QP Code : 14669

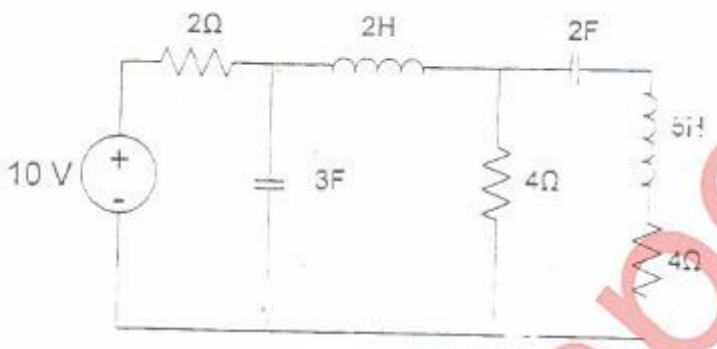
(3 Hours) **[Total Marks : 80**

Note:

1) Question 1 is compulsory
2) Solve any three questions from questions no. 2 to 6
3) Assume suitable data if necessary

Q1

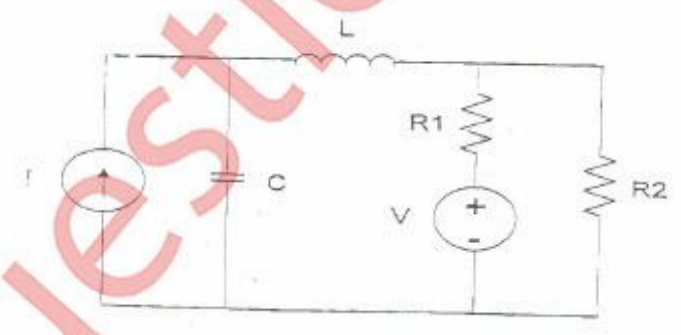
a) Explain the time domain behavior of system with respect to pole zero plot. (04)
b) Describe natural response and forced response. (04)
c) Write the equilibrium equations on KCL and KVL basis for a network. (04)
d) Draw the dual of following circuit. (04)



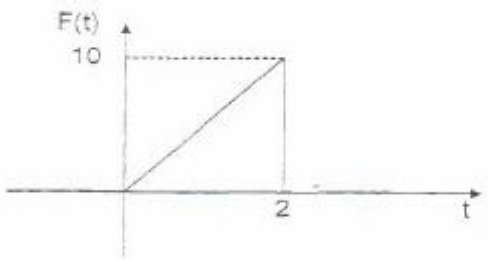
e) Determine the range of values of k so that polynomial $P(s) = s^3 + 14s^2 + 56s + k$ is Hurwitz. (04)

Q2

a) For the given network draw an oriented graph. How many trees are possible for this graph. Write complete incidence matrix for this graph. (10)

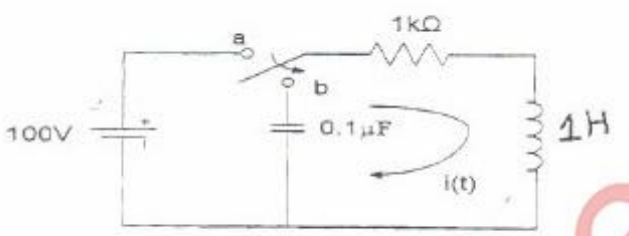


b) Explain the reciprocity theorem. (05)
c) Find the Laplace transform of triangular wave shape shown. (05)



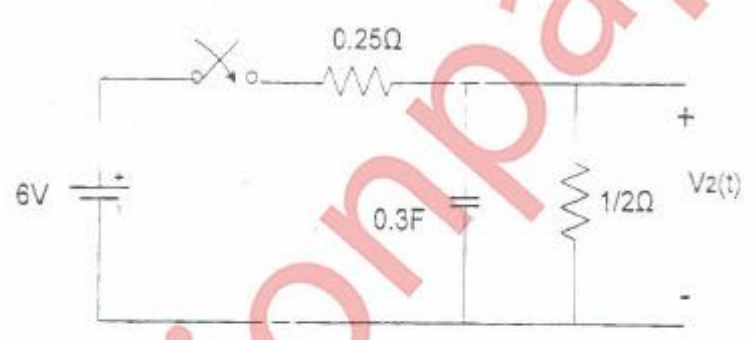
Q3

a) In a network, the switch is changed from position 'a' to 'b' at t=0. Solve for $i, \frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t=0^+$. (10)



