

CBCS SCHEME



USN

17EC35

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 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. Reduce the Network shown in Fig Q1(a) to a single voltage source in series with a resistance using source shift and source transformation. (07 Marks)
- b. Use mesh analysis to determine the three mesh currents I_1 , I_2 and I_3 in the circuit show in Fig Q1(b). (05 Marks)
- c. Find current in 30Ω resistor using nodal analysis for the circuit shown in Fig Q1(c). (08 Marks)

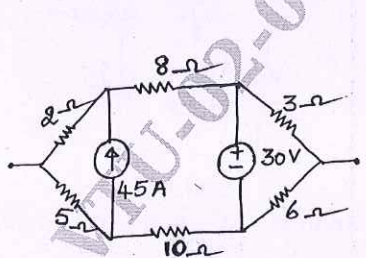


Fig Q1(a)

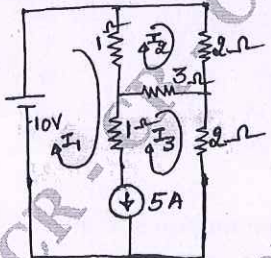


Fig Q1(b)

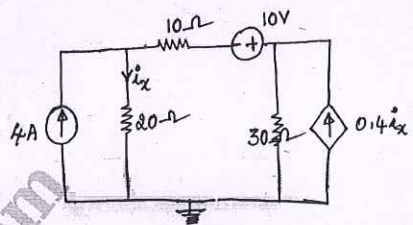


Fig Q1(c)

OR

- 2 a. Find the equivalent resistance between a and b using star delta transformation for the network shown in Fig Q2(a). (05 Marks)
- b. For the circuit shown in Fig Q2(b), determine I_x and other loop currents. (07 Marks)
- c. For the circuit shown in Fig Q2(c), determine all node voltages. (08 Marks)

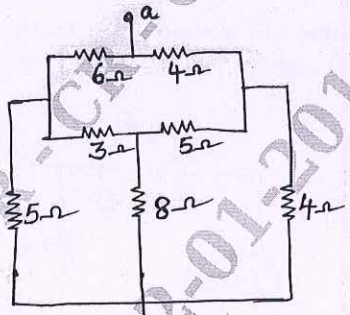


Fig 2(a)

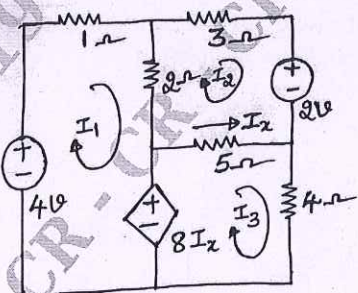


Fig 2(b)

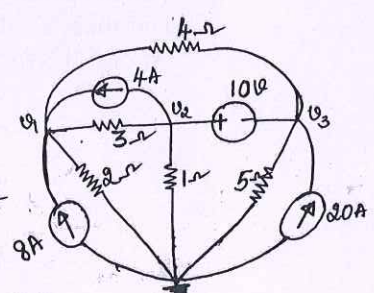


Fig 2(c)

Module-2

- 3 a. For the circuit shown in Fig Q3(a), find the current I_x using super position theorem. (07 Marks)
- b. Verify Reciprocity theorem by calculating 'T' for the network shown in Fig Q3(b). (05 Marks)
- c. Obtain the Thevenin's equivalent of the circuit shown in Fig Q 3(c) (08 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.

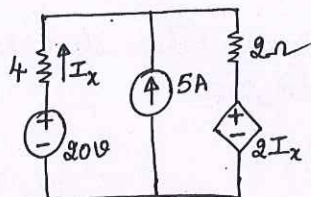


Fig Q3 (a)

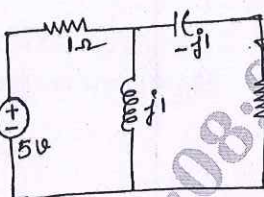


Fig Q3 (b)

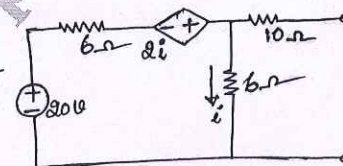


Fig Q3 Q(c)

OR

- 4 a. For the circuit shown in Fig Q4(a), find the current in $(6 + j8)\Omega$ impedance using Millman's theorem. (05 Marks)
- b. For the Network shown in Fig Q4(b), determine Norton's equivalent across A and B. Find the current through the impedance $(6 - j8)\Omega$ connected to the terminals A and B. (05 Marks)

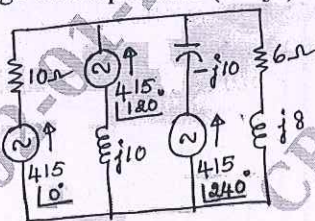


Fig Q4(a)

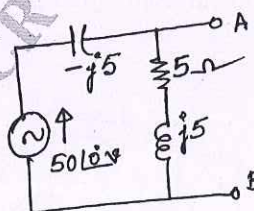


Fig Q4(b)

- c. State and prove maximum power transfer theorem for AC circuit, where both R_L and X_L are varying. (10 Marks)

