(3 Hours)   **Total Marks - 80**

N.B.
  i) Question No. 1 is compulsory.
  ii) Attempt any three questions from remaining.
  iii) Assume suitable data if necessary.
 iv) Figures to the right indicate full marks.

Q.1 Attempt any **Four**
A) Express Z - parameters in terms of Y- parameters.   [05]
B) Explain the principle of duality.   [05]
C) State reciprocity theorem.   [05]
D) Find Laplace transform of unit step & unit ramp function.   [05]
E) State restrictions on pole & zero location for driving point function.   [05]

Q.2
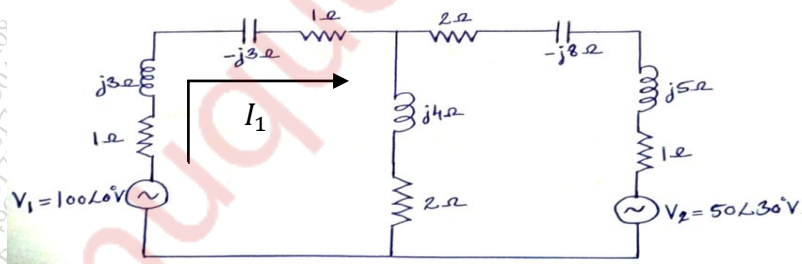 A) Use Nodal analysis to determine voltage V_1 for the electrical circuit shown below,   [10]
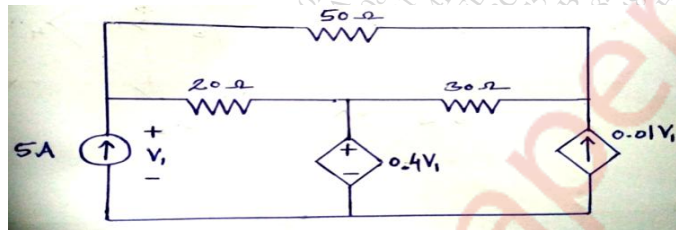
B) Find the current through 10Ω capacitive reactance by using mesh analysis,   [10]
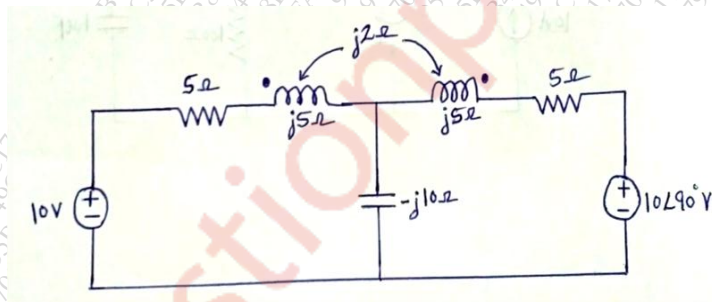
Q.3
A) Use Superposition theorem to find current I_1 for the electrical circuit shown below,   [10]

B) Define the following terms,   [05]
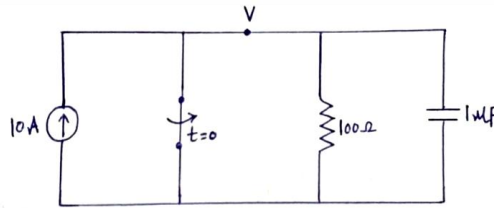i) Non-oriented & Oriented graph.
ii) Tree & Co-tree.

C) Define pole & zero of network function & draw p-z plot for $V(s) = \dfrac{5(S+5)}{S(S+10)(S+15)}$.   [05]

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Q.4

A) For a given tree of the linear graph, obtain incidence matrix, fundamental cut-set matrix & fundamental tie-set matrix, [10]
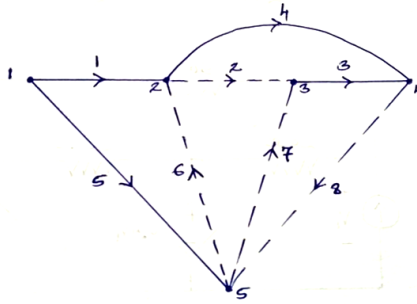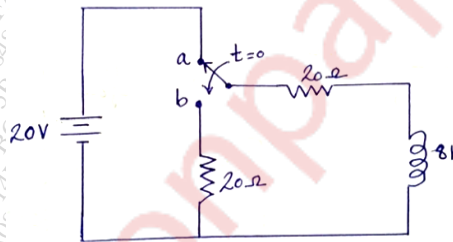

B) In the given circuit switch is opened at t = 0, find the value of $v, \frac{dv}{dt}$ & $\frac{d^2v}{dt^2}$ at time t = 0+. [10]
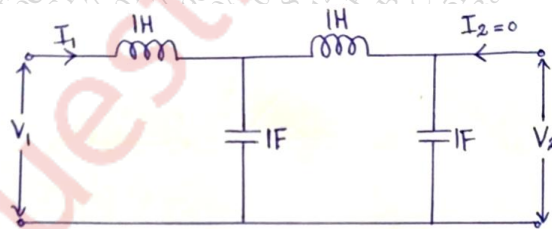

Q.5

A) The switch changes its position from "a" to "b" at time t = 0. Determine current i(t) for t>0 using Laplace transform. [10]
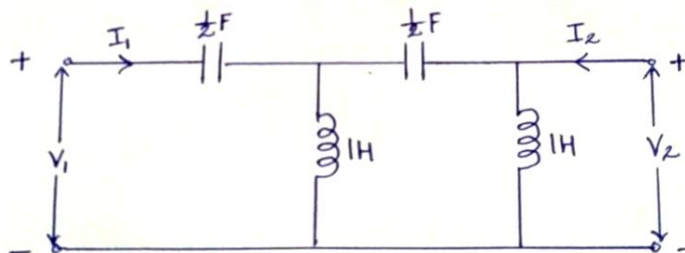

B) Find the network functions $\frac{V_1}{I_1}, \frac{V_2}{V_1}$ & $\frac{V_2}{I_1}$ for the network shown below, [10]

Q.6

A) Determine the Y- parameters for the two port network shown below, [10]

B) Define the Z - parameters of two port network. Derive the expression for reciprocity & symmetry condition. [10]

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