Term Evaluation (Odd) Semester Examination September 2025

Roll no.....

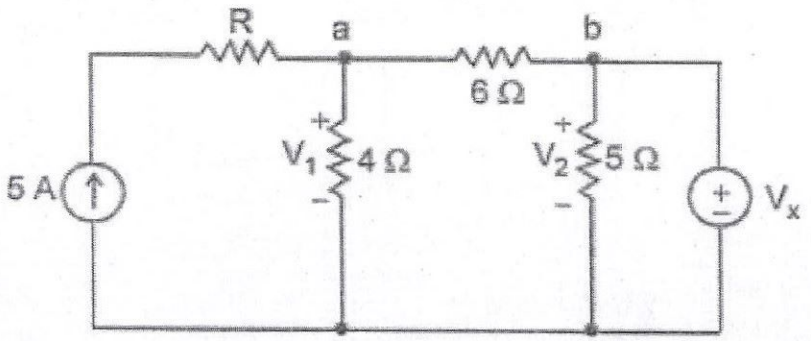
Name of the Course: B. Tech
Semester: III
Name of the Paper: Network Theory
Paper Code: TEC 303
Time: 1.5-hour **Maximum Marks: 50**

Note:
(i) Answer all the questions by choosing any one of the sub-questions
(ii) Each question carries 10 marks.

Q1. CO1 (10 Marks)
a. Discuss the condition for maximum power transfer in AC circuits. Derive the expression for maximum power delivered to the load.

OR

b. Find the unknown voltage V_x, in the circuit shown in figure below. Assume $V_1 = 16$ V

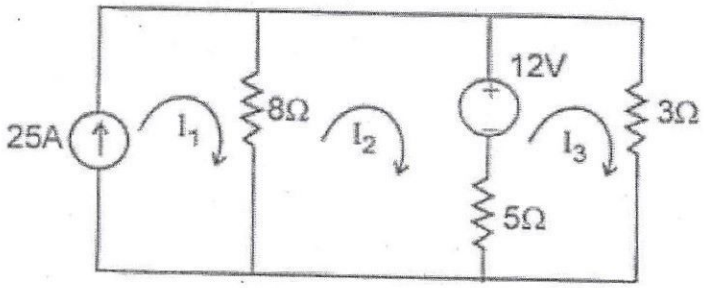


Q2. CO1 (10 Marks)
a. Explain Superposition Theorem and its limitations. Solve an example to illustrate its use.

OR

b. State and prove the Reciprocity Theorem and discuss its applicability in AC networks.

Q3. CO1, CO2 (10 Marks)
a. Write the mesh equation for the circuit shown below and determine the current in each loop.



OR

b. Write short notes on: (i) Incidence matrix, (ii) Circuit matrix, (iii) Tie-set matrix, (iv) Cut-set matrix

Q4. CO1, CO2 (10 Marks)
a. Explain Tellegen's theorem in detail. Prove it using Kirchhoff's laws and discuss its significance in network analysis.

OR

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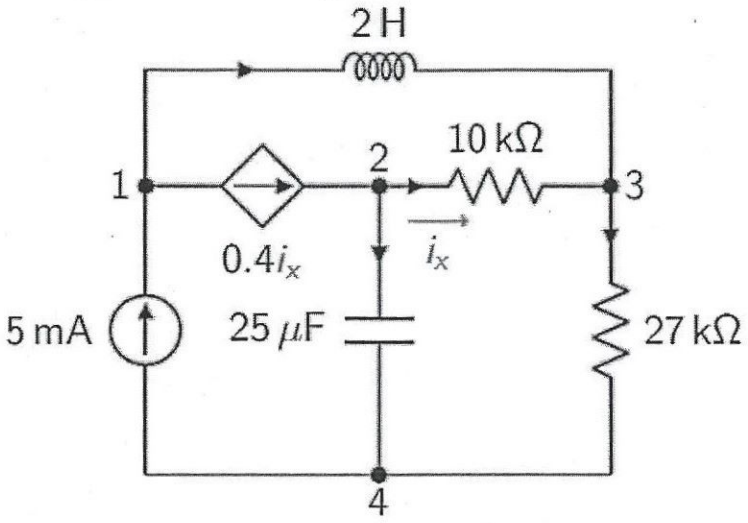
c. Derive the relationship between incidence, tie-set, and cut-set matrices in network graph theory.

Q5. CO2 (10 Marks)

a. Define the following with suitable diagrams: Graph, Subgraph, Connected graph, Tree, Co-tree.

OR

d. Draw the tie-set matrix for the given below network



Note For the question paper setters:

- Question paper should cover all the COs of the course.
- Please specify COs against each question.