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18EE32

Third Semester B.E. Degree Examination, June/July 2025
Electric Circuit Analysis

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Use Mesh analysis to find I_1, I_2, I_3 in the circuit of Fig.Q1(a).

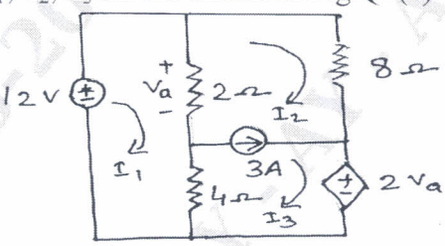

Fig.Q1(a) **(10 Marks)**

b. Find R_{eq} and i, for the circuit shown in Fig.Q1(b).

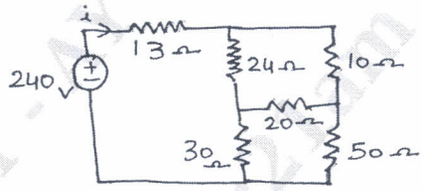

Fig.Q1(b) **(06 Marks)**

c. Construct the dual of the circuit in Fig.Q1(c).

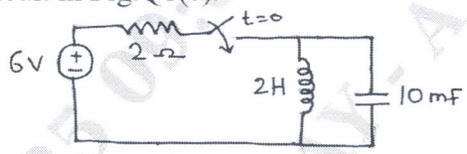

Fig.Q1(c) **(04 Marks)**

OR

2 a. Determine the power supplied by the dependent source in Fig.Q2(a) , using Node analysis.

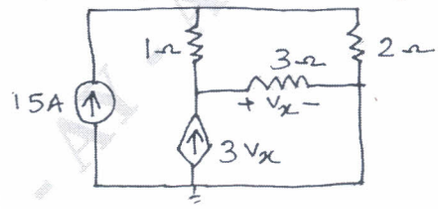

Fig.Q2(a) **(10 Marks)**

b. Reduce the network in Fig.Q2(b) to a single voltage source using source shifting and transformation.

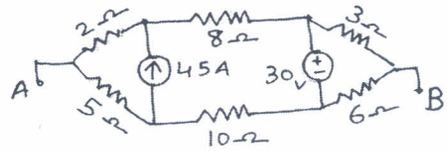

Fig.Q2(b) **(10 Marks)**

Module-2

3 a. Using superposition theorem, find V_x in the circuit of Fig.Q3(a).

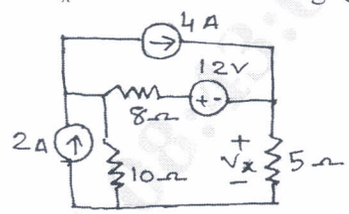

Fig.Q3(a) **(10 Marks)**

b. Find the current I in the circuit Fig.Q3(b) and verify reciprocity theorem.

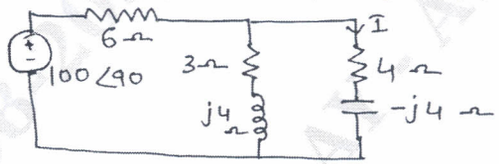

Fig.Q3(b) **(10 Marks)**

OR

4 a. Obtain the Thevenin's equivalent across AB for the network shown in Fig.Q4(a).

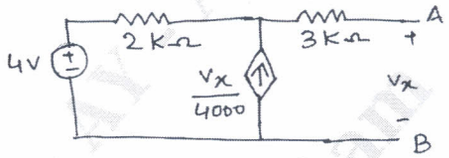

Fig.Q4(a) **(08 Marks)**

b. Obtain the Norton equivalent across AB for the network shown in Fig.Q4(b).

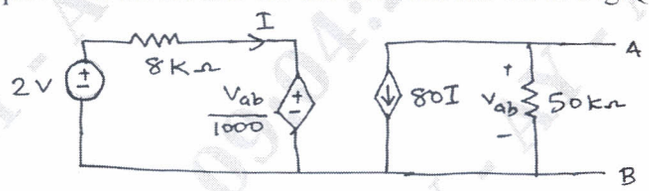

Fig.Q4(b) **(06 Marks)**

c. In the circuit shown in Fig.Q4(c), find the load connected at AB for which the power transferred will be maximum. Also find the maximum power.

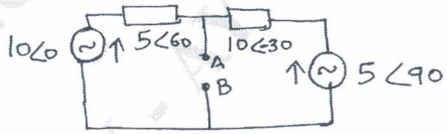

Fig.Q4(c) **(06 Marks)**

Module-3

5 a. Determine the RLC parallel circuit parameters whose response curve is as shown in Fig.Q5(a). What are the new values of ω_r and bandwidth if C is increased by four times.

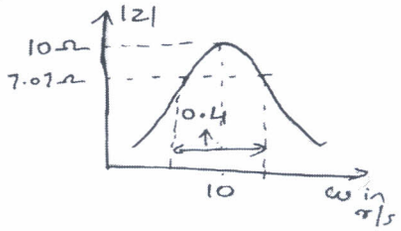

Fig.Q5(a) **(08 Marks)**

b. In the circuit shown in Fig.Q5(b), the switch K is opened at t = 0. Find at $t = 0^+$ the voltage across the switch, its first and second derivatives.

