

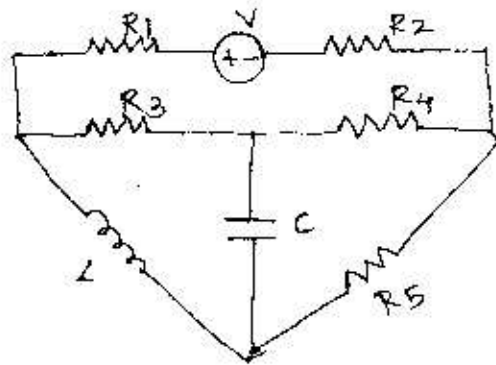
(3 Hours)

[Total Marks : 100

- N.B.** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions from remaining **six** questions.
 (3) Assume **suitable** data if **required**.

1. (a) Draw the dual of the network shown in figure.

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(b) The reduced incidence matrix of an oriented graph is :

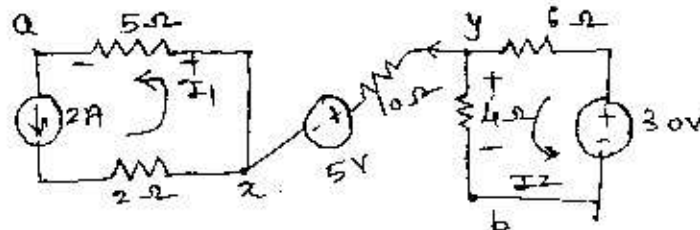
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$$A = \begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Draw oriented graph and how many trees are possible for this graph.

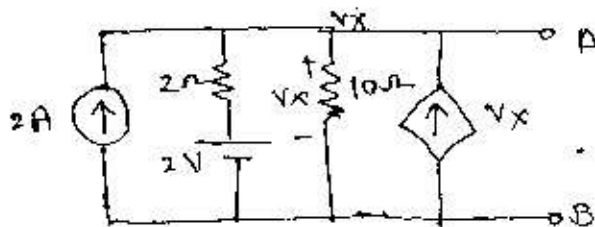
(c) Find the voltage V_{ab} in the network shown :

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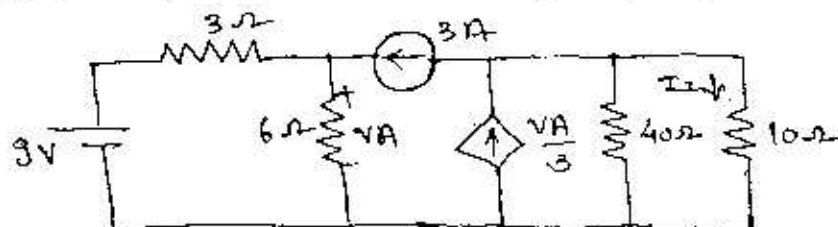


(d) Find V_{TH} and R_{TH} between points A and B in figure.

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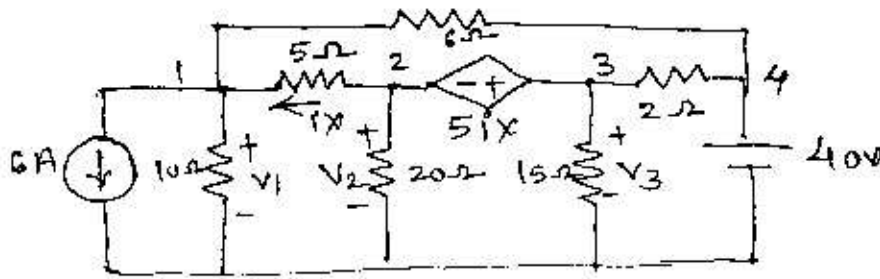
2. (a) Determine current I_2 in the network shown in figure by using superposition principle. 10



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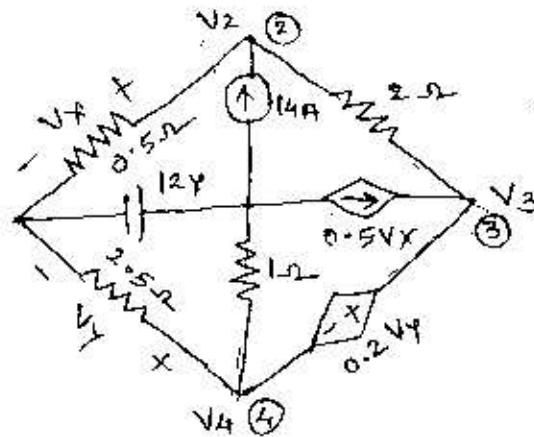
(b) Find the nodal voltages in the circuit shown in figure.

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3. (a) Find the nodal voltage in the circuit shown.

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(b) (i) Define following terms :—

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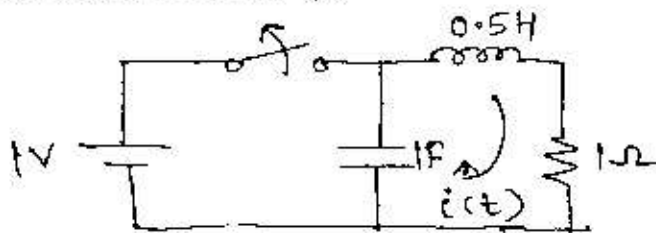
- (1) Gain margin
- (2) Phase margin
- (3) Gain crossover frequency.

