PAPER ID-421711

Roll No:

BTECH
(SEM IV) THEORY EXAMINATION 2021-22
NETWORKS ANALYSIS & SYNTHESIS

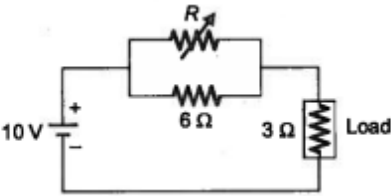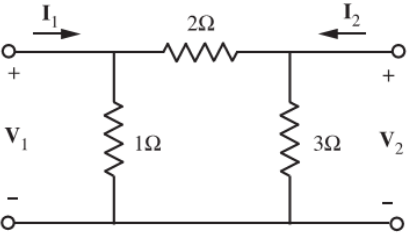*Time: 3 Hours*   *Total Marks: 100*

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

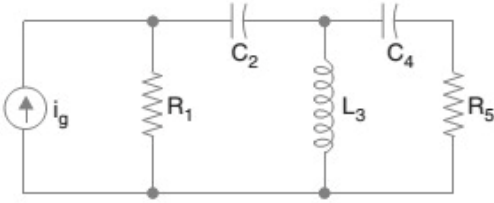1.   **Attempt** *all* **questions in brief.**   **2*10 = 20**

Q.no.	Questions	CO
(a)	Write the properties of a Complete Incidence matrix.	1
(b)	Describe the following: Tree, Co-Tree, Twig, Link, Cut-set and Tie set.	1
(c)	In the given network, find the value of R so as to provide maximum power to the load of 3 ohm.	2
(d)	Write the limitations of Millman's Theorem.	2
(e)	What is transient and steady state response?	3
(f)	A series LC circuit is suddenly connected to a DC voltage of V Volts. Find out the current in the series circuit just after the switch is closed.	3
(g)	Find the Y parameters of the two-port network shown below:	4
(h)	Explain reciprocity theorem and state the condition of reciprocity of Z parameters.	4
(i)	What is a Hurwitz polynomial and write its properties?	5
(j)	What is a low-pass filter? Draw its characteristics and diagram.	5

SECTION B

2.   **Attempt any** *three* **of the following:**   **10*3 = 30**

Qno	Questions	CO
(a)	Draw the dual of the network in figure below:	1

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(b)	Obtain the Thevenin equivalent circuits at terminals xy of the network below: 	2
(c)	Find the voltage and current response of a series RL circuit when suddenly excited by a DC source.	3
(d)	Obtain the T-parameters in terms of hybrid parameters.	4
(e)	Find the 1st form of Foster for the following impedance function. $$Z(s) = \frac{s(s^2 + 2)}{(s^2 + 1)(s^2 + 3)}$$	5

SECTION C

3. **Attempt any *one* part of the following:**   **10*1 = 10**

Qno	Questions	CO
(a)	For the resistive network, write a cutset matrix and equilibrium equations on voltage basis. Hence obtain values of branch voltages and branch currents. 	1
(b)	For the network shown in the figure, draw the oriented graph and obtain the tie-set matrix. Use this matrix to calculate *i*. 	1

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4.   **Attempt any *one* part of the following:**   10 *1 = 10

Qno	Questions	CO
(a)	The ladder network is shown in figure below. Verify the reciprocity theorem for the circuit.	2
(b)	Find the value of i_b using Norton equivalent circuit. Take $R = 667\ \Omega$.	2

5.   **Attempt any *one* part of the following:**   10*1 = 10
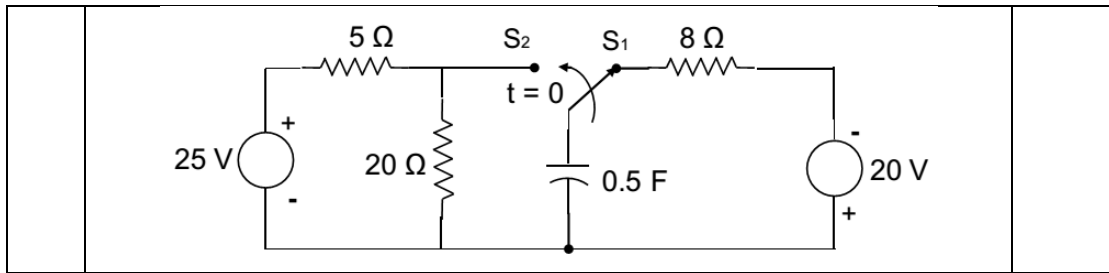
Qno	Questions	CO
(a)	The circuit in figure below is initially under steady-state condition. The switch is moved from position 1 to position 2 at t = 0. Find the current after switching.	3
(b)	The switch was in position S_1 for a long time. Next, it is moved to position S_2 at $t=0$. Calculate the voltage across the capacitor for $t > 0$. Further, evaluate the time at which the capacitor voltage becomes zero.	3

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6. **Attempt any *one* part of the following:** 10*1 = 10

Qno	Questions	CO
(a)	Find the Y parameters for the two-port network shown below:	4
(b)	When the two 2-port network are cascaded together, derive the equivalent parameters for equivalent network.	4

7. **Attempt any *one* part of the following:** 10*1 = 10

Qno	Questions	CO
(a)	Obtain both Cauer I and II realizations of the driving point function given by: $$Z(s) = \frac{10s^4 + 12s^2 + 1}{2s^3 + 2s}$$	5
(b)	Check the positive realness of the following functions. i. $\frac{2s+4}{s+5}$ ii. $\frac{s^2+2s+4}{(s+3)(s+1)}$	5