University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev-2019

Examination: SE Semester III

Course Code: ECC304 and Course Name: Network Theory

Time: 2 Hour Max. Marks: 80

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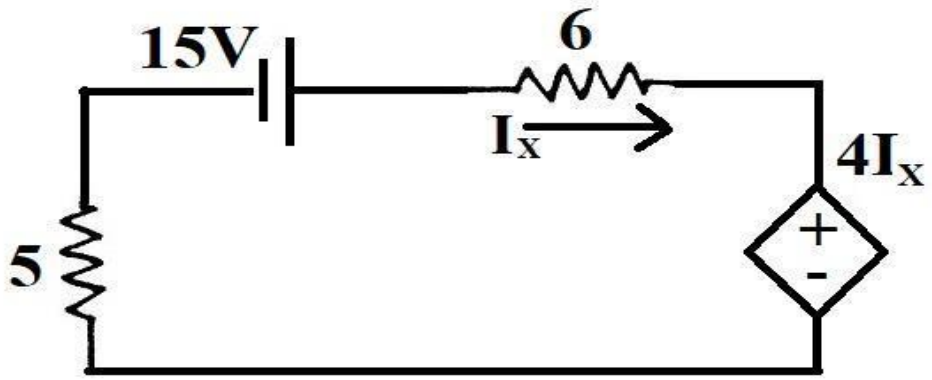
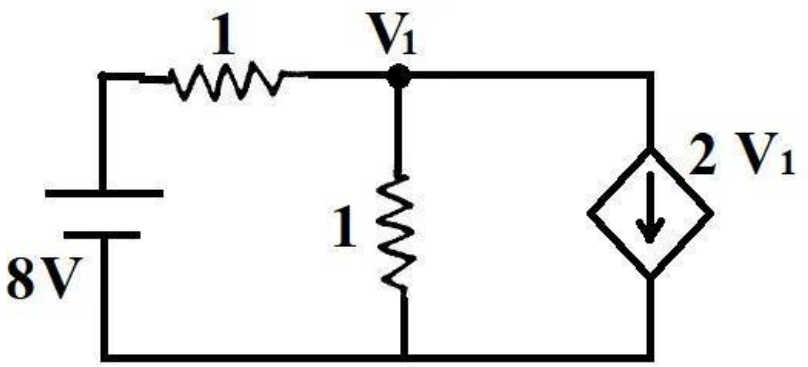
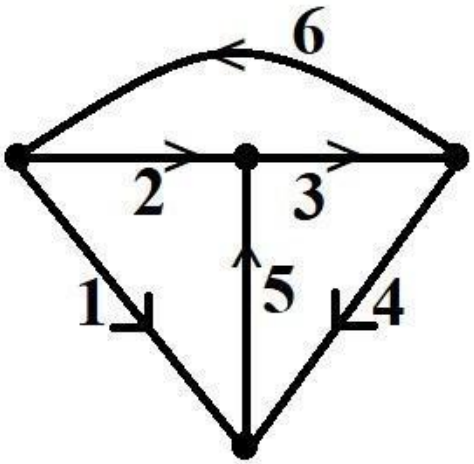
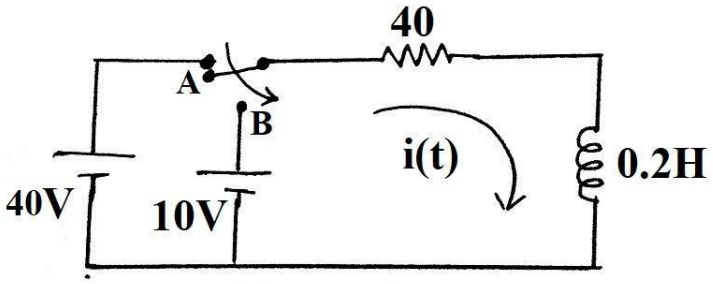
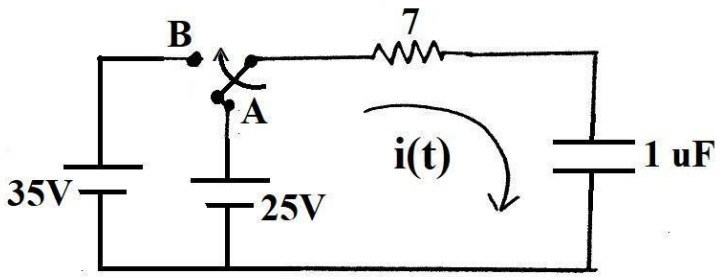
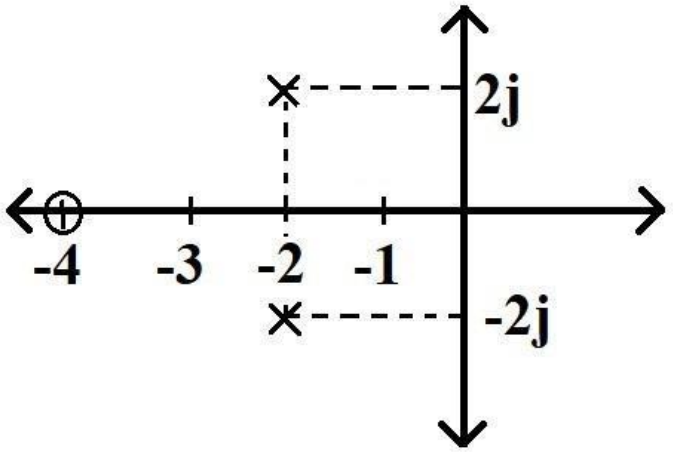
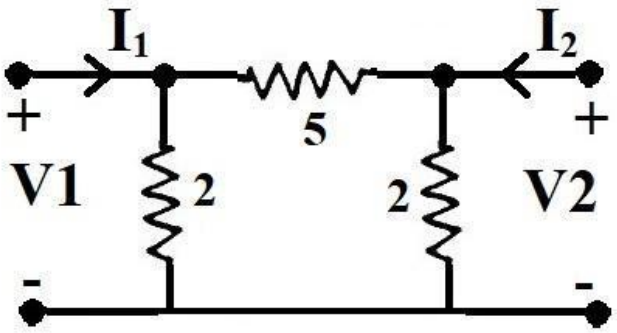
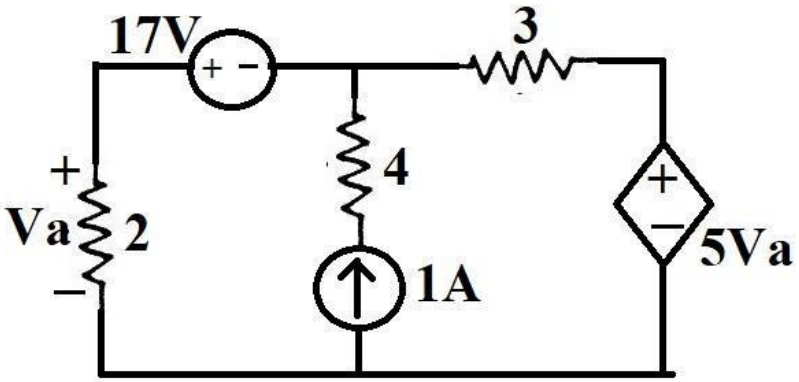
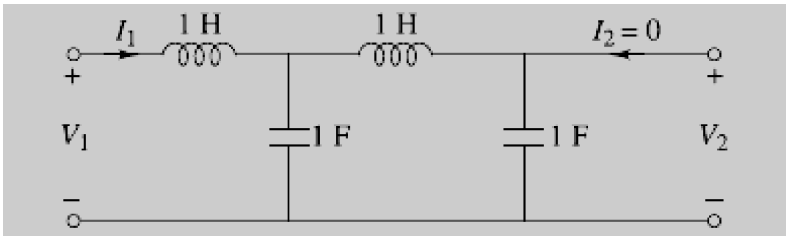
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks.**
1.	In which theorem equivalent circuit is shown with parallel combination of current source, equivalent resistor and Load?
Option A:	Norton's Theorem
Option B:	Superposition Theorem
Option C:	Maximum power transfer theorem
Option D:	Thevenin's theorem
2.	Coil L1 and L2 are inductively coupled and connected in series with value 16mH and 4mH respectively. If the coefficient of coupling is 0.75, calculate mutual inductance (M).
Option A:	8 mH
Option B:	12 mH
Option C:	6 mH
Option D:	10 mH
3.	In the following figure calculate loop current (Ix). 
Option A:	1 A
Option B:	5 A
Option C:	6 A
Option D:	4 A
4.	Refer the following figure to determine node voltage V1.