(ii) Write short note on significance of initial condition.

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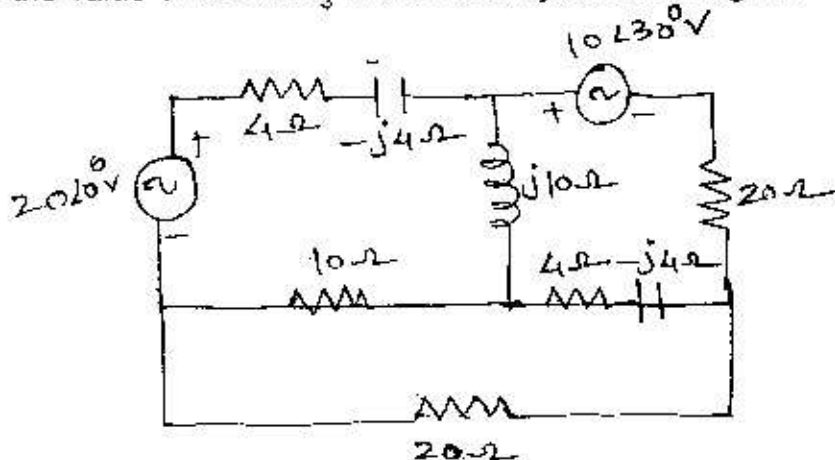
4. (a) In the network shown in figure switch is opened at $t = 0$. Steady state condition is achieved before $t = 0$ find $i(t)$.

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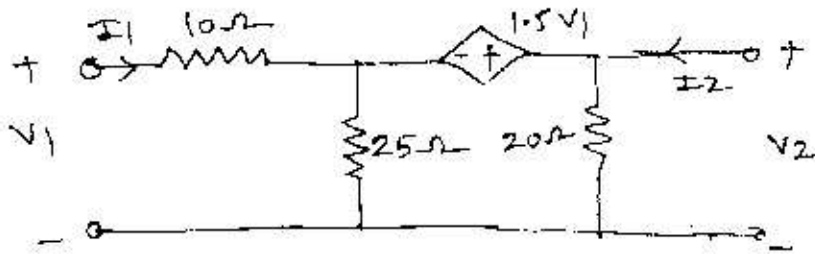


(b) Find the value of current I_3 in the network shown in figure.

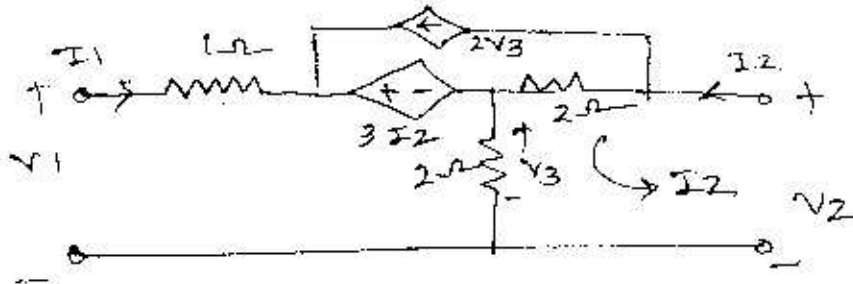
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5. (a) Find the transmission parameters for the two port network shown in figure. 10



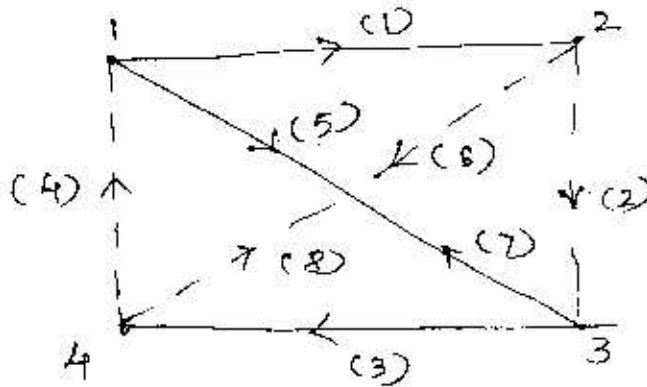
- (b) Determine Z and Y parameters of the network shown in figure. 10



6. (a) Define and with suitable example differentiate between :— 10

- (i) Tree and Cotree
- (ii) F-cutset matrix and Tieset matrix
- (iii) Planer and non-planer graph.

- (b) Obtain incidence matrix Tieset matrix and f-cutset matrix for the graph shown. 10



7. (a) Test whether the following polynomial is Hurwitz :— 10

- (i) $P(s) = s^4 + s^3 + 3s^2 + 2s + 12$
- (ii) $P(s) = s^4 + s^3 + 2s^2 + 3s + 2$

- (b) Realize Foster I and Cauer I forms of RC impedance : 10

$$Z(s) = \frac{s + 4}{(s + 2)(s + 6)}$$