

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

- Q.1(a) Analyze the relationship between the incidence matrix and fundamental cut-set matrix. [2] CO CO1 BL BL1
- Q.1(b) Select a suitable tree based on the obtained graph for Fig.1 and determine the tie-set matrix. Analyze the KVL equation from the tie-set matrix. [3] CO1, BL3
CO2 BL4
&
CO4

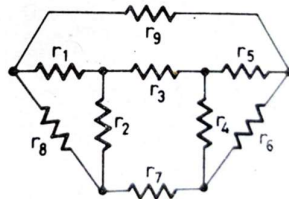


Fig. 1

- Q.2(a) Determine the graph for the network as shown in Fig.2 below and analyze the number of trees for the obtained graph. [2] CO1, BL3
CO2 BL4
&
CO4
- Q.2(b) Analyze the graph for Fig. 3 as shown below. Select a suitable tree and obtain the cut-set matrix. Identify the number of twigs and links. [3] CO1, BL3
CO2 BL4
&
CO4

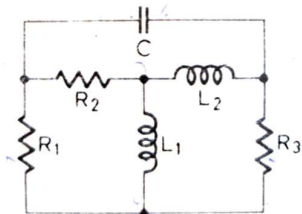


Fig. 2

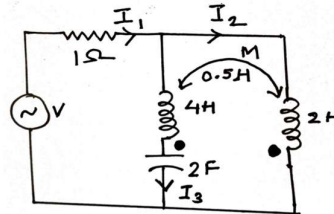


Fig. 3

- Q.3 The electrical network and the corresponding graph is shown as in Fig. 4a & Fig. 4b respectively. Obtain the incidence matrix, node admittance matrix and analyze the node equations. [5] CO1, BL1
CO2 BL3
&
CO4

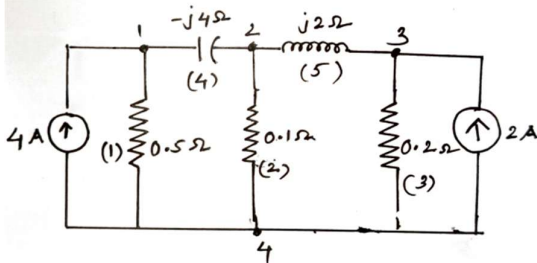


Fig. 4a

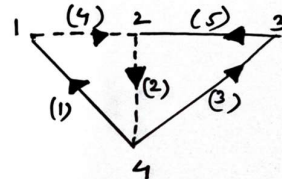


Fig. 4b

Q.4 In the network shown in Fig. 5, verify the reciprocity theorem, if the voltage source of $100\angle 45^\circ$ V causes a current I to flow through $5\ \Omega$ resistor. [5]

CO1, BL1
CO2, BL4
&
CO4

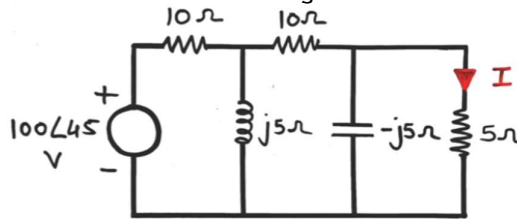


Fig. 5

Q.5 Verify substitution theorem by replacing branch x-y of Fig. 6 by the elements of Fig. 7 (a), (b), (c) and (d) respectively. [5]

CO1, BL1
CO2, BL4
&
CO4

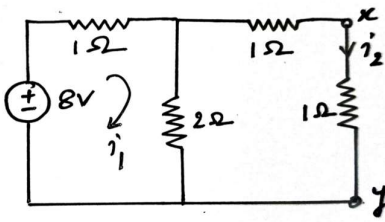


Fig. 6

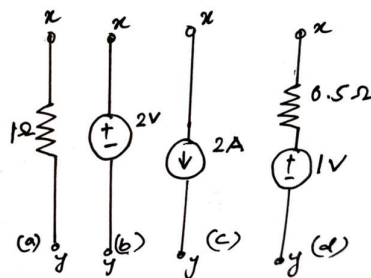


Fig. 7 (a) - (d)