

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Nov-Dec 2023

B.Tech -Program: EXTC Scheme II

Examination: SY Semester: III

Course Code: EXC305

Course Name: Electrical Network and Theory

Set:

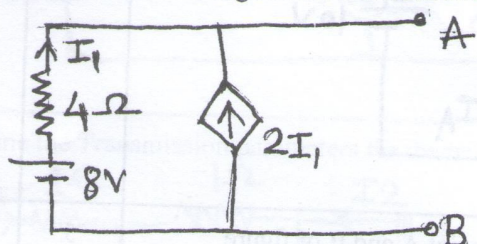
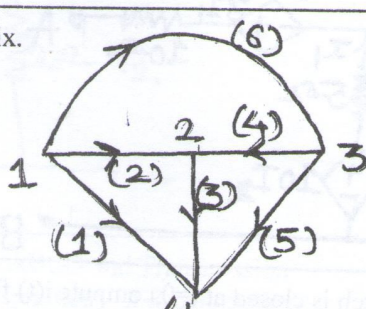
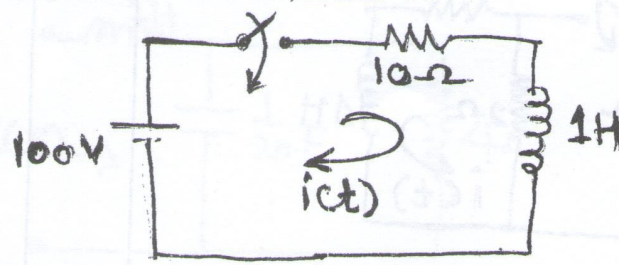
Date of Exam: 6/12/23

Duration: 02 Hours

Max. Marks: 45

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	Solve any 5 questions out of six.	15		
i)	Compute Thevenin's voltage of the Network shown in fig. 	3	1	Ap
ii)	Write complete Incidence matrix. 	3	2	Ap
iii)	In the given network, the switch is closed at $t=0$ with zero current in inductor, calculate values of i , di/dt at $t=0^+$ 	3	3	Ap
iv)	Write condition for Symmetry and Reciprocity of ABCD parameters.	3	4	Un

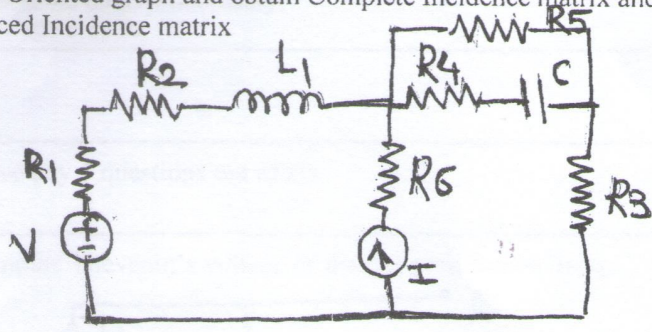
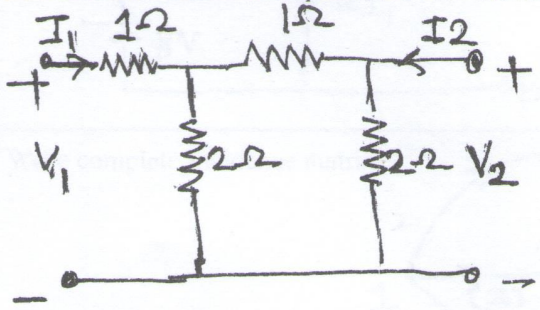
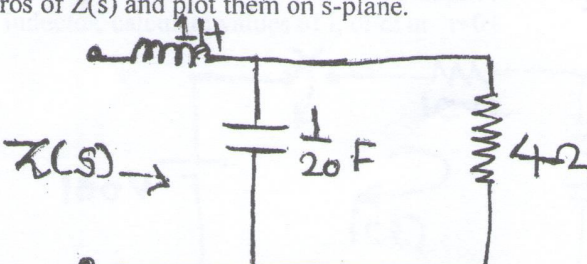
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v)	Test whether polynomial $P(s)=s^3+4s^2+5s+2$ is Hurwitz	3	5	Ap
vi)	State necessary and sufficient conditions for positive real functions	3	6	Un
Q.2	Solve any three questions out of four.	15		
i)	Obtain branch currents in the network shown in figure	5	1	Ap
<p>The circuit diagram for question i) shows a 5V DC voltage source on the left. A 5Ω resistor is in series with the source. The current through this resistor is labeled I_A. This is followed by a dependent current source of $10I_B$ pointing to the right. After this current source, there is a 5Ω resistor. The current through this resistor is labeled I_B. This resistor is in series with a 10Ω resistor. A dependent current source of $5I_A$ is connected in parallel across the 10Ω resistor. The circuit is completed by a $10V$ DC voltage source on the right.</p>				
ii)	Compute open circuit voltage across point A and B of figure	5	1	Ap
<p>The circuit diagram for question ii) shows a 5V DC voltage source on the left. A 10Ω resistor is in series with the source. The current through this resistor is labeled I_2. This is followed by a dependent current source of $10I_2$ pointing upwards. After this current source, there is a 5Ω resistor. The current through this resistor is labeled I_1. This resistor is in series with a 10Ω resistor. A dependent current source of $3I_1$ is connected in parallel across the 10Ω resistor. The circuit is completed by an open circuit between points A and B.</p>				
iii)	In the figure, the switch is closed at $t=0$, compute $i(t)$ for $t>0$	5	3	Ap
<p>The circuit diagram for question iii) shows a $10A$ DC current source on the left. A 1Ω resistor is in parallel with the current source. A switch is connected in series with the circuit. After the switch, there is a 2Ω resistor in parallel with the circuit. This is followed by another 2Ω resistor in parallel with the circuit. The current through this resistor is labeled $i(t)$. Finally, a $1H$ inductor is connected in parallel with the circuit.</p>				

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iv)	Test whether $F(s) = \frac{(s^2+1)}{(s^3+4s)}$ is a positive real function	5	6	Ap
Q.3	Solve any three questions out of four.	15		
i)	Draw Oriented graph and obtain Complete Incidence matrix and Reduced Incidence matrix 	5	2	Un
ii)	Determine the Transmission parameters for the network shown 	5	4	Ap
iii)	Write down the equations of Z, Y, ABCD and Transmission parameters and write condition of symmetry of Z parameters.	5	4	Un
iv)	Determine $Z(s)$ in the network shown in figure. Compute poles and zeros of $Z(s)$ and plot them on s-plane. 	5	5	Ap
