CBCS SCHEME

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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)**

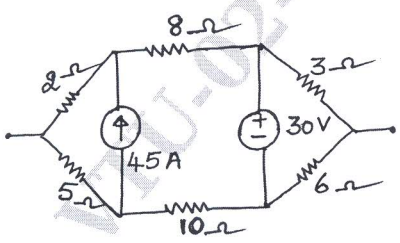

Fig Q1(a)

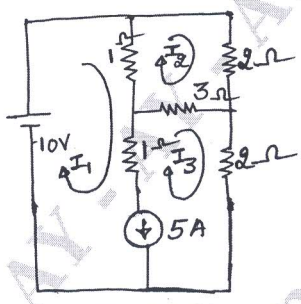

Fig Q1(b)

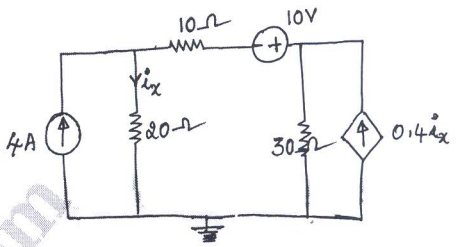

Fig Q1(c)

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)**

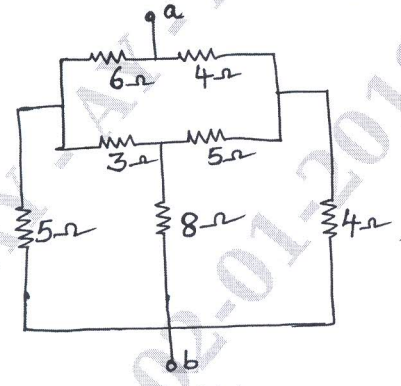

Fig 2(a)

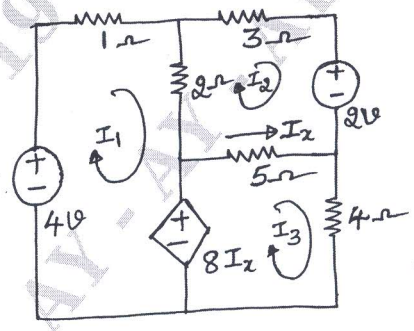

Fig 2(b)

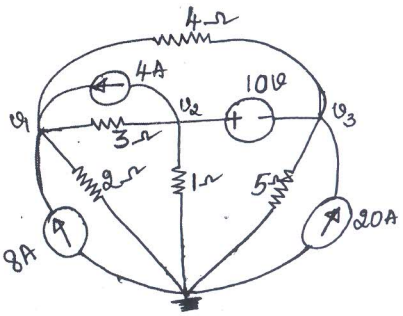

Fig 2(c)

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 'I' 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)**

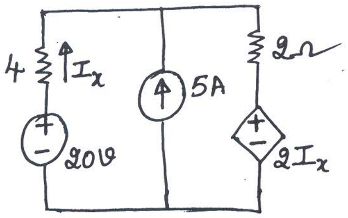

Fig Q3 (a)

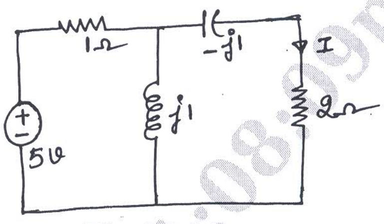

Fig Q3 (b)

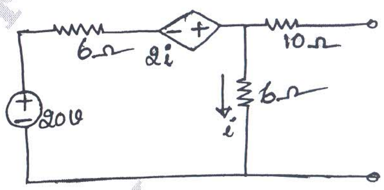

Fig Q3 Q(c)

OR

4 a. For the circuit shown in Fig Q4(a), find the current in (6 + j8)Ω 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 thorough the impedance (6 – j8) Ω connected to the terminals A and B. **(05 Marks)**

