Paper id: 252567

Roll No:

BTECH
(SEM IV) THEORY EXAMINATION 2024-25
NETWORKS ANALYSIS & SYNTHESIS

TIME: 3 HRS **M.MARKS: 70**

Note: Attempt all Sections. In case of any missing data; choose suitably.
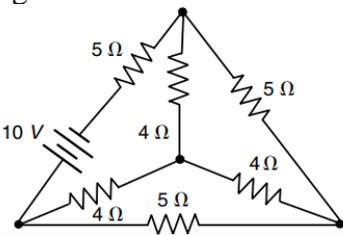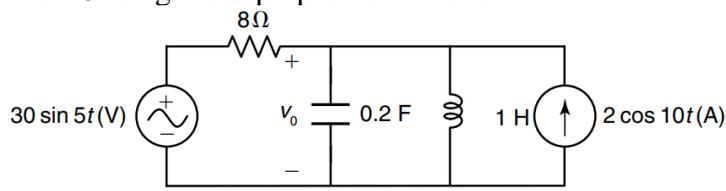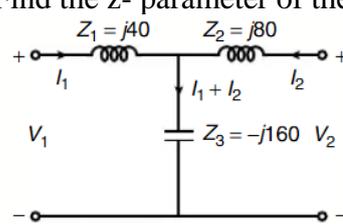
SECTION A

1. Attempt *all* questions in brief. 02 x 7 = 14

Q no.	Question	CO	Level
a.	Define Link and co-tree.	1	K2
b.	State reciprocity theorem.	2	K2
c.	Differentiate between natural response and force response.	3	K2
d.	Derive condition for maximum power transfer.	2	K2
e.	State the compensation theorem.	2	K2
f.	Discuss the properties of RC driving point function.	4	K2
g.	Differentiate between active filter and passive filter.	5	K2

SECTION B

2. Attempt any *three* of the following: 07 x 3 = 21

Q no.	Question	CO	Level
a.	Write the incidence matrix and cut-set matrix for the network shown in figure.	1	K2
b.	Find V_0 using the superposition theorem.	2	K3
c.	A constant voltage of 100V is applied at t = 0 to a RC series circuit having $R = 5M\Omega$, $C = 20\mu F$. Assuming no initial charge to the capacitor, find current i and the voltage across R and C.	3	K3
d.	Find the z- parameter of the given network shown in figure.	4	K3
e.	Design a constant K type low pass filter of 2000Hz and a zero-frequency characteristics impedance of 200Ω. Draw T and π section of the filter.	5	K4

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SECTION C

3.   **Attempt any *one* part of the following:**   **07 x 1 = 07**

Q no.	Question	CO	Level
a.	For the network shown in figure, give fundamental cut-set matrix and hence find KCL equation.	1	K3
b.	The network shown in figure using loop method of analysis, determine current in all the branches indicating their directions, use graph theory method.	1	K3

4.   **Attempt any *one* part of the following:**   **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Find the Thevenin's equivalent between terminal a and b of the circuit in figure.	2	K3
b.	Determine the value of load impedance Z_L for which maximum power will be delivered to this load from the source in the circuit shown in figure.	2	K3

5.   **Attempt any *one* part of the following:**   **07 x 1 = 07**

Q no.	Question	CO	Level
a.	In given circuit shown, switch is closed at t=0. Find the current in the circuit at any time t using Laplace transform.	3	K2

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b.	The circuit shown in figure consist of resistance, inductance and capacitance in series with 100V constant source. When the switch is closed t=0, find the transient current.	3	K3

6.   **Attempt any *one* part of the following:**   **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Find transmission parameter of network in figure. Further prove that $AD - BC = 1$	4	K3
b.	Determine the Y- Parameter for the network shown in figure.	4	K3

7.   **Attempt any *one* part of the following:**   **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Test whether the following polynomial is Hurwitz or not. $$F(s) = \frac{2s^4 + 6s^3 + 11s^2 + 10s + 5}{s^4 + 5s^3 + 8s^2 + 9s + 6}$$	5	K4
b.	Find Cauer form -I and Cauer form -II of the following $$Z(s) = \frac{s(s^2 + 3)(s^2 + 5)}{(s^2 + 2)(s^2 + 4)}$$	5	K4