CBCS SCHEME

USN | | | | | | | | | | |

15EC34

Third Semester B.E. Degree Examination, June/July 2023
Network Analysis

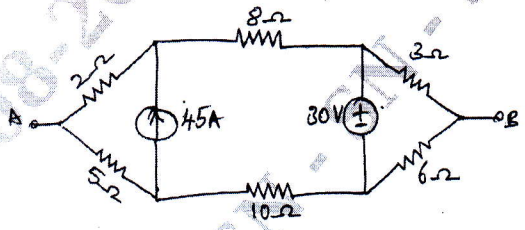
Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

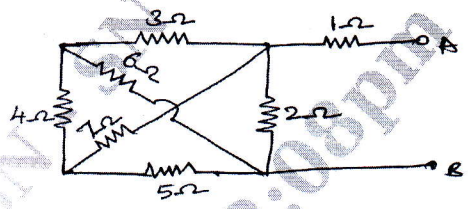
1 a. Reduce the network shown in Fig. Q1(a) into a single voltage source in series with a resistance using source shift and source transformation. **(08 Marks)**

Fig. Q1(a)



b. Using Star – delta transformation, determine the resistance between A and B for the network shown in Fig. Q1(b). **(08 Marks)**

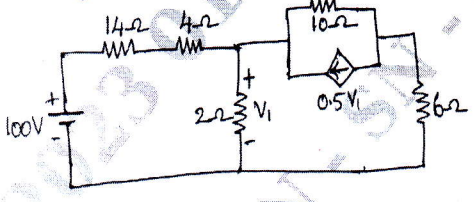
Fig. Q1(b)



OR

2 a. For the network shown in Fig. Q2(a), find the current through 4Ω and 6Ω resistors.

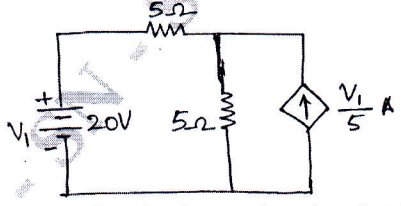
Fig. Q2(a)



(06 Marks)

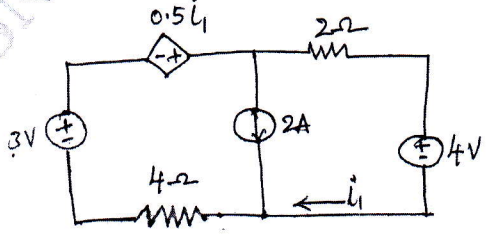
b. Find the Power delivered by the dependent current source shown in Fig. Q2(b). **(06 Marks)**

Fig. Q2(b)



c. Find i_1 using nodal analysis for the circuit shown in Fig. Q2(c). **(04 Marks)**

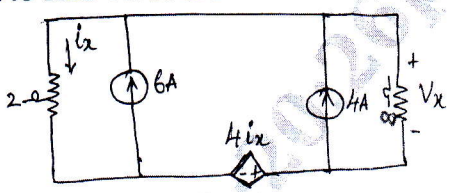
Fig. Q2(c)



Module-2

3 a. Use Superposition theorem to find Vx in the circuit shown in Fig. Q3(a). **(08 Marks)**

Fig. Q3(a)



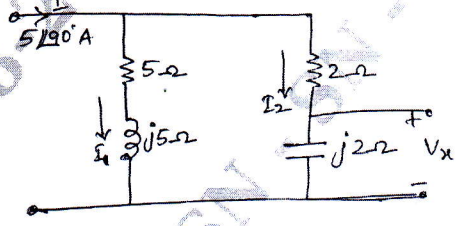
b. State and prove Thevenin's theorem. **(08 Marks)**

OR

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

b. For the circuit shown in Fig. Q4(b), find the voltage V_x and verify the Reciprocity theorem. **(08 Marks)**

Fig. Q4(b)