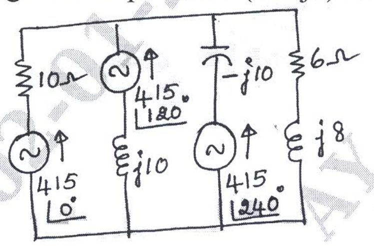

Fig Q4(a)

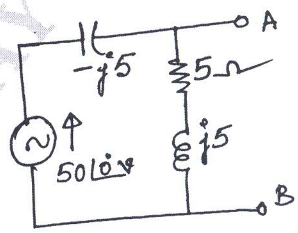

Fig Q4(b)

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 $\frac{di_1}{dt}$ at t = ∞. **(10 Marks)**

b. For the given circuit in Fig Q5(b), find the value of the loop currents, their first derivatives and their 2[nd] 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)**

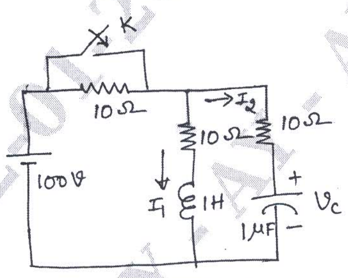

Fig Q5(a)

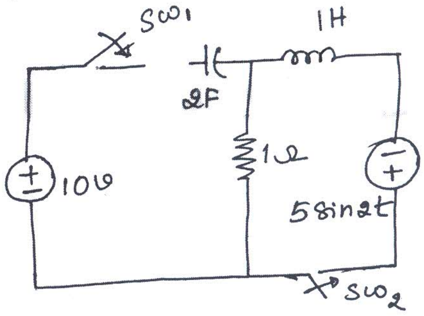

Fig Q5(b)

OR

6 a. In the circuit of Fig Q6(a), the source voltage is v(t) = 50sin 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)**

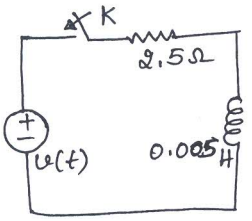

Fig Q6(a)

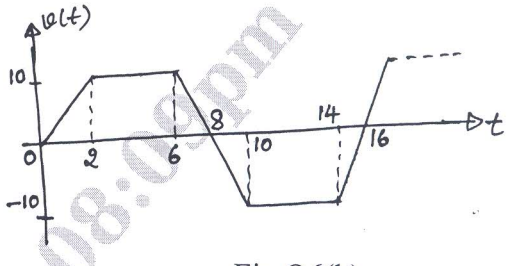

Fig Q6(b)

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 $c = 10\mu F$. When $C = 12.5\mu F$, 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 $318\mu H$. 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)**

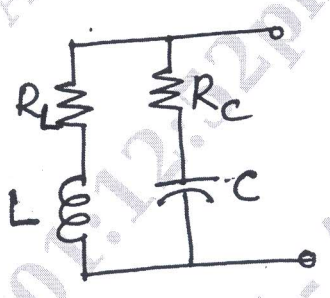

Fig Q8(a)

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).

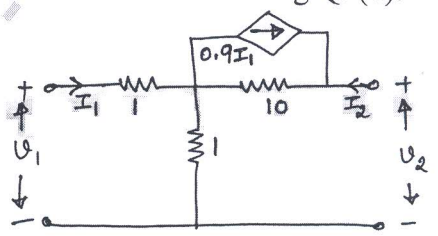

Fig Q9(b) **(10 Marks)**

OR

10 a. Find Z and h-parameters for the network shown in Fig Q10(a). **(12 Marks)**

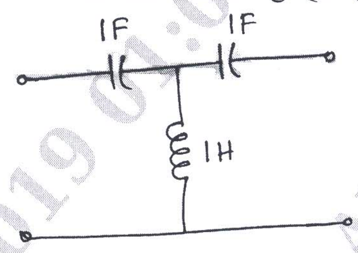

Fig Q10(a)

b. Write a note on hybrid p's with its equivalent circuit. **(04 Marks)**

c. Explain symmetry and reciprocal property of 2-port Networks. **(04 Marks)**

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