University of Mumbai
Examination June 2021
Examinations Commencing from 15th June 2021 to 26th June 2021
Program: **Bachelor of Engineering**
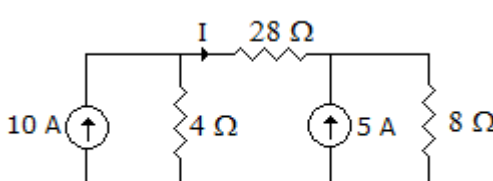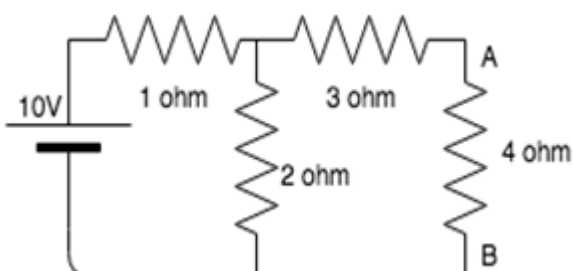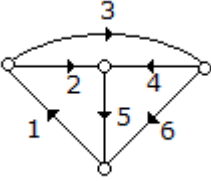Curriculum Scheme: **Electronics & Telecommunication (Rev2019 'C' Scheme)**
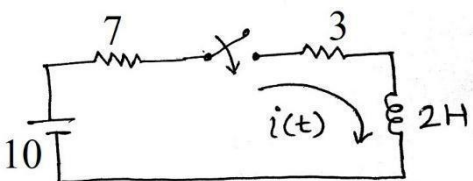Examination: **DSE** Semester **III**
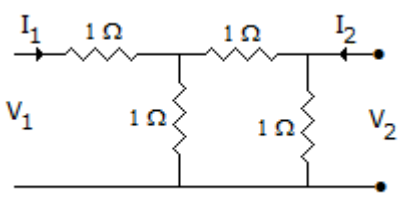Course Code: **ECC304** and Course Name: **Network Theory**

Time: 2-hour   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks.
1.	Norton's theorem states that a complex network connected to a load can be replaced with an equivalent impedance
Option A:	in series with a current source
Option B:	in parallel with a voltage source
Option C:	in series with a voltage source
Option D:	in parallel with a current source
2.	Find current I ?
Option A:	1 A
Option B:	2 A
Option C:	4 A
Option D:	8 A
3.	Determine V_{th} in the following figure.
Option A:	4.2
Option B:	3.8
Option C:	6.6
Option D:	2.8

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4.	Which one of the following is a cut set of the graph in the given figure?
Option A:	1, 2, 3, and 4
Option B:	2, 3, 4, and 6
Option C:	1, 4, 5, and 6
Option D:	1, 3, 4, and 5
5.	If 10 V independent voltage source is connected in series with 100 ohm and R_L load. Maximum power that can be transferred to the load is ---
Option A:	5 W
Option B:	10 W
Option C:	0.25 W
Option D:	2.5 W
6.	If a graph consists of 5 nodes and 7 branches, then the number of twigs and number of links are ------ and ------ respectively.
Option A:	3, 4
Option B:	5, 2
Option C:	2, 5
Option D:	4, 3
7.	Reduced Incidence matrix can be obtained by -----
Option A:	Eliminating a row of complete incidence matrix
Option B:	Multiplying complete incidence matrix with its transpose
Option C:	$\lvert A A^T \rvert$
Option D:	Obtaining tree
8.	In the following figure, a switch was opened for a long time and then closed at t = 0. Determine i(t) at t = 0^+.
Option A:	1 A
Option B:	0.3 A
Option C:	0.7 A
Option D:	0 A
9.	For an RC driving point impedance function, the poles, and zeros
Option A:	should alternate on real axis
Option B:	should alternate only on negative real axis

Option C:	should alternate on imaginary axis
Option D:	should alternate only on negative imaginary axis
10.	In figure, switch is at position A for long time, what is current at $t = 0^-$?
Option A:	20 A
Option B:	3 A
Option C:	1.81 A
Option D:	2 A
11.	Determine location of poles of following transfer function $$F(S) = \frac{S^2+1}{S^2+4}$$
Option A:	0, 2j
Option B:	1j, -1j
Option C:	-3, -4
Option D:	2j, -2j
12.	For transfer function $(s) = \frac{S+1}{S+7}$ Which of the following is the correct statement?
Option A:	All the poles are at the right half of the S plane.
Option B:	There is a pole at s = -7
Option C:	System has three zeros.
Option D:	There is zero at right half of the S plane
13.	Find out Z_{11}?
Option A:	5/3 Ohm
Option B:	3/2 Ohm
Option C:	2 Ohm
Option D:	2/3 Ohm
14.	Two port networks are connected in cascade. The combination is to be represented as a single two-port network. The parameters obtained by multiplying individual are ----

