

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

Nov – Dec 2025

Program: B.Tech_Scheme II/IIB

Regular/Supplementary Examination: FY/SY/TY/LY Semester: III

Course Code:EXC 305 and Course Name: Electrical Network Theory

Date of Exam: ~~04/12/2025~~ *07/01/2026* 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)	In the network, the switch is closed at $t = 0$. assuming all initial conditions as zero,, Compute value for $i(t)$ at $t = 0+$		3	Ap
ii)	Calculate Y_{11} and Y_{12} parameter for the network shown in fig.		4	Ap
iii)	Define Voltage and Current Transfer function		5	U,R
iv)	Obtain the V_{th} for the given network of Fig. at terminals A and B.			Ap
v)	Explain properties of Positive real function		6	U,R

Nov – Dec 2025

Program: B.Tech_Scheme II/IIB

Regular/Supplementary Examination: FY/SY/TY/LY Semester: III

Course Code: EXC 305 and Course Name: Electrical Network Theory

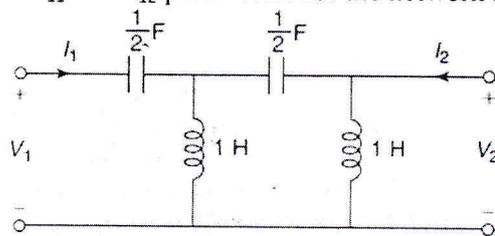
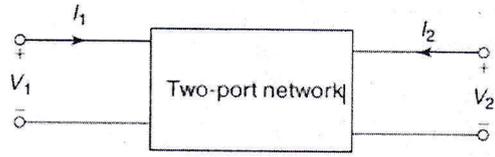
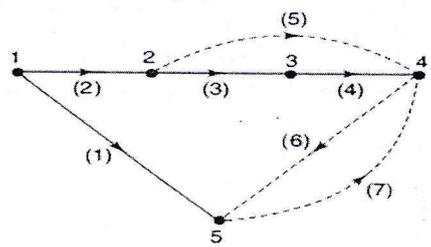
Date of Exam: ~~04/12/2025~~ **7/2/26** Duration: 02 Hours

Max. Marks: 45

vi)	Draw the oriented graph from the complete incidence matrix given below :	2	Ap																																																															
	<table border="1" style="margin: auto;"> <thead> <tr> <th style="border-right: 1px solid black;">Nodes ↓</th> <th colspan="8">Branches →</th> </tr> <tr> <th style="border-right: 1px solid black;"></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> </tr> </thead> <tbody> <tr> <th style="border-right: 1px solid black;">1</th> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <th style="border-right: 1px solid black;">2</th> <td>0</td> <td>-1</td> <td>0</td> <td>0</td> <td>-1</td> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <th style="border-right: 1px solid black;">3</th> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>-1</td> <td>1</td> <td>-1</td> </tr> <tr> <th style="border-right: 1px solid black;">4</th> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>-1</td> <td>0</td> </tr> <tr> <th style="border-right: 1px solid black;">5</th> <td>-1</td> <td>-1</td> <td>-1</td> <td>-1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>	Nodes ↓	Branches →									1	2	3	4	5	6	7	8	1	1	0	0	0	1	0	0	1	2	0	-1	0	0	-1	1	0	0	3	0	0	1	0	0	-1	1	-1	4	0	0	0	1	0	0	-1	0	5	-1	-1	-1	-1	0	0	0	0		
Nodes ↓	Branches →																																																																	
	1	2	3	4	5	6	7	8																																																										
1	1	0	0	0	1	0	0	1																																																										
2	0	-1	0	0	-1	1	0	0																																																										
3	0	0	1	0	0	-1	1	-1																																																										
4	0	0	0	1	0	0	-1	0																																																										
5	-1	-1	-1	-1	0	0	0	0																																																										
Q.2	Solve any three questions out of four.	15																																																																
i)	Find the voltage across the 5 Ω resistor in the network shown in Fig. <div style="text-align: center; margin-top: 10px;"> </div>	1	Ap																																																															
ii)	Test whether $F(s) = \frac{s^2 + 6s + 5}{s^2 + 9s + 14}$ is positive real function.	6	Ap																																																															
iii)	In the given network of Fig., the switch is closed at $t = 0$. With zero current in the inductor, find $i(t)$ and di/dt at $t = 0^+$ <div style="text-align: center; margin-top: 10px;"> </div>	3	Ap																																																															
iv)	In the network of Fig, find currents I_1 and I_2 . <div style="text-align: center; margin-top: 10px;"> </div>	1	Ap																																																															

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

Nov – Dec 2025
 Program: B.Tech_Scheme II/IIB
 Regular/Supplementary Examination: FY/SY/TY/LY Semester: III
 Course Code: EXC 305 and Course Name: Electrical Network Theory
 Date of Exam: ~~04/12/2025~~ **7/2/26** Duration: 02 Hours Max. Marks: 45

Q.3	Solve any three questions out of four.	15		
i)	Determine whether $P(s) = S^4 + S^3 + 2S^2 + 3S + 2$ is Hurwitz.		5	Ap
ii)	Find h_{11} and h_{12} parameters for the network shown in Fig. 		4	Ap
iii)	In the two-port network shown in Fig. compute h-parameters from the following data: (a) With the output port short-circuited: $V_1 = 25$ V, $I_1 = 1$ A, $I_2 = 2$ A (b) With the input port open-circuited: $V_1 = 10$ V, $V_2 = 50$ V, $I_2 = 2$ A 		4	Ap
iv)	The graph of a network is shown in Figure. Write the (a) incidence matrix, and (b) tieset matrix 		2	Ap