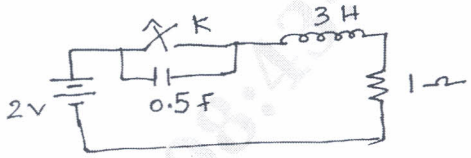

Fig.Q5(b) **(12 Marks)**

OR

6 a. In the circuit shown in Fig.Q6(a), the switch K is closed at t = 0. Solve for the currents in L and C and their derivatives at $t = 0^+$.

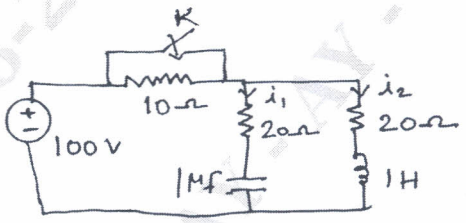

Fig.Q6(a) **(12 Marks)**

b. Find the value of L for which the given circuit in Fig.Q6(b) resonates at 1000 Hz.

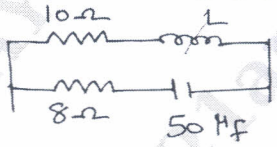

Fig.Q6(b) **(08 Marks)**

Module-4

7 a. Find the final value and the initial value for the given functions:

i) $f(t) = 5 + 4e^{-2t}$ ii) $f(s) = \dfrac{s^3 + 7s^2 + 5}{s(s^3 + 3s^2 + 4s + 2)}$ **(06 Marks)**

b. Find the Laplace transform of the given waveform in Fig.Q7(b).

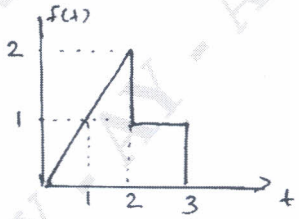

Fig.Q7(b) **(06 Marks)**

c. Obtain the Laplace transform for the given waveform in Fig.Q7(c).

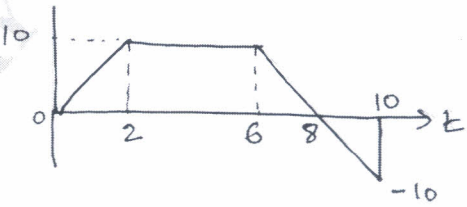

Fig.Q7(c) **(08 Marks)**

OR

8 a. State and prove initial value and final value theorem. **(10 Marks)**

b. Obtain the Laplace transform of the periodic function in Fig.Q8(b).

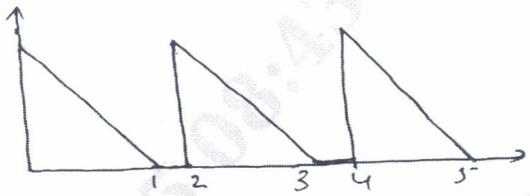

Fig.Q8(b) **(10 Marks)**

Module-5

9 a. For the unbalanced delta connected load in Fig.Q9(a), find the phase currents, line currents and total power consumed by load when the phase sequence ACB.

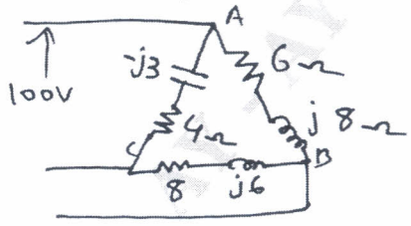

Fig.Q9(a) **(10 Marks)**

b. Obtain the Y parameter for the network shown in Fig.Q9(b).

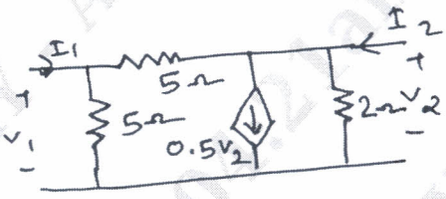

Fig.Q9(b) **(10 Marks)**

OR

10 a. Find the Z – parameters for the network shown in Fig.Q10(a).

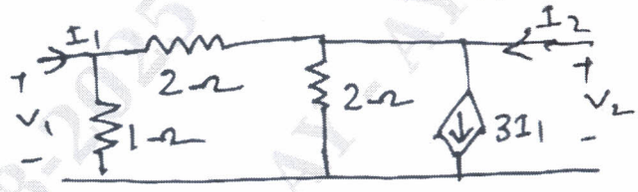

Fig.Q10(a) **(10 Marks)**

b. Obtain the T parameter, for the network shown in Fig.Q10(b), give the result in S domain.

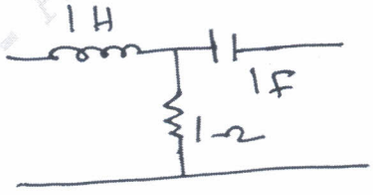

Fig.Q10(b) **(10 Marks)**

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