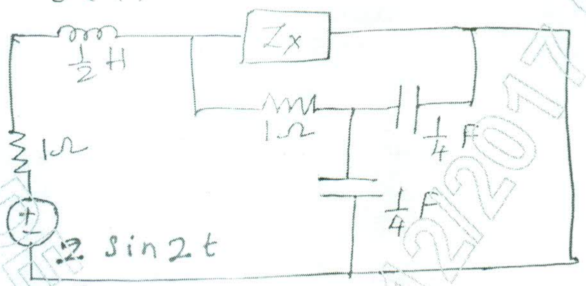

Fig.Q4(b)

Module-3

5 a. In the network shown in Fig.Q5(a), the switch is moved from position 1 to position 2 at $t = 0$. The steady – state has been reached before switching. Calculate i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(08 Marks)**

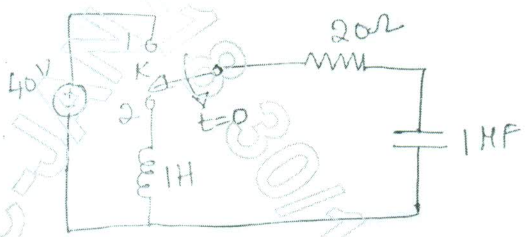

Fig.Q5(a)

b. In the network shown in Fig.Q5(b), $v_1(t) = e^{-t}$ for $t \geq 0$ and is zero for all $t < 0$. If the capacities is initially uncharged, determine the value of $\frac{d^2v_2}{dt^2}$ and $\frac{d^3v_3}{dt^3}$ at $t = 0^+$. **(08 Marks)**

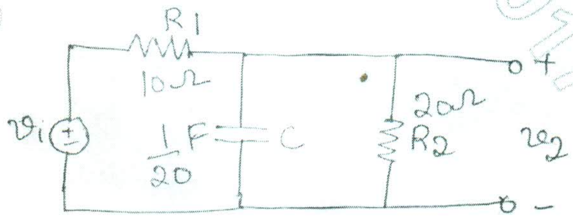

Fig.Q5(b)

OR

6 a. Obtain Laplace transform of i) step function, ii) Ramp function iii) Impulse function. **(09 Marks)**

b. Find the Laplace transform of the periodic signal x(t) as shown in Fig.Q6(b). **(07 Marks)**

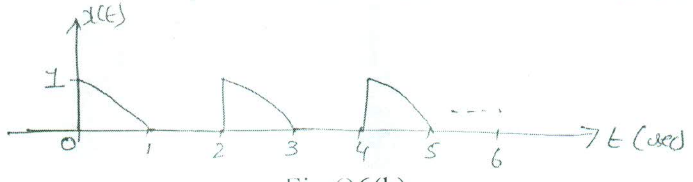

Fig.Q6(b)

Module-4

7 a. What is resonance? Derive an expression for half power cutoff frequency. **(08 Marks)**

b. Define Q-factor, selectivity and bandwidth. **(03 Marks)**

c. A series RLC circuit has $R = 4\Omega$, $L = 1mH$, $C = 10\ \mu F$. Calculate resonant frequency, Q-factor, half power frequencies and bandwidth. **(05 Marks)**

OR

8 a. Obtain an expression for resonant frequency in a parallel resonant circuit. **(06 Marks)**

b. Show that a two branch parallel resonant circuit is resonant at all frequencies if :

$R_L = R_C = \sqrt{\frac{L}{C}}$, where R_L = Resistance in the inductor branch, R_C = resistance in the capacitor branch. **(06 Marks)**

c. Find the value of R_L for which the circuit shown in Fig.Q8(c) at resonance condition. **(04 Marks)**

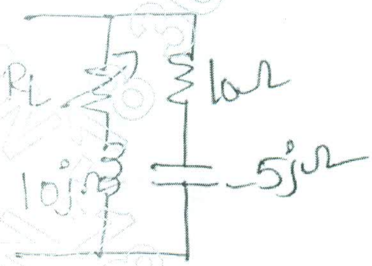

Fig.Q8(c)

Module-5

9 a. Define h-parameters. Express h-parameters in terms of z-parameters. **(08 Marks)**

b. Find y-parameters for the two-port–network shown in Fig.Q9(b). **(08 Marks)**

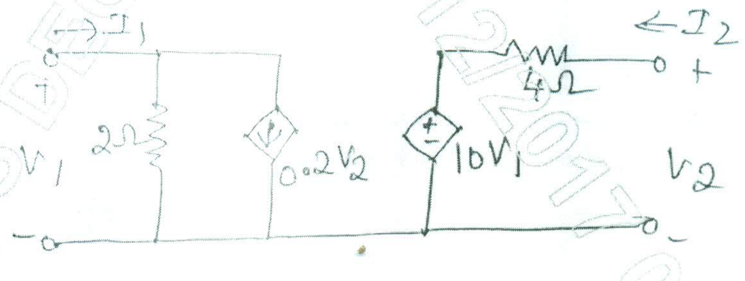

Fig.Q9(b)

OR

10 a. Define ABCD parameters. Express y-parameters in terms of ABCD parameters. **(08 Marks)**

b. Find the ABCD parameters for the circuit shown in Fig.Q10(b). **(08 Marks)**

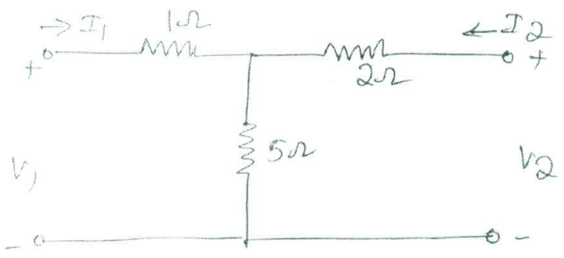

Fig.Q10(b)

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