CBCS SCHEME

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17EC35

Third Semester B.E. Degree Examination, Aug./Sept. 2020
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. Briefly explain the classification of electrical networks. **(08 Marks)**

b. Find the current through 2 Ω resistor for the network shown in the Fig. Q1 (b) by making use of source transformation technique. **(06 Marks)**

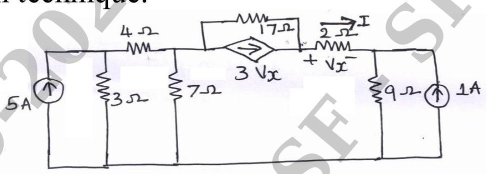

Fig. Q1 (b)

c. Three impedances are connected in delta, obtain the star equivalent of one network. **(06 Marks)**

OR

2 a. Using mesh current method, find the power delivered by the dependent voltage source in the circuit shown in Fig. Q2 (a). **(10 Marks)**

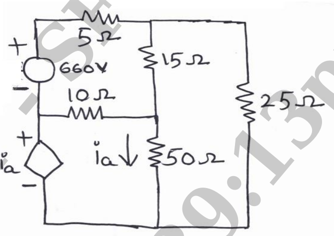

Fig. Q2 (a)

b. Find the current i_1 for the circuit shown in Fig. Q2 (b) using nodal analysis. **(10 Marks)**

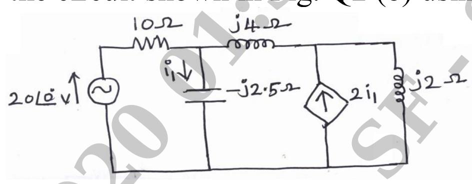

Fig. Q2 (b)

Module-2

3 a. State and explain reciprocity theorem. **(05 Marks)**

b. For the circuit shown in Fig. Q3 (b), find the voltage Vx using super position theorem. **(08 Marks)**

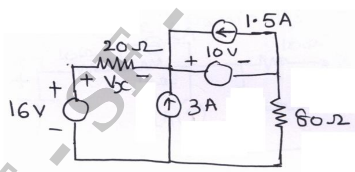

Fig. Q3 (b)

c. Find the voltage across the load of 1 KΩ connected between the terminals a and b, for the circuit shown in Fig. Q3 (c) using Millman's theorem. **(07 Marks)**

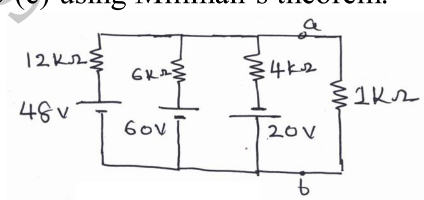

Fig. Q3 (c)

OR

4 a. State and prove Thevinin's theorem. **(05 Marks)**

b. Find the value of R_L for the circuit shown in Fig. Q4 (b) for which the power transferred to the loading maximum and also find the maximum power transferred. **(07 Marks)**

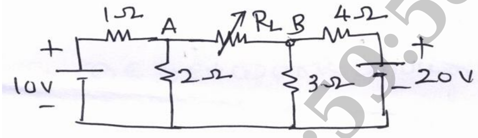

Fig. Q4 (b)

c. For the circuit shown in Fig. Q4 (c), find the Norton's equivalent circuit across the terminal's x and y. **(08 Marks)**

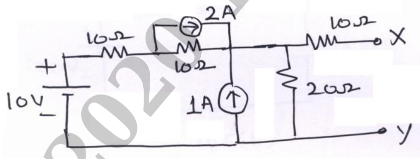

Fig. Q4 (c)

Module-3

5 a. For the network shown in Fig. Q5 (a), the switch is moved from position a to b at t = 0 and steady state is reached at position a. Find i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$. Assume that the capacitor is initially uncharged. **(08 Marks)**

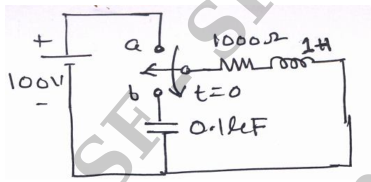

Fig. Q5 (a)

b. In the network shown in Fig. Q5 (b), the switch is closed at t = 0 with the capacitor uncharged. Find the values of i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(06 Marks)**

