Sr. No.....................................

## Dec 2018

## B.Tech 3rd SEMESTER

## Network Analysis and Synthesis (EE-205C)

| Time: 3 Hours | | Max. Marks:75 |
|---|---|---|

**Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
2. Answer any four questions from Part -B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.
4. Any other specific instructions

## PART -A

Q1 (a) Define a tree and co-tree. (1.5)

(b) A network function is given by $P(s) = \frac{2s}{(s+2)(s^2+2s+2)}$. Obtain the pole zero diagram. (1.5)

(c) State Reciprocity theorem. (1.5)

(d) Check whether the polynomial $P(s)=s^5+7s^4+6s^3+9s^2+8s$ is Hurwitz or not. (1.5)

(e) Explain initial and final value theorem. (1.5)

(f) The strength of current in 1H inductor changes at a rate of 1A/sec. Find the voltage across it (1.5) and determine the magnitude of energy stored in inductor after 2 seconds

(g) For a given circuit, impedance parameters are $Z = \begin{bmatrix} 3 & 5 \\ 4 & 4 \end{bmatrix}$. Obtain Y-parameters (1.5)

(h) Explain the concept of duality. (1.5)

(i) An impulse function is given by $\delta(t-t1)$. Obtain its laplace transform. (1.5)
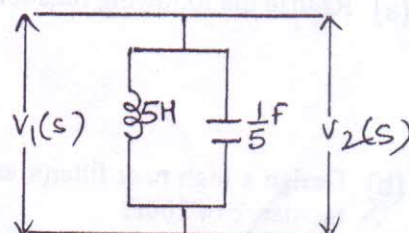
(j) Define a transfer function. (1.5)

## PART -B

Q2 (a) In the given figure find $V_2/V_1$ using mesh method: (8)



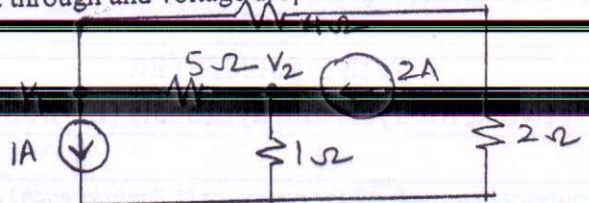(b) Derive the condition of reciprocity and symmetry in case of T-parameters (7)

Q3 (a) For the network shown in fig. determine: (8)

    i)     Z21(s)
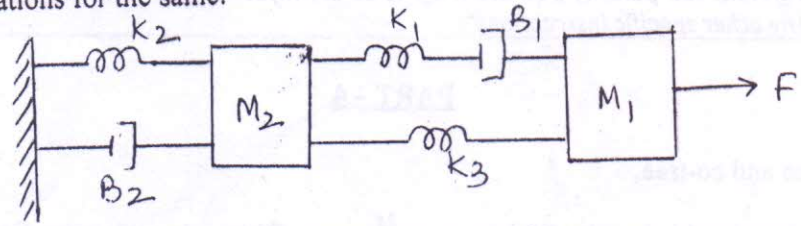    ii)    Y21(s)
    iii)   G21(s)
    iv)   α21(s)



(b) State and Explain Maximum Power Transfer theorem with the help of a relevant example. (7)
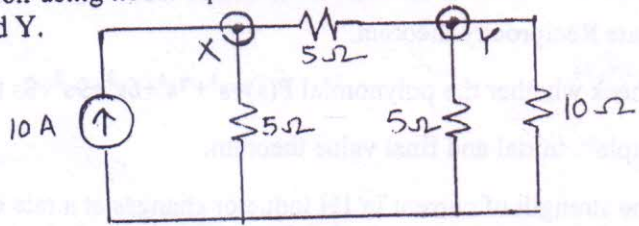
Q4 (a) Find the current through and voltage drop across 5Ω resistor (7)



(b) Obtain the electrical analogous of the mechanical system shown in fig. Also write the equations for the same. (8)
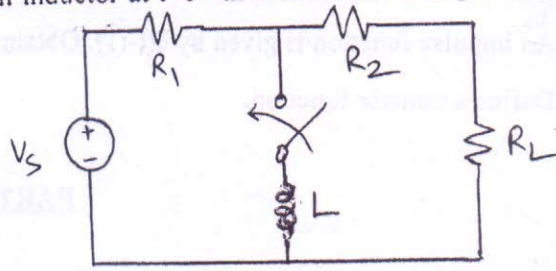


Q5 (a) Obtain equilibrium equation using nodal equations for the network shown in fig. Also find the node voltages at X and Y. (8)
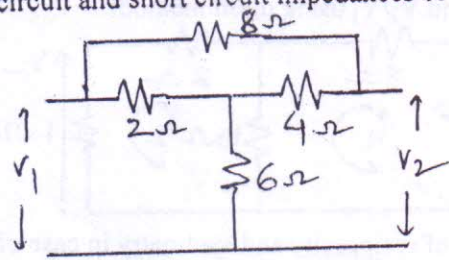


(b) Obtain Y-parameters in terms of Transmission parameters (7)

Q6 (a) In the fig. find the current through inductor at t=0+ as well as the voltage after closing the switch 'S' at t=0. (8)
Vs=10V, $R_1$=10Ω
$R_2$=5Ω, $R_L$=1Ω, L=0.5H



(b) Determine the open circuit and short circuit impedances of the network shown in fig (7)



Q7 (a) Realize the following function in Foster-I and Foster-II form (10)
$$Z(s) = \frac{(s+2)(s+5)}{(s+1)(s+4)}$$

(b) Design a high pass filter(π and T-network)having a cut off frequency of 3kHz with a load resistance of 200Ω (5)

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