CBCS SCHEME

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

18EI/BM36

Third Semester B.E. Degree Examination, July/August 2022
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. Define the following Networks with examples: i) Unilateral ii) Bilateral iii) Linear iv) Distributed. **(04 Marks)**

b. Determine the current through 2Ω resistor in the network shown in Fig Q1(b), Using source transformation method

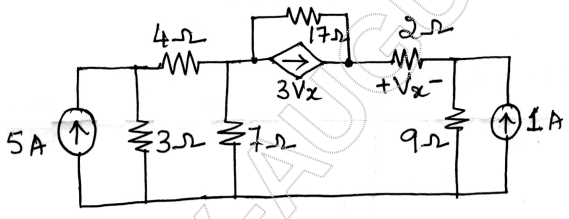

Fig Q1(b) **(08 Marks)**

c. Use mesh analysis to determine what value of V_2 in the network shown in Fig Q1(c), causes the voltage V = 0v across the 20Ω.

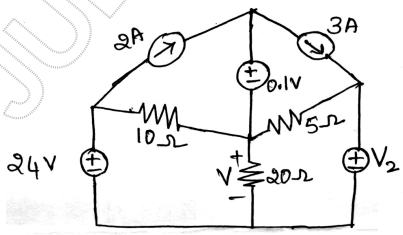

Fig Q1(c) **(08 Marks)**

OR

2 a. Using node analysis, find the node voltage for the network shown in Fig Q2(a).

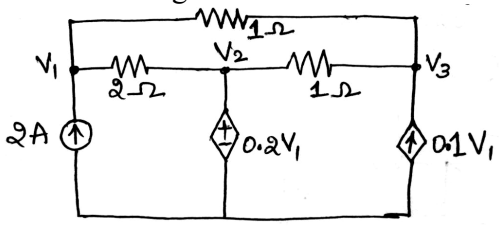

Fig Q2(a) **(07 Marks)**

b. Determine the power delivered by voltage source of the network, shown in Fig Q2(b), using supermesh analysis.

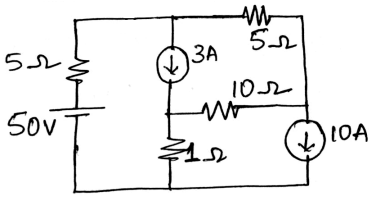

Fig Q2(b) **(06 Marks)**

c. Using supernode analysis, find the voltage 'V_0' in the network of Fig Q2(c).

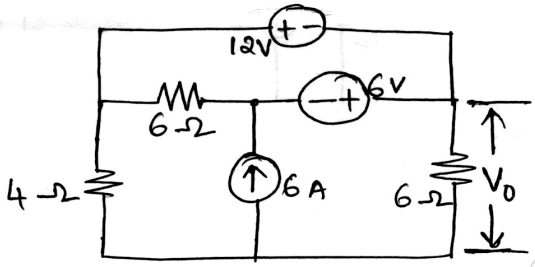

Fig Q2(c) **(07 Marks)**

Module-2

3 a. Determine the current through 10Ω resistor of the network shown in Fig Q3(a), using super position theorem.

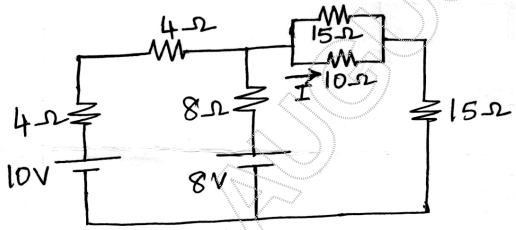

Fig Q3(a) **(12 Marks)**

b. For the circuit shown in Fig Q3(b), find the current through load resistor R_L using Thevenin's theorem.

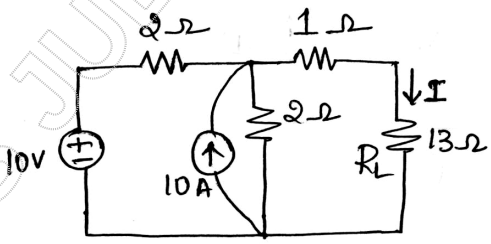

Fig Q3(b) **(08 Marks)**

OR

4 a. Using Norton's theorem, determine the current through 16Ω resistor shown in Fig Q4(a).

