

Nov - Dec 2024

Program: B. Tech Scheme III

Regular Examination: SY Semester: III

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

Date of Exam: 16-12-24

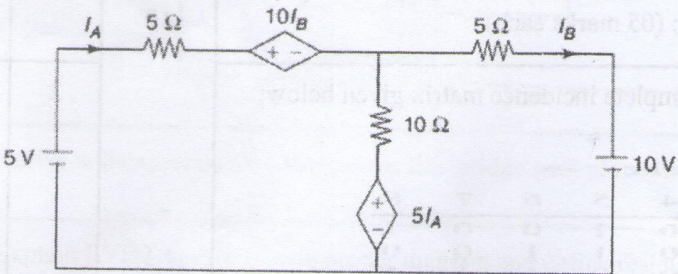
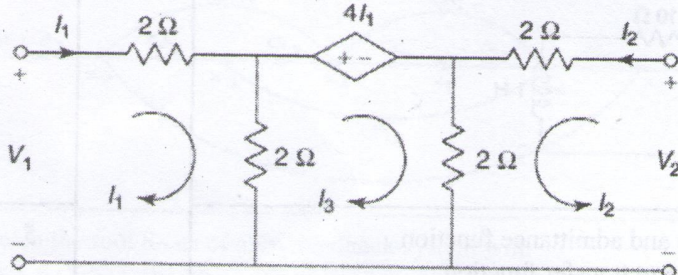
Duration: 02.5 Hours

Max. Marks: 60

Instructions:

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

Q. No.	Question	Max. Marks	CO	BT level																																																														
Q 1	Solve any two questions out of three: (05 marks each)	10																																																																
a)	Draw the oriented graph from the complete incidence matrix given below; <table><tr><th>Nodes ↓</th><th colspan="8">Branches →</th></tr><tr><th></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><tr><th>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>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>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>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>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></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	2	R
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																																																										
b)	In the network, the switch is closed at $t = 0$. With zero current in the inductor, compute value for $i(t)$ & di/dt at $t = 0^+$ 	3	Ap																																																															
c)	Define i) Driving point impedance and admittance function ii) Define Voltage and Current transfer function		5	R																																																														
Q 2	Solve any two questions out of three: (05 marks each)	10																																																																
a)	Calculate Y_{11} and Y_{12} parameter of given network. 	4	Ap																																																															

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b)	Test whether following function is positive real function or not. $F(s) = \frac{s^2 + 4}{s^3 + 3s^2 + 3s + 1}$	6	Ap
c)	Compute the branch currents in the network shown in Fig. 	1	Ap
Q.3	Solve any two questions out of three. (10 marks each)	20	
a)	Calculate Z and h parameters for the network shown in Fig. 	4	Ap
b)	Enumerate whether the following polynomials are Hurwitz or not using continued fraction expansion method. i) $P(s) = s^4 + s^3 + 3s^2 + 2s + 12$. ii) $P(s) = s^4 + 7s^3 + 6s^2 + 21s + 8$	5	R
c)	For the network shown in Fig. compute Norton's equivalent network	1	Ap

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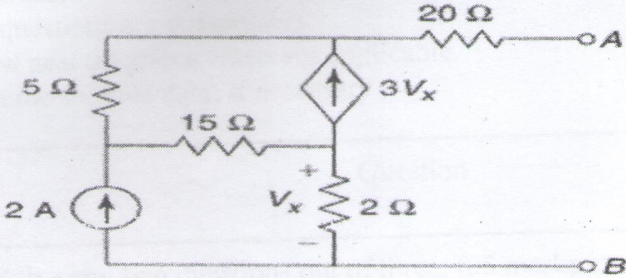
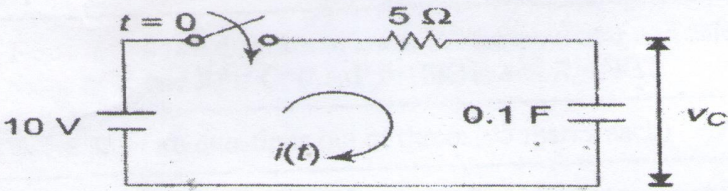
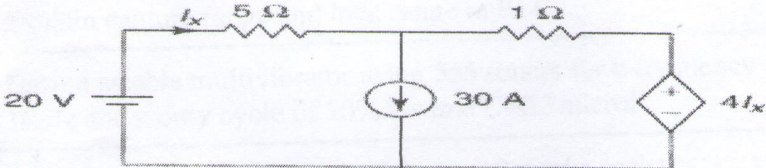
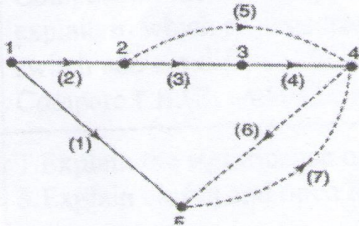
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Q.4	Solve any two questions out of three. (10 marks each)	20		
a)	For the following series RC Circuit switch is closed at $t = 0$, Determine $i(t)$ and $V_C(t)$ at $t > 0$. 		3	Ap
b)	Calculate the current I_x using superposition theorem: 		1	Ap
c)	The graph of a network is shown in Figure. Compute (a) incidence matrix, and (b) tieset matrix c) cutset matrix 		2	