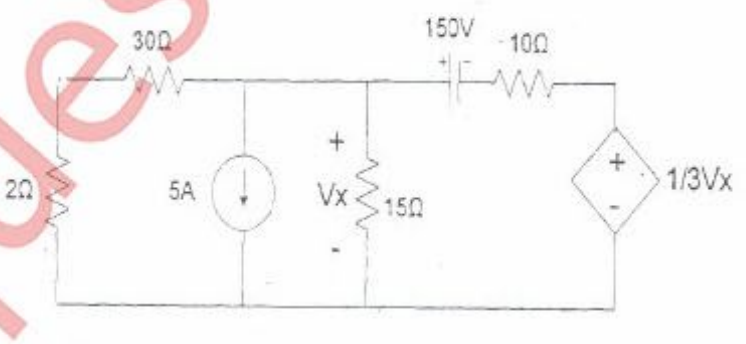
b) Derive the response of unit step signal in case of R-L series circuit. (04)

c) In the network shown, the switch is open for a long time and at t=0, it is closed. Determine $V_2(t)$. (06)



Q4

a) Find the current in 2Ω resistance using Thevenin's theorem. (10)

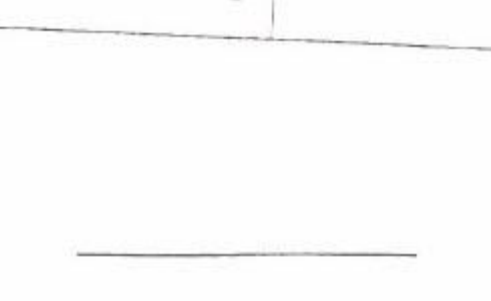


b) Test whether $F(s) = \frac{(s^2+1)}{(s^3+4s)}$ is a positive real function or not. (06)

c) Derive the condition for reciprocity for Z-parameters. (04)

Q5

a) A network is shown in figure. The poles and zeros of driving point function Z(s) is at following places. Poles at $(-\frac{1}{2} \pm j\ \frac{\sqrt{3}}{2})$, zero at (-1). If Z(j0)=1, determine R,L,C. (10)

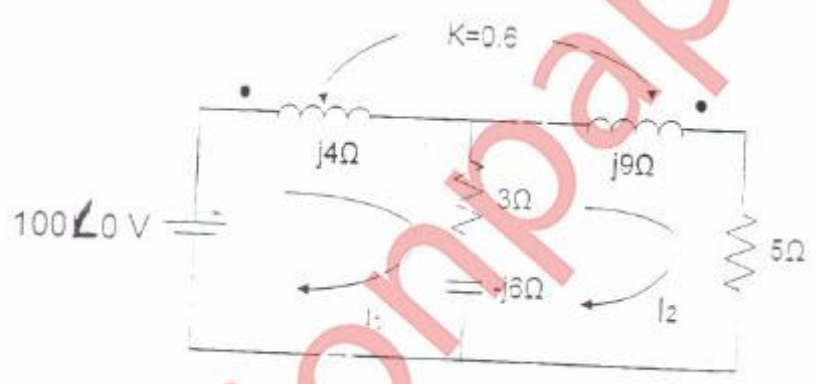


b) Determine Foster I and Foster II forms of realization for following function (10)

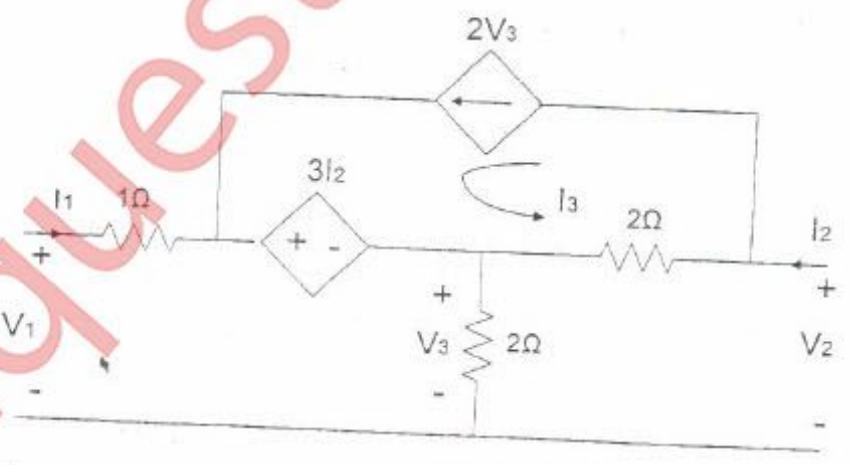
$$Z(s) = \frac{(s+1)(s+3)}{s(s+2)(s+4)}$$

Q6

a) For the network shown, Find I_1 and I_2 using mesh analysis. (08)



b) Determine Z parameters for given circuit. Express Y parameters in terms of Z parameters and find values. (10)



c) State Millman's theorem. (02)