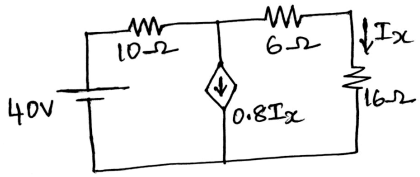

Fig Q4(a) **(07 Marks)**

b. State Maximum Power Transfer Theorem for the networks shown in Fig Q4(b), find the load impedance to be connected across the terminals AB that maximum power transferred to the load.

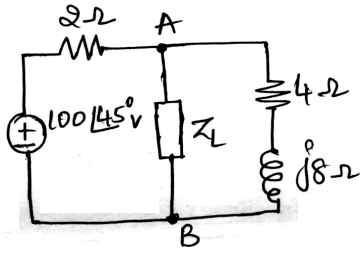

Fig Q4(b) **(08 Marks)**

c. Verify the reciprocity theorem and determine the voltage V_x for the networks shown in Fig Q4(c).

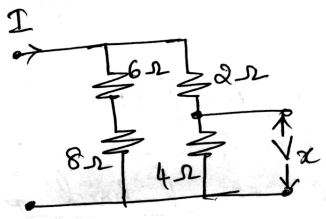

Fig Q4(c) **(05 Marks)**

Module-3

5 a. Mention the significance of initial conditions of RLC networks. **(04 Marks)**

b. A parallel RL circuit is energized by a current source of 1A. The switch across the source is opened at t = 0. Solve for V, $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$ if R = 100Ω and L = 1H, shown in Fig Q5(b)

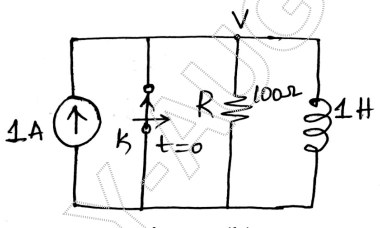

Fig Q5(b) **(09 Marks)**

c. For the network shown in Fig Q5(c), the switch is moved from position 1 to position 2 at t = 0 the steady state has been reached before switching, calculate i, $\frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t = 0^+$.

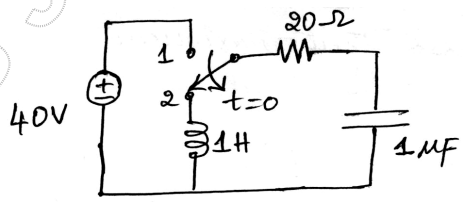

Fig Q5(c) **(07 Marks)**

OR

6 a. Define h-parameters and draw its equivalent model for the network shown in Fig Q6(a), find the hybrid parameters.

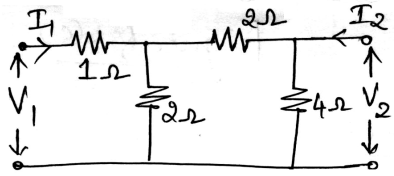

Fig Q6(a) **(10 Marks)**

b. Define Z-parameters and draw its equivalent model. Find the open circuit impedance for the circuit shown in Fig Q6(b).

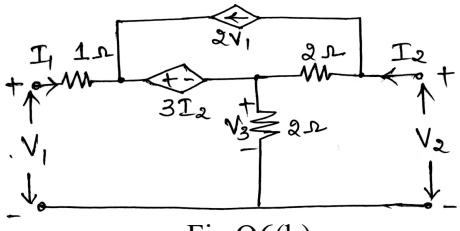

Fig Q6(b) **(10 Marks)**

Module-4

7 a. Define Resonance. Explain the phenomenon of resonance in an electrical circuit. **(06 Marks)**

b. Derive an expression of resonant frequency, bandwidth and selectivity for series RLC circuit. Prove that $f_0 = \sqrt{f_1 \cdot f_2}$. **(10 Marks)**

c. A series resonant circuit included 1μF capacitor and a resistance of 16Ω? If the Bandwidth is a 500rad/sec, determine : i) w_r ii) Q iii) L. **(04 Marks)**

OR

8 a. Derive an expression for resonance frequency of the parallel circuit shown in Fig Q8(a).