Option A:	Z-parameter matrix
Option B:	Y-parameter matrix
Option C:	h-parameter matrix
Option D:	ABCD-parameter matrix
15.	One of the conditions for two port network to be reciprocal is ------
Option A:	$Z_{11} = Z_{22}$
Option B:	$h_{21} = - h_{12}$
Option C:	$A = D$
Option D:	$Y_{11} = Y_{22}$
16.	Which of the following is the correct generalized KVL equation in graph theory?
Option A:	$B.Z_b.I_l = B.Z_b I_S$
Option B:	$Z_b.B.B^T I_l = B(Z_b I_S - V_S)$
Option C:	$B.Z_b.B^T I_l = B.Vs - B.Z_b I_S$
Option D:	$Y.V_t = Q I_S - Q Y_b Vs$
17.	A Two port network has the following equations. $I2 = 10 I_1 + 2 V_2$ and $V_1 = 5 I_1 + 6 V_2$ and Hybrid parameters are h_{11}= ------- and h_{12} = -------- respectively.
Option A:	6 and 5
Option B:	10 and 2
Option C:	5 and 6
Option D:	2 and 10
18.	If tree consists of 4 twigs and 3 links, the number of rows in fundamental cutset matrix are ------
Option A:	5
Option B:	4
Option C:	3
Option D:	7
19.	For a series connected R-C network where R = 100 ohm and C = 0.1 uF connected in series. Time constant (τ) of a given circuit is --------.
Option A:	10 uSec
Option B:	1 / 100 Sec
Option C:	100 uSec
Option D:	1 uSec
20.	If a dependent current source has value $8V_1$, where V_1 is voltage across a node in the same circuit, the dependent source represents --------.
Option A:	Current controlled voltage source
Option B:	Voltage controlled current source
Option C:	Voltage controlled voltage source
Option D:	Current controlled current source

Q2	Solve any Two Questions out of Three	10 marks each
A	Find the current I in 8 Ω resistor by using superposition theorem.	

B	Find Thevenin's equivalent across AB and find the power dissipated in a 25 ohm load.
C	Draw the graph of the network whose incidence matrix is given below $$\begin{bmatrix} 1 & 0 & 1 & 0 & 0 & 0 & 0 & -1 \\ 0 & -1 & 0 & -1 & 0 & -1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & -1 & 0 & -1 & 0 & 1 & 0 \end{bmatrix}$$

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Find Z Parameters of the network shown in figure
B	For the network shown, capacitor C has an initial voltage Vc (-0) of 10 V and at the same instant, current in the inductor L is zero. The switch is closed at time t = 0. Obtain the expression for the voltage V(t) across the inductor L.
C	Find network function $\dfrac{V1}{I1}, \dfrac{V2}{I1}, \dfrac{V2}{V1}$
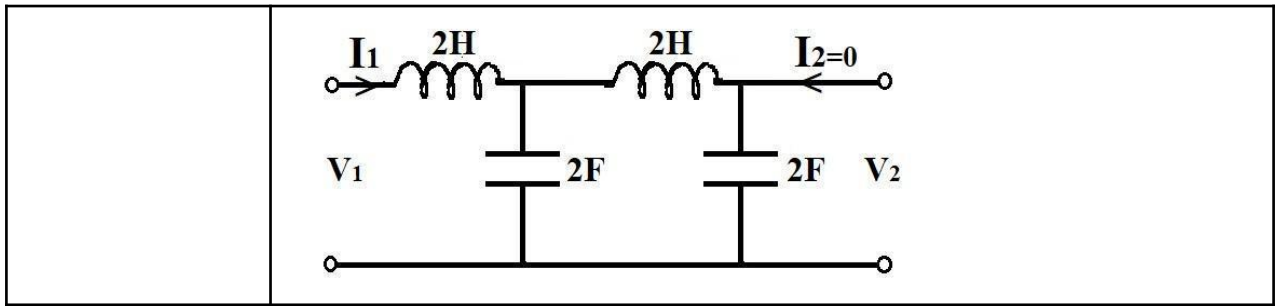
I_1 2H 2H $I_{2=0}$

V_1 2F 2F V_2

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	A
Q3.	C
Q4.	D
Q5.	C
Q6.	D
Q7.	A
Q8.	D
Q9.	A
Q10.	D
Q11.	D
Q12.	B
Q13.	A
Q14.	D
Q15.	B
Q16.	C
Q17.	C
Q18.	B
Q19.	A
Q20.	B