CBCS SCHEME

USN | | | | | | | | | |

17EC35

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Network Analysis

Time: 3 hrs. Max. Marks: 100

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. Define controlled source and mention its types. Also, mention its applications. **(05 Marks)**

b. Using source shift and source transformations, determine the voltage across the current source in Fig Q1(b).

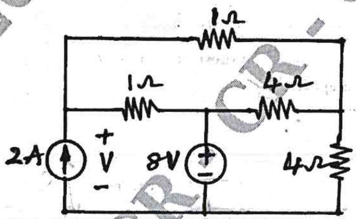

Fig Q1(b) **(05 Marks)**

c. For the circuit of Fig Q1(c), use nodal analysis to determine the voltage labeled V_x

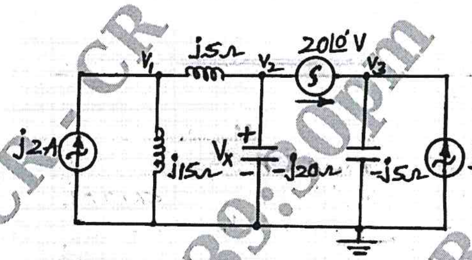

Fig Q1(c) **(10 Marks)**

OR

2 a. Define and explain supermesh. **(04 Marks)**

b. Use Star-Delta transformations to find the equivalent resistance at AB in Fig Q2(b).

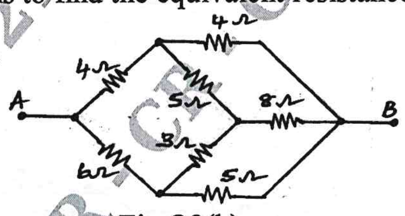

Fig Q2(b) **(06 Marks)**

c. Use Mesh analysis to determine V_1 and the power being supplied by the dependent current source in the circuit shown in Fig Q2(c).

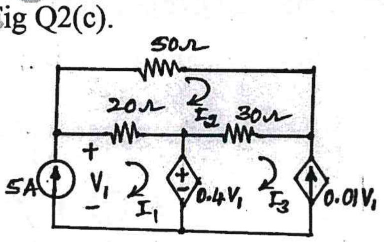

Fig Q2(c) **(10 Marks)**

Module-2

3 a. State and explain Millman's theorem for AC circuit. **(05 Marks)**

b. Use superposition on the circuit shown in Fig Q3(b) to find the current i_x.

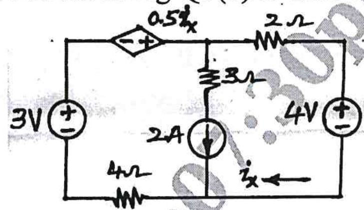

Fig Q3(b) **(05 Marks)**

c. Use Norton's theorem for the circuit of Fig Q3(c) to determine the power absorbed by the 20Ω resistor.

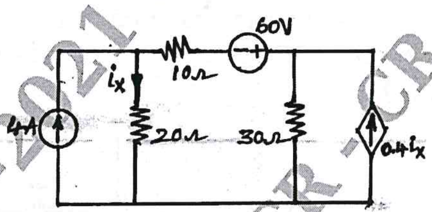

Fig Q3(c) **(10 Marks)**

OR

4 a. State and prove maximum power transfer theorem for AC voltage source with internal impedance connected to variable impedance. **(06 Marks)**

b. Verify reciprocity theorem for the circuit of Fig Q4(b).

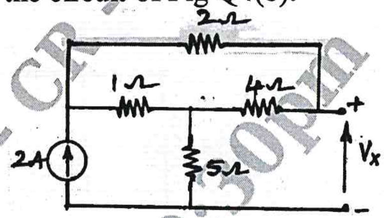

Fig Q4(b) **(04 Marks)**

c. For the circuit of Fig Q4(c), what value of R_L will absorb a maximum average power, and what is the value of this power?

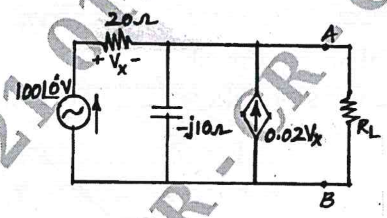

Fig Q4(c) **(10 Marks)**

Module-3

5 a. Explain the behavior of R, L and C elements for transients. Mention their representation at $t = 0^+$ **(06 Marks)**

b. In the network of the Fig Q5(b), is in the steady state with the switch K closed. At t = 0, the switch is opened. Find the values of v_1, v_2, $\frac{dv_1}{dt}$ and $\frac{dv_2}{dt}$ at $t = 0^+$.

