

University of Mumbai

Examinations Summer 2022

Program: **Electronics and Telecommunication Engineering**

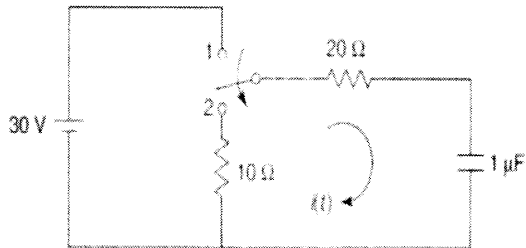
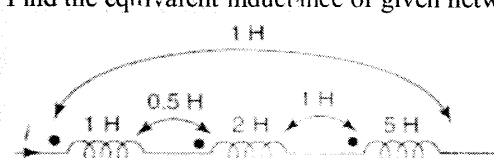
Curriculum Scheme: Rev-2019

Examination: SE Semester III

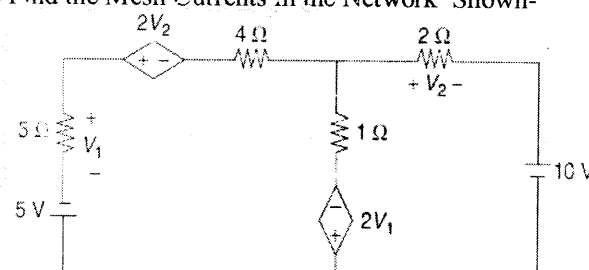
Course Code: ECC304 and Course Name: Network Theory

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	According maximum power transfer theorem which of the following option is true?
Option A:	$R_{th} < R_l$
Option B:	$R_{th} > R_l$
Option C:	$R_{th} = R_l$
Option D:	$R_{th} = 0$
2.	Which Of the following is property of Positive Real Function?
Option A:	The poles and zeros of a positive real function cannot have positive real parts
Option B:	Only simple poles with real negative residues can exist on the $j\omega$ -axis
Option C:	The poles and zeros of a positive real function can have positive real parts
Option D:	The sum of two positive real functions is not a positive real.
3.	Which of the following is the Transfer Impedance function?
Option A:	V_1 / V_2
Option B:	I_2 / V_1
Option C:	I_2 / I_1
Option D:	V_1 / I_2
4.	Find the voltage across capacitor and current $i(t)$ at $t = 0^+$ respectively.
	
Option A:	0V, -1A
Option B:	30V, -1A
Option C:	30V, 0A
Option D:	0V, 0A
5.	Find the equivalent inductance of given network.
	
Option A:	10 H
Option B:	12 H
Option C:	13 H
Option D:	15 H
6.	Which of the following property satisfies the symmetrical criteria of two port network?

Option A:	$h_{11} h_{22} - h_{12} h_{21} = 1$
Option B:	$AD - BC = 1$
Option C:	$Z_{11} Z_{22} - Z_{12} Z_{21} = 1$
Option D:	$Y_{21} = Y_{12}$
7.	The reduced incidence matrix is given below, find the total number of possible trees. $A = \begin{bmatrix} 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & -1 & 1 & -1 & 0 & 0 \\ -1 & 0 & -1 & 0 & -1 & 0 \end{bmatrix}$
Option A:	12
Option B:	14
Option C:	20
Option D:	16
8.	For $t = 0^-$ i.e. At initial condition inductor and capacitor are _____ and _____ respectively.
Option A:	Short circuited , Open circuited
Option B:	Open circuited , Short circuited
Option C:	Short circuited , Short circuited
Option D:	Open circuited , Open circuited
9.	If the graph consists of 4 nodes and 6 branches then the number of twigs and number of links are ----- and ----- respectively.
Option A:	5, 5
Option B:	4, 4
Option C:	3, 4
Option D:	3, 3
10.	_____ theorem states that any two terminals of network can be replaced by equivalent Voltage source and an equivalent series resistance.
Option A:	Maximum power Transfer
Option B:	Thevenin's theorem
Option C:	Norton's theorem
Option D:	Duality theorem

Q2 (20 Marks)	Solve any Four out of Six 5 marks each
A	Find the Mesh Currents in the Network Shown- 
B	Find the Norton's equivalent Network-

C	For the Graph shown, write the complete incidence matrix and tiset matrix-
D	In the network, switch is closed for a long time and at $t=0$ switch is opened. Determine the current through the capacitor -
E	Find the transmission parameter for the network shown-
F	Test whether, $F(s)$ is a positive real function. $F(s) = \frac{s+3}{s+1}$

Q3 (20 Marks)	Solve any Two Questions out of Three 10 marks each
A	Find the Network Functions $\frac{V1}{I1}$, $\frac{V2}{V1}$ and $\frac{V2}{I1}$ for the Network -

B	In the network Shown Find I_1 and I_2 –
C	In the Network shown, the switch is shifted to position b at $t = 0$. Find $V(t)$ for $t > 0$.

Q4. (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	Determine Z and Y parameters of the Network shown-	
B	Determine the Foster form I and Foster Form II of realisation of RC impedance function- $Z(s) = \frac{(s+1)(s+3)}{s(s+2)(s+4)}$	
C	For the Network shown, write down the f-cutset matrix and obtain the Network equilibrium equation in matrix form using KCL.	