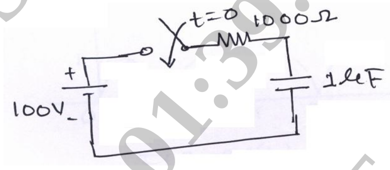

Fig. Q5 (b)

c. In the network shown in Fig. Q5 (c), find $i_1(0^+)$ and $i_L(0^+)$. The circuit is in steady state for $t < 0$. **(06 Marks)**

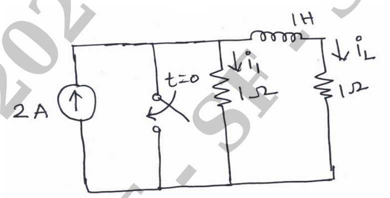

Fig. Q5 (c)

OR

6 a. Obtain the Laplace transform of (i) Unit step function (ii) Unit Ramp function (iii) Unit impulse function. **(09 Marks)**

b. Find the Laplace transform of the periodic function shown in Fig. Q6 (b). **(07 Marks)**

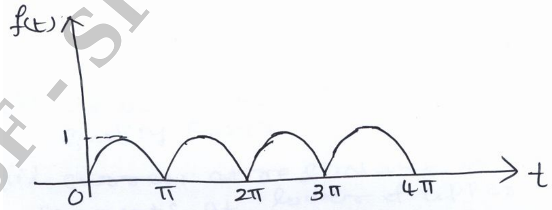

Fig. Q6 (b)

c. Find the Laplace transform of the non-sinusoidal periodic waveform shown in Fig. Q6 (c). **(04 Marks)**

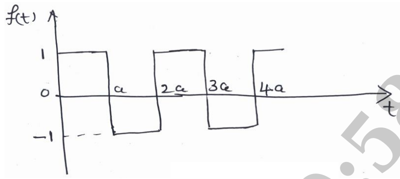

Fig. Q6 (c)

Module-4

7 a. What is resonance? Derive an expression for half power frequencies in series RLC circuit. **(08 Marks)**

b. Define Q-factor, selectivity and bandwidth. **(03 Marks)**

c. A series RLC circuit has a resistance of 10 Ω, an inductance of 0.3 H and a capacitance of 100 μF. The applied voltage is 230 V. Find
   (i) The resonant frequency and quality factor.
   (ii) Current at resonance and currents at lower and upper cutoff frequencies.
   (iii) Voltage across the inductor and capacitor at resonance.
   (iv) Band width. **(09 Marks)**

OR

8 a. For the circuit shown in Fig. Q8 (a), derive an expression for resonant frequency. **(07 Marks)**

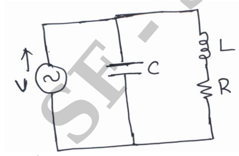

Fig. Q8 (a)

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 inductor branch, R_C = Resistance in the capacitor branch. **(07 Marks)**

c. An inductance coil of resistance 6 Ω and inductance 1 mH is connected in parallel with another branch consisting of a resistance of 4 Ω with a capacitance of 20 μF. Find (i) The resonant frequency (ii) Current at resonance. The applied voltage is 200 V. **(06 Marks)**

Module-5

9 a. Derive the z parameters in terms of y parameters. **(08 Marks)**

b. Find y and z parameters for the network shown in Fig. Q9 (b). **(12 Marks)**

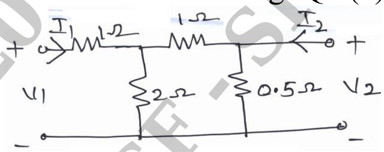

Fig. Q9 (b)

OR

10 a. Derive y parameters in terms of ABCD parameters. **(08 Marks)**

b. Determine the h parameters, for the circuit shown in Fig. Q10 (b). **(06 Marks)**

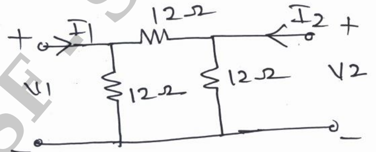

Fig. Q10 (b)

c. Find the ABCD parameters, for the circuit shown in Fig.Q10 (c). **(06 Marks)**

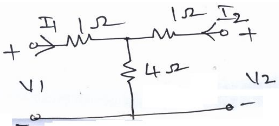

Fig. Q10 (c)

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