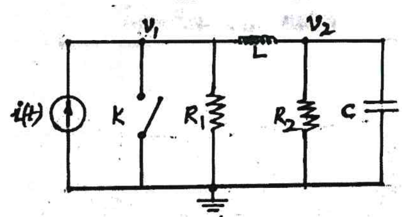

Fig Q5(b) **(08 Marks)**

c. Find the Laplace transform of the waveform shown in Fig Q5(c)

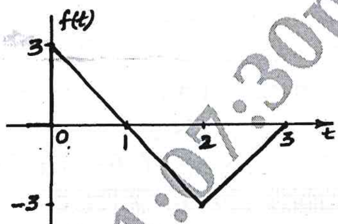

Fig Q5(c) **(06 Marks)**

OR

6 a. In the network of the Fig Q6(a), a steady state is reached with the switch K open. AT time $t = 0$, the switch is closed. Find the values of i_1, i_2, $\frac{di_1}{dt}$ and $\frac{di_2}{dt}$ at $t = 0^+$.

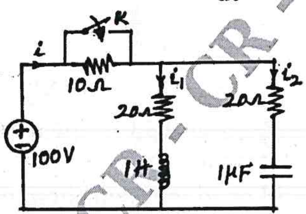

Fig Q6(a) **(10 Marks)**

b. In the network of the Fig Q6(b), the switch K is closed at $t = 0$ a steady state having previously excited. Draw the transform network and find the current i(t), using the Laplace transformation method.

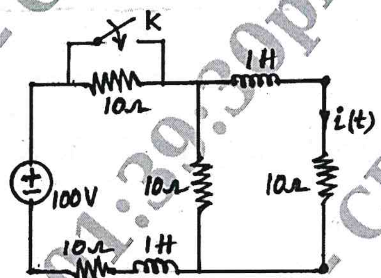

Fig Q6(b) **(10 Marks)**

Module-4

7 a. In a series resonant circuit, show that resonant frequency is equal to the geometric mean of half-power frequencies. **(06 Marks)**

b. An R-L-C series circuit of 8Ω resistance should be designed to have a bandwidth of 50Hz. Determine the values of L and C, so that the system resonates at 250Hz. Also determine the half power frequencies. **(06 Marks)**

c. For the network shown in Fig Q7(c), determine the value of C at which it resonates when f = 100Hz. Also find the values of R_L and R_C at which the circuit resonates at all frequencies.

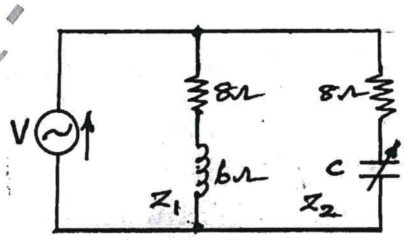

Fig Q7(c) **(08 Marks)**

OR

8 a. Define the following terms pertaining to a series R-L-C circuit, i) Resonance ii) Quality factor iii) Bandwidth iv) Selectivity. **(04 Marks)**

b. A series R-L-C circuit with an input voltage $5\angle 0^\circ$ V resonates at a frequency of 8400Hz. The peak value of current is 500mA at resonance and the bandwidth is 120Hz. Determine the values of R, L, C and cut-off frequencies. **(06 Marks)**

c. For the network shown in Fig Q8(c), determine: i) Resonance frequency ii) Input admittance iii) Quality factor iv) Bandwidth and v) half power frequencies.

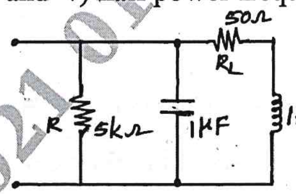

Fig Q8(c) **(10 Marks)**

Module-5

9 a. Obtain Y-parameters in terms of z-parameters. **(06 Marks)**

b. Find hybrid parameters for the two part shown in Fig Q9(b). What value of K in the two-part of figure shown will produce reciprocal network.

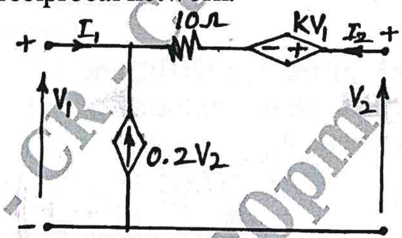

Fig Q9(b) **(06 Marks)**

c. Determine the ABCD parameters for the network of Fig Q9(c).

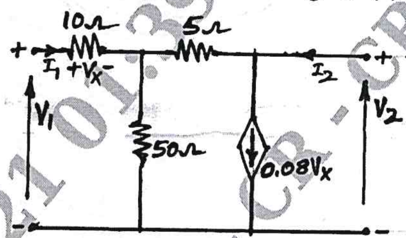

Fig Q9(c) **(08 Marks)**

OR

10 a. Explain h-parameters with equivalent circuit. Also obtain t-parameters in terms of h-parameters and hence show that AD – BC = 1. **(10 Marks)**

b. Find the Z-parameters and the Y-parameters for the network of Fig Q10(b)

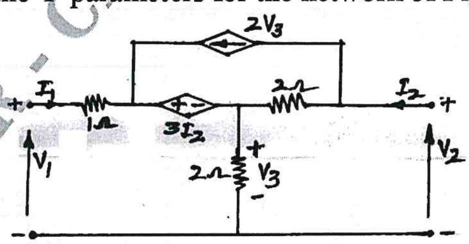

Fig Q10(b) **(10 Marks)**

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