Module-3

- 5 a. In the Network shown in Fig Q5(a), a steady state is reached with the switch K open. At $t = 0$, the switch K is closed. Obtain the initial values of (i) i_1 (ii) i_2 (iii) v_c (iv) $\frac{di_1}{dt}$ (v) $\frac{di_2}{dt}$ and $\frac{dv_c}{dt}$ at $t = \infty$. (10 Marks)
- b. For the given circuit in Fig Q5(b), find the value of the loop currents, their first derivatives and their 2nd derivatives, all evaluated at $t = 0^+$, given that $V_c(0^-) = 1$ volt, $i_2(0^-) = 0$ amp. At $t = 0$, sw_1 and sw_2 are closed. (10 Marks)

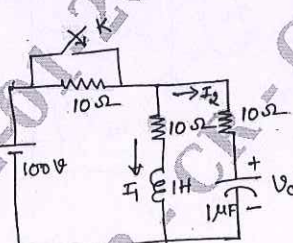


Fig Q5(a)

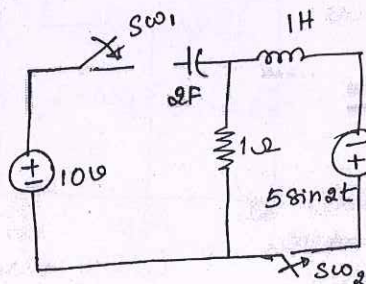


Fig Q5(b)

OR

- 6 a. In the circuit of Fig Q6(a), the source voltage is $v(t) = 50\sin 250t$. Using Laplace transforms, determine the current when switch K is closed at $t = 0$. (08 Marks)
- b. Synthesize the periodic waveform shown in Fig Q6(b) and find its Laplace transform and prove any formula used. (12 Marks)

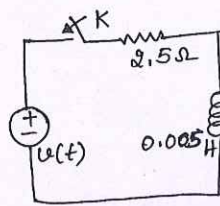


Fig Q6(a)

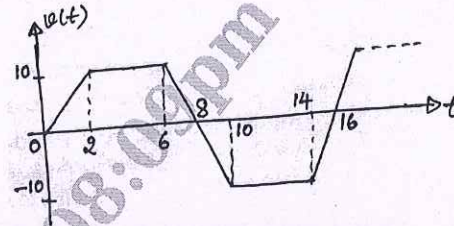


Fig Q6(b)

Module-4

- 7 a. Show that resonant frequency of series resonant circuit is equal to the geometric mean of two half power frequencies. (05 Marks)
- b. A coil is connected in series with a variable capacitor across $v(t) = 10 \cos 1000t$. The current is maximum when $c = 10\mu\text{F}$. When $C = 12.5\mu\text{F}$, the current is 0.707 times the maximum value. Find L, R, and Q of the coil. (08 Marks)
- c. A coil has resistance of 400Ω and inductance of $318\mu\text{H}$. Find the capacitance of capacitor which when connected in parallel with the coil will produce resonance with a supply frequency of 1MHz. If a second capacitor of capacitance 23.42pF is connected in parallel with the first capacitor, find the frequency at which resonance will occur. (07 Marks)

OR

- 8 a. Derive the expression for the resonant frequency of the circuit shown in Fig Q8(a). Also show that the circuit will resonate at all frequencies if $R_L = R_c = \sqrt{\frac{L}{C}}$. (12 Marks)

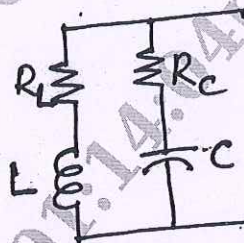


Fig Q8(a)

- b. A coil of 10Ω resistance 0.2H inductance is connected in parallel with a variable condenser across 220V , 50Hz supply. Determine: (i) Capacitance of condenser so that current drawn may be in phase with the supply voltage (ii) Effective impedance of the circuit (iii) Power absorbed at resonance (iv) Current magnification factor. (08 Marks)

Module-5

- 9 a. Z-parameters of a Network are obtained from an experiment. Explain how y-parameters and transmission parameter can be computed from the experimental data. (10 Marks)
- b. Find Z and Y parameters of the network shown in Fig Q9(b).

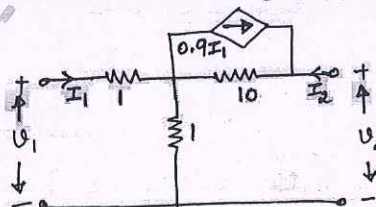


Fig Q9(b)

(10 Marks)

OR

- 10 a. Find Z and h-parameters for the network shown in Fig Q10(a).

(12 Marks)

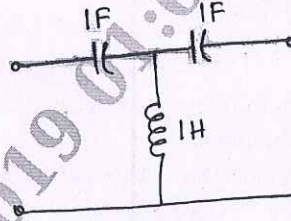


Fig Q10(a)

- b. Write a note on hybrid p's with its equivalent circuit.
c. Explain symmetry and reciprocal property of 2-port Networks.

(04 Marks)

(04 Marks)

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