

CBCS Scheme

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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.

Module-1

- 1 a. Briefly explain the classification of electrical networks. (08 Marks)
 b. Use source transformation to convert the circuit in Fig.1(b) to a single current source in parallel with a single resistor. (08 Marks)

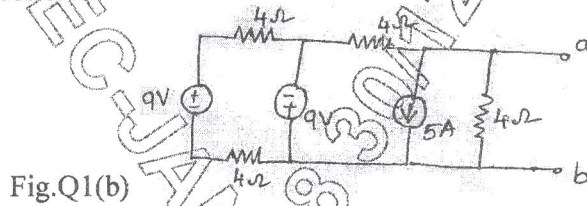


Fig.Q1(b)

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)

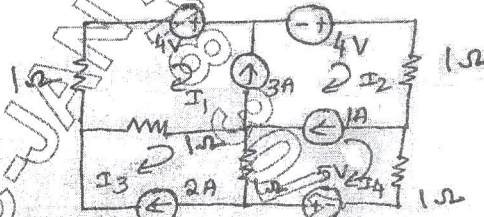


Fig.Q2(a)

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

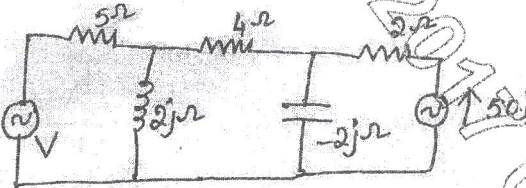


Fig.Q2(b)

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)

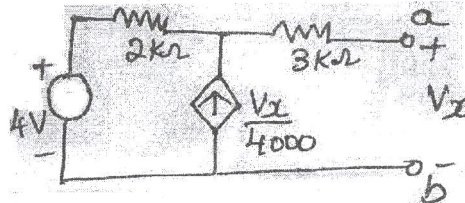


Fig.Q3(c)

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.

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)

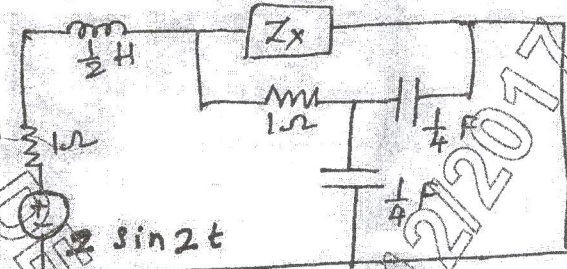


Fig.Q4(b)

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)

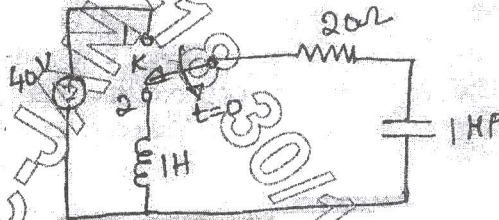


Fig.Q5(a)

- 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)

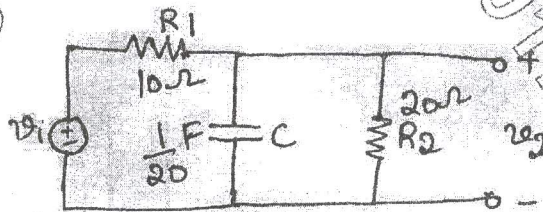


Fig.Q5(b)

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)

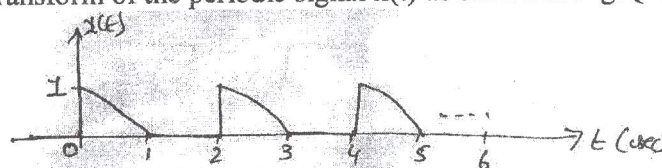


Fig.Q6(b)

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 $R = 4\Omega$, $L = 1\text{mH}$, $C = 10\ \mu\text{F}$. 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)

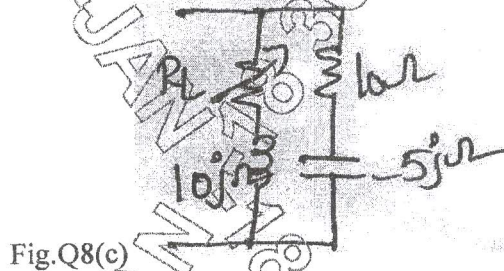


Fig. Q8(c)

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)

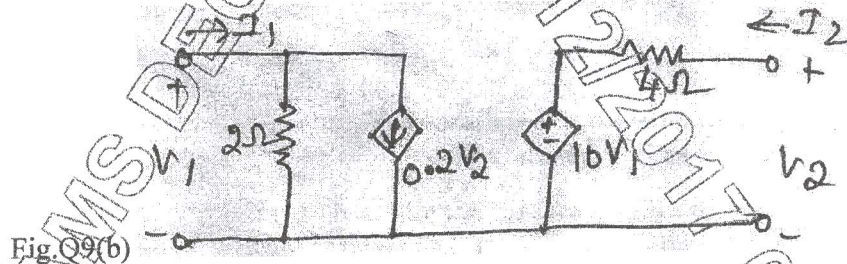


Fig. Q9(b)

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)

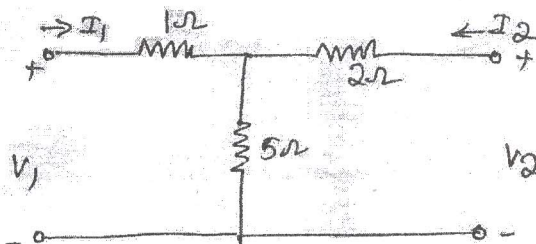


Fig. Q10(b)