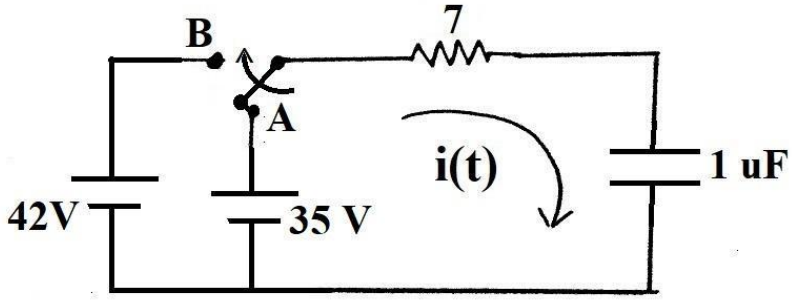
	
Option A:	4 V
Option B:	1 V
Option C:	3.2 V
Option D:	2 V
5.	If the graph consists of 5 nodes and 8 branches then the number of twigs and number of links are ------ and ------ respectively.
Option A:	5, 8
Option B:	6, 3
Option C:	5, 3
Option D:	4, 4
6.	The graph shown in figure, number of rows in reduced incidence matrix are ------- 
Option A:	5
Option B:	4
Option C:	3
Option D:	6
7.	Number of maximum possible trees for the graph is given by --------.
Option A:	N -1
Option B:	b – (n+1)
Option C:	b + n -1