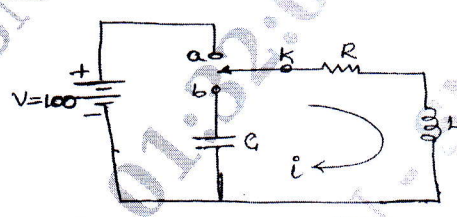


Module-3

5 a. State and prove Intial value theorem and Final value theorem. **(08 Marks)**

b. In the network shown in Fig. Q5(b), switch 'K' is changed from position a to b at t = 0. Determine $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = O^+$. If $R = 1k\Omega$, $\alpha = 1H$, $C = 0.1\mu f$ and V = 100V. Assume $V_c(0^-) = 0V$. **(08 Marks)**

Fig. Q5(b)

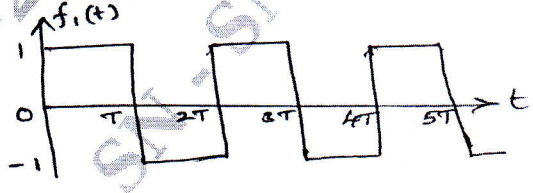


OR

6 a. Find the Laplace transforms of Unit step and Unit Ramp function. **(08 Marks)**

b. Obtain the Laplace transform of the square wave train shown in Fig. Q6(b). **(08 Marks)**

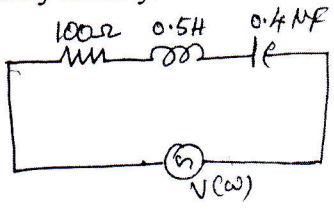
Fig. Q6(b)



Module-4

7 a. For a series RLC circuit shown in Fig. Q7(a), find the Resonant frequency, Half power frequency, Band width and Quality factory. **(08 Marks)**

Fig. Q7(a)



b. Show that Band width of series RLC resonant circuit is $\Delta f = \frac{R}{4\pi L}$ **(08 Marks)**

OR

8 a. A resonant circuit with capacitor is in parallel with series combination of resistance and inductance. Derive the expression for Resonant frequency (f_{ar}). **(08 Marks)**

b. For the parallel resonant circuit shown in Fig. Q8(b). Find I_o , I_α , I_c ,F_o and dynamic resistance. **(08 Marks)**

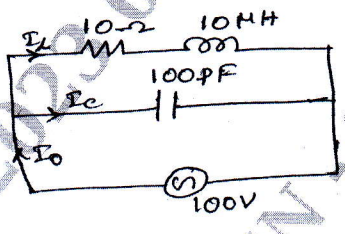


Fig. Q8(b)

Module-5

9 a. Derive the expression for Open circuited impedance parameters. **(08 Marks)**

b. Determine Y – parameters for the network shown in Fig. Q9(b). **(08 Marks)**

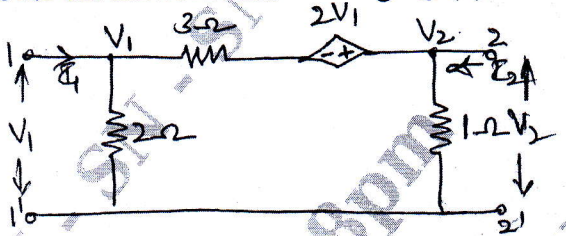


Fig. Q9(b)

OR

10 a. Determine Transmission parameters for the network shown in Fig. Q10(a). **(08 Marks)**

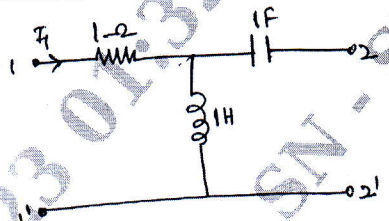


Fig. Q10(a)

b. The Z – parameters of a two port network are $Z_{11} = 20\Omega$, $Z_{22} = 30\Omega$, $Z_{12} = Z_{21} = 10\Omega$. Find Y and ABCD parameters of the network. **(08 Marks)**

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