

Electrical
E.N
Sem III

QP Code : 14669

(3 Hours)

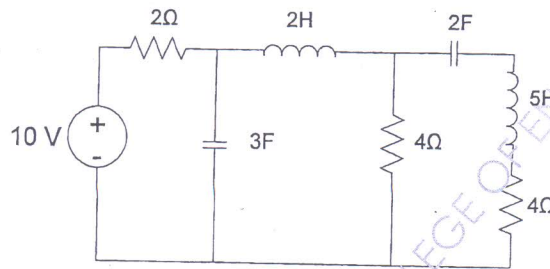
[Total Marks : 80

Note:

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

Q1

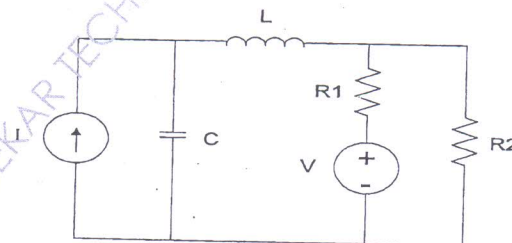
- a) Explain the time domain behavior of system with respect to pole zero plot. (04)
- b) Describe natural response and forced response. (04)
- c) Write the equilibrium equations on KCL and KVL basis for a network. (04)
- d) Draw the dual of following circuit. (04)



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

Q2

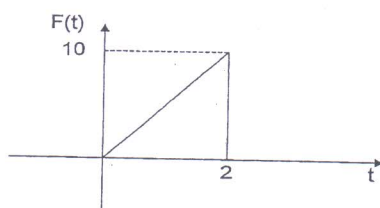
- a) For the given network draw an oriented graph. How many trees are possible for this graph. Write complete incidence matrix for this graph. (10)



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

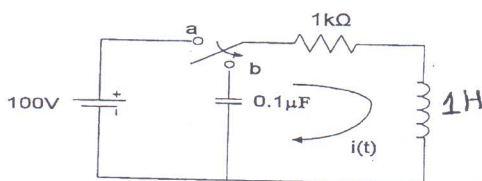
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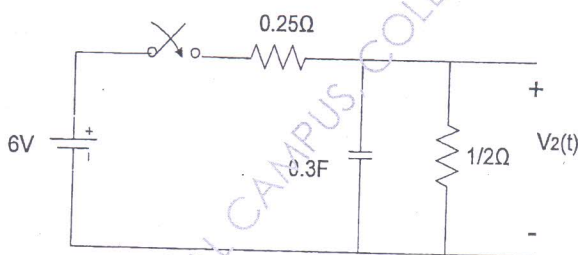


Q3

- 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)

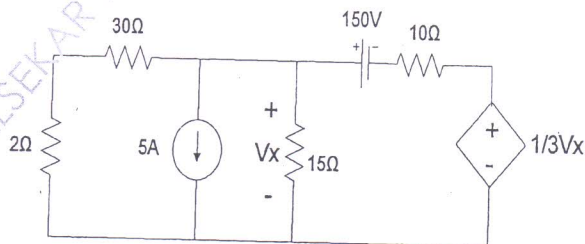


- b) Derive the response of unit step signal in case of R-L series circuit. (04)
 c) In the network shown, the switch is open for a long time and at $t=0$, it is closed. Determine $V_2(t)$. (06)



Q4

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



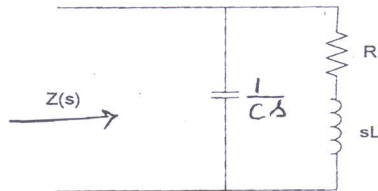
- b) Test whether $F(s) = \frac{(s^2+1)}{(s^3+4s)}$ is a positive real function or not. (06)
 c) Derive the condition for reciprocity for Z-parameters. (04)

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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)

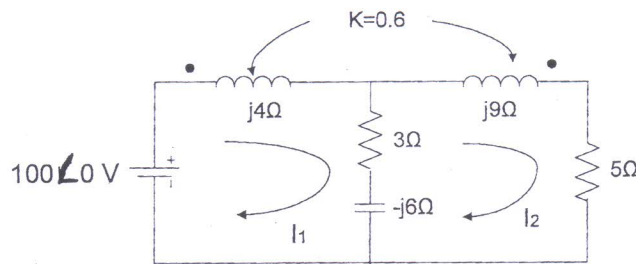


- b) Determine Foster I and Foster II forms of realization for following function (10)

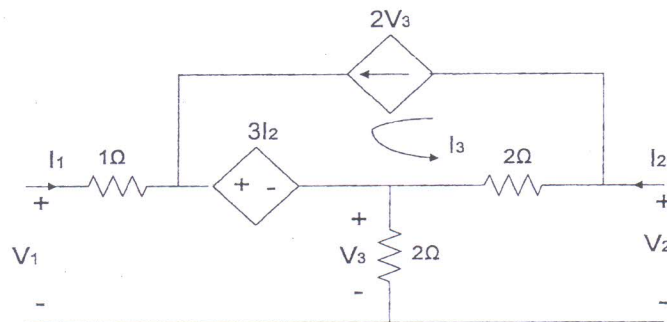
$$Z(s) = \frac{(s + 1)(s + 3)}{s(s + 2)(s + 4)}$$

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)