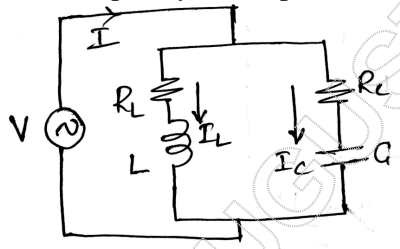

Fig Q8(a) **(08 Marks)**

b. Determine the value of L for which the circuit shown in Fig Q8(b) is resonant at W_0 = 500rad/sec.

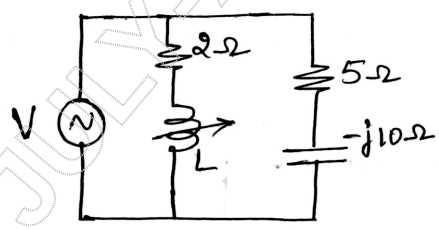

Fig Q8(b) **(07 Marks)**

c. For the parallel resonant circuit shown in Fig Q8(c), find I_o, I_L, I_C, resonant frequency and dynamic resistance.

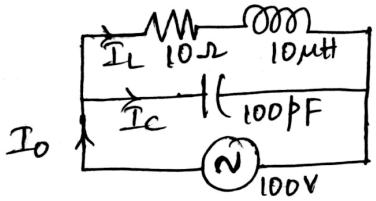

Fig Q8(c) **(05 Marks)**

Module-5

9 a. Explain the following terms with respect to network topology :
i) Oriented Graph ii) Isomorphic Graph iii) Cutset. **(06 Marks)**

b. For the given draw oriented graph of network in shown in Fig Q9(b), write complete incidence matrix and reduced incidence matrix. Determine number of possible trees for the given Network, shown in Fig Q9(b).

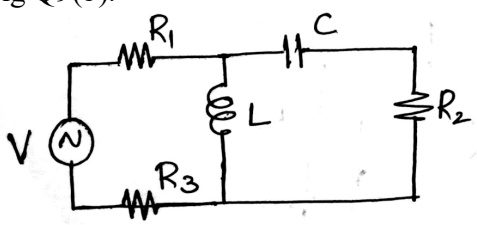

Fig Q9(b) **(06 Marks)**

c. Explain principle of Duality. Draw the dual network of the circuit shown in Fig Q9(c)

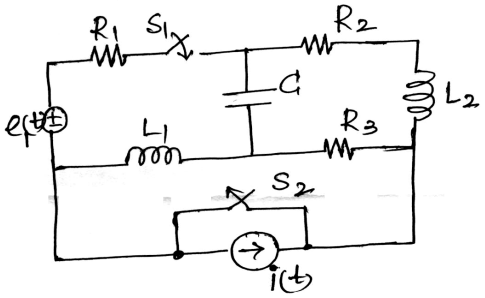

Fig Q9(c) **(08 Marks)**

OR

10 a. For the network shown in Fig Q10(a), for a co-tree (4, 5, 2, 8), write tie set and cut set matrices.

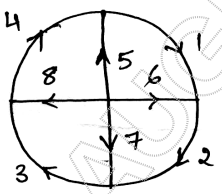

Fig Q10(a) **(10 Marks)**

b. For the networks shown in Fig Q10(b), draw its dual networks, write the integro-differential: i) Mesh equations for the given network ii) Node equations for its dual network.

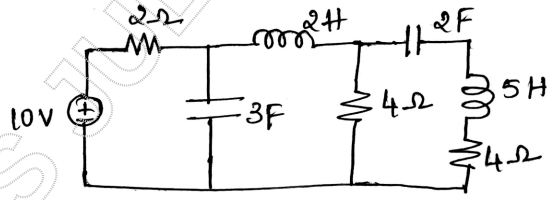

Fig Q10(b) **(10 Marks)**

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