CBCS SCHEME

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15EC34

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Network Analysis

Time: 3 hrs. Max. Marks: 80

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

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.

Module-1

1 a. Derive the expression for Star to Delta and Delta to star transformation. **(10 Marks)**

b. Use loop analysis to determine I_x and V_x in the circuit shown in Fig.Q1(b).

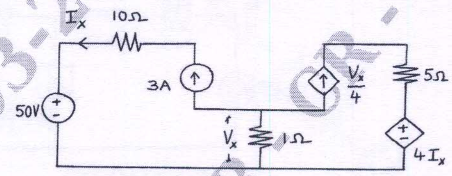

Fig.Q1(b) **(06 Marks)**

OR

2 a. Find the power loss in R (1Ω) resistor using star and delta transformation for the network shown in Fig.Q2(a).

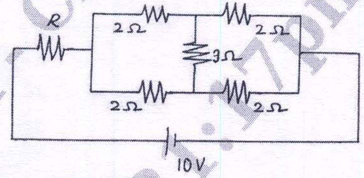

Fig.Q2(a) **(07 Marks)**

b. For the circuit shown in Fig.Q2(b), determine the node voltages.

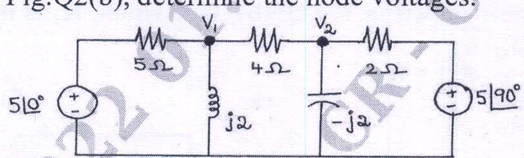

Fig.Q2(b) **(09 Marks)**

Module-2

3 a. Using Norton's theorem, find the current through the resistance of 16 Ω for the circuit shown in Fig.Q3(a).

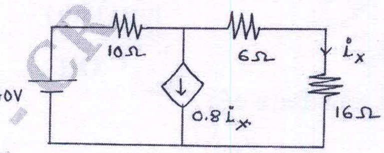

Fig.Q3(a) **(08 Marks)**

b. Using maximum power transfer theorem, find the maximum power transfer to the load for the circuit shown in Fig.Q3(b).

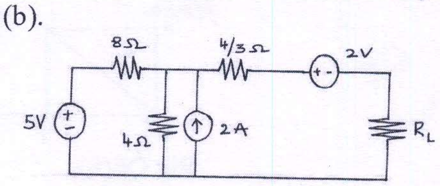

Fig.Q3(b) **(08 Marks)**

OR

4 a. Using superposition theorem, find the current, I for the circuit shown in Fig.Q4(a).

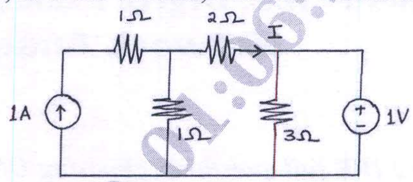

Fig.Q4(a) **(08 Marks)**

b. Using Millman's theorem, find the current in the impedance, Z_1, for the circuit shown in Fig.Q4(b).

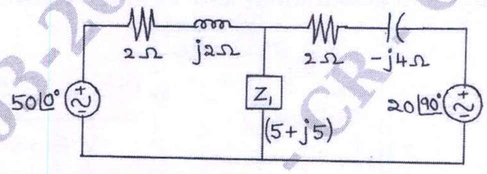

Fig.Q4(b) **(08 Marks)**

Module-3

5 a. For the circuit shown in Fig.Q5(a), the switch, K, is changed from position 1 to 2 at t = 0 (Steady state condition having reached before switching). Find i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$.

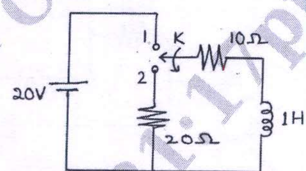

Fig.Q5(a) **(08 Marks)**

b. For the circuit shown in Fig.Q5(b), the switch, K, is opened at t = 0. Find the values of v, $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$.

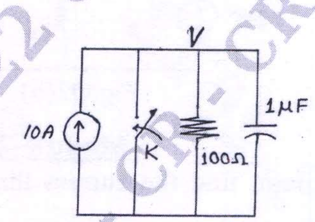

Fig.Q5(b) **(08 Marks)**

OR

6 a. Find the Laplace transform of ;
(i) f(t) = u(t)
(ii) f(t) = t **(08 Marks)**

b. Obtain the Laplace transform of saw tooth waveform shown in Fig.Q6(b).

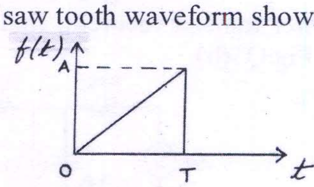

Fig.Q6(b) **(08 Marks)**

Module-4

7 a. A 220 V, 100 Hz source supplies a series RLC circuit with a capacitor and a coil. If the coil has 50 mΩ and 5 mH, find at a resonance frequency of 100 Hz, the value of C. Also find Q, f_1 and f_2. **(08 Marks)**

b. Find the value of R_1 for the circuit shown in Fig.Q7(b) such that the given circuit is resonant.

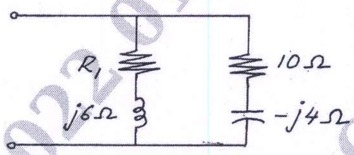

Fig.Q7(b) **(08 Marks)**

OR

8 a. A series RLC circuit is shown in Fig.Q8(a). Determine (i) quality factor (ii) bandwidth (iii) resonance frequency and (iv) half power frequencies.

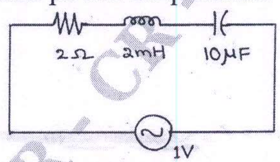

Fig.Q8(a) **(08 Marks)**

b. Derive the expressions of a resonance frequency and dynamic impedance of a parallel resonance circuit. **(08 Marks)**

Module-5

9 a. Derive the expression of Z-parameters in terms of h-parameters. **(08 Marks)**

b. Find the Y-parameters for the network shown in Fig.Q9(b).

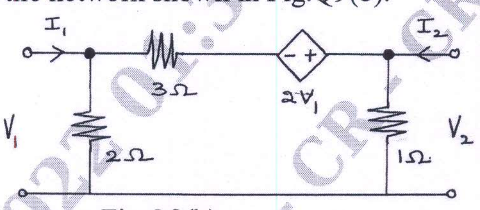

Fig.Q9(b) **(08 Marks)**

OR

10 a. Derive the expression of ABCD-parameters in terms of Y-parameters. **(08 Marks)**

b. Find the h-parameters for the network shown in Fig.Q10(b).

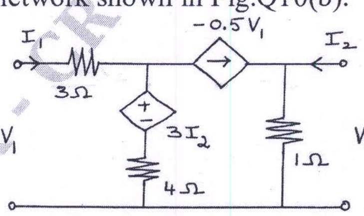

Fig.Q10(b) **(08 Marks)**

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