CBCS SCHEME

USN | | | | | | | | | | 18EC32

Third Semester 13. E. **Degree Examination, Dec.20t9/San.2020**

Network Theory

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Using source transformation technique find the current through 50 resistor for the circuit shown in Fie.Q.1(a) **(06 Marks)**

Fig.Q.1(a)

b. Use Mesh Analysis to determine the Mesh currents i_1, i, and i3 for the network shown in Fig.Q.1(b). **(06 Marks)**

Fig.Q.1(b)

c. Find the power delivered by lA current source using nodal analysis for the circuit shown in Fig.Q.1(c), **(08 Marks)**

Fig.Q.1(c)

OR

2 a. Three Impedances are connected in delta, obtain the star equivalent of the network. **(06 Marks)**

b. Use Mesh Analysis to find the power delivered by the dependent voltage source in the circuit shown in Fig.Q.2(b). **(06 Marks)**

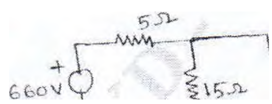

Fig.Q.2(b)

c. Determine all the node voltages for the circuit shown in Fig.Q.2(c) using nodal analysis. **(08 Marks)**

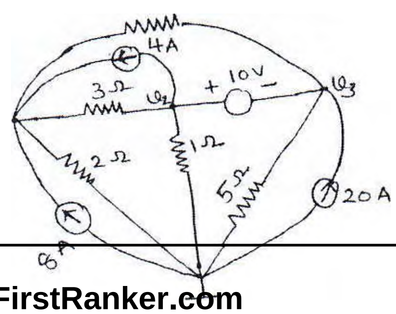

Fig.Q.2(

Module-2

3 a. State and explain superposition theorem **(06 Mark:**

b. Use Millman's Theorem to find the current flowing through (2 + PO impedance for the circuit shown in Fig.Q.3(b). **(08 Marks)**

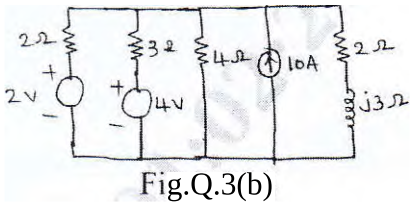

Fig.Q.3(b)

c. State and prove Norton's theorem. **(06 Marks)**

OR

4 a. Find the Thevenin's equivalent for the circuit shown inFig.Q.4(a) with respect to terminals X-Y. **(08 Marks)**

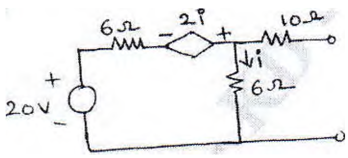

Fig.Q.4(a)

b. Find the condition for maximum power transfer in the AC circuit, where both RL and X_L are varying. **(06 Marks)**

c. Determine the current through the load resistance using Norton's Theorem for the circuit shown .in Fig.Q.4(c). **(06 Marks)**

TV"

94-

Fig.Q.4(c)

Module-3

5 a. Explain the behavior of R, L, C elements at the time of switching at t = 0, at t = 0 $^+$ and t = 00. **(07 Marks)**

b. In the network shown in Fig.Q.5(b). Find i, $\frac{di}{dt}$ and $\frac{}{dt}$ at t = O. Assume that the capacitor is initially uncharged. **(07 Marks**

151jZt-67d1"

lov <? kuil^{4}F

Fig.Q.5(b)

c. In the network shown in Fig.Q.5(0 find, i, $\frac{di}{dt}$ and ___ at t 0. The swich k is closed at t = 0 with zero current in the inductor. **(06 Marks)**

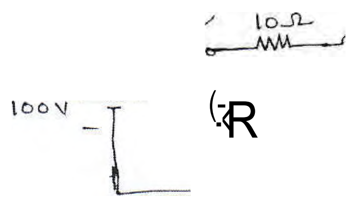

Fig.Q.5(c)

OR

6 a. In the network shown in Fig.Q.6(a). The switch k is changed from position a to b at t = 0, the steady state is reached at position a. Find i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0^+. Assume that the capacitor is initially uncharged. **(10 Marks)**

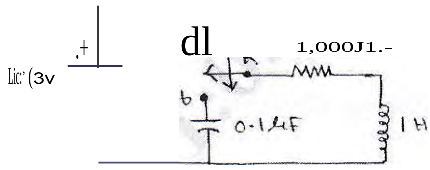

Fig.Q.6(a)

b. For the network shown in Fig.Q.6(b). The network is in steady state with switch k is closed. At t = 0, the switch is opened. Determine the voltage across the switch V_k and $\frac{d}{dt}V_k$ at t = **(10 Marks)**

F

Fig.Q.6(b)

Module-4

7 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.Q.7(b). **(11 Marks)**

.T.Eu

Fig.Q.7(b)

OR

8 a. In the series RL circuit shown in Fig.Q.8(a),, the source voltage is v(t) = 50 sin 2501V. Using Laplace transform determine, the current when switch K is closed at t = 0. **(10 Marks)**

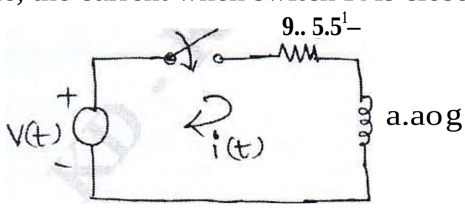

Fig.Q.8(a)

b. Find the Laplace transform of the non-sinusoidal periodic waveform shown in Fig.Q.8(b)

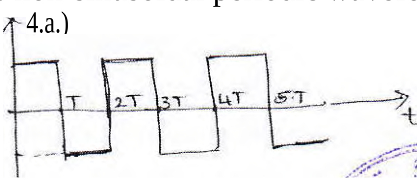

Fig.Q.S(b) **(10 Marks)**

Module-5

9 a. Define Z parameters. Determine Z parameters interrns of Y parameters. **(06 Mark.**

b. Determine h parameters of the circuit shown in Fig.Q.9(b) **(07 Marks)**

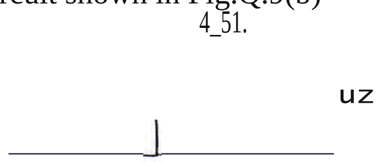

Fig.Q.9(b)

c. For the network shown in Fig.Q.9(c). Find the transmission parameters. **(07 Marks)**

31.2_,_

\./ i

Fig.Q.9(c)

OR

10 a. Define Q-factor, selectivity and Band width. **(03 Marks)**

b. A series RLC circuit has a resistance of 100, an inductance of 0.3H and a capacitance of 1001AF. The applied voltage is 230V. Find: i) The resonant frequency **ii)** lower and upper cut off frequencies iii) current at resonance iv) currents at f_i and f2 v) Voltage across. the inductance at resonance. **(07 Marks)**

c. Derive the expression for the resonant frequency of the circuit shown in Fig.Q.10(c). Also show that the circuit will resonate at all frequency if $R = R_c = \frac{L}{C}$. **(10 Marks)**

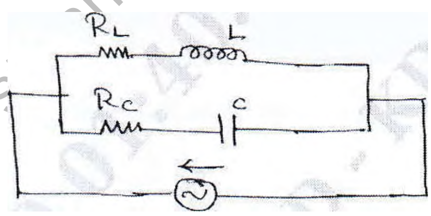

Fig.Q.10(c)