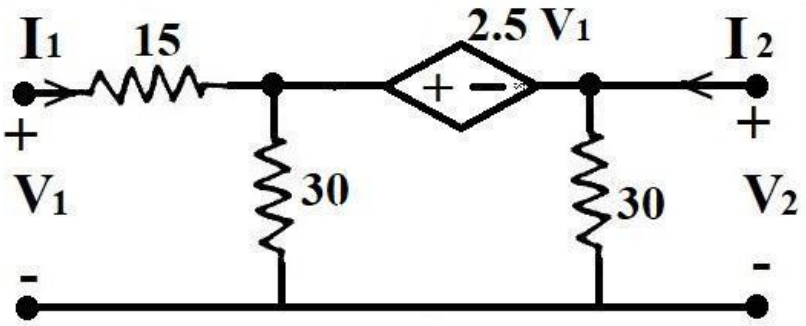
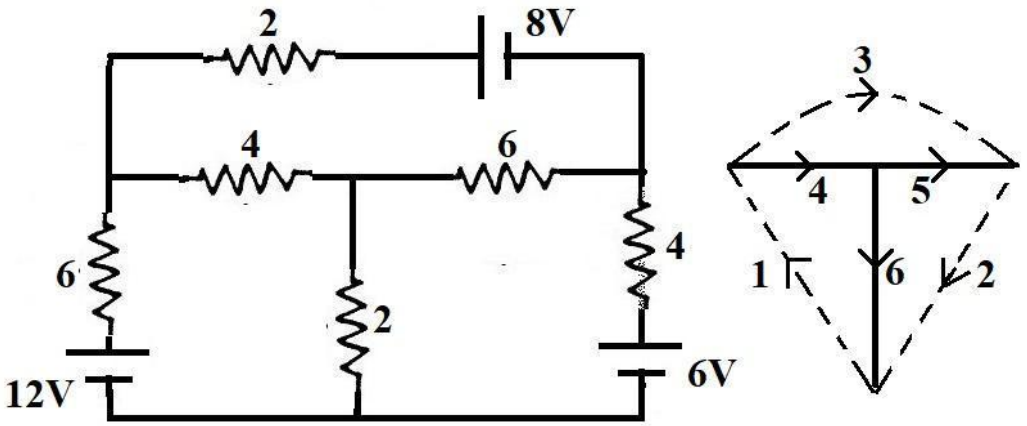
Option D:	$\lvert A A^T \rvert$
8.	The Laplace transform of the time function *f*(t-a) is --------.
Option A:	$e^{-as}F(S)$
Option B:	F(S-a)
Option C:	$e^{as}F(S)$
Option D:	F(S+a)
9.	In a given network, the switch is at position A for a long time and moved to position B at t=0. Current in the inductor at t=0+ is equal to --------. 
Option A:	8 A
Option B:	0.25 A
Option C:	1 A
Option D:	1.25 A
10.	In the network shown in figure, switch is at position A for a long time and moved to position B at t=0. Voltage across the capacitor at t = 0+ is equal to --------. 
Option A:	3.5 V
Option B:	35 V
Option C:	5 V
Option D:	25 V
11.	Convert R, L and C into S domain.
Option A:	R, L and C
Option B:	RS, LS and CS
Option C:	R, LS and 1/CS
Option D:	R, 1/LS and CS
12.	A system is represented by transfer function 12/(S+4)(S+2), the DC gain of the system is --------.
Option A:	21

Option B:	14
Option C:	1.5
Option D:	294
13.	The driving point impedance function Z(S) of a network has pole-zero location shown in figure, then Z(S) is given by --------. 
Option A:	$\frac{H\ (S+4)}{(S+2-2j)(S+2+2j)}$
Option B:	$\frac{H\ (S-4)}{(S-2-2j)(S-2+2j)}$
Option C:	$\frac{H\ (S-4)}{(S+2-2j)(S+2+2j)}$
Option D:	$\frac{H\ (S+4)}{(S+2-2j)(S-2-2j)}$
14.	Number of poles in the following functions are -----. $F(S) = \frac{S^3+6S^2+4S+5}{S^4+6S^3+3S^2+5S+1}$
Option A:	1
Option B:	3
Option C:	2
Option D:	4
15.	Two 2 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
Option B:	Y-parameter
Option C:	h-parameter
Option D:	ABCD-parameter
16.	Determine Y11 and Y12 parameters of the network given in figure.

	
Option A:	Y11 = -0.2 ℧ and Y12 = 0.7 ℧
Option B:	Y11 = 0.7 ℧ and Y12 = -0.2 ℧
Option C:	Y11 = 2 ℧ and Y12 = 5 ℧
Option D:	Y11 = 7 ℧ and Y12 = 2 ℧
17.	Two port equations of a networks are $V_2 = 8\ I_1 + 7\ I_2$ $V_1 = 3\ I_1 + 5\ I_2$ Z parameters of give network are -------.
Option A:	$Z_{11} = 5,\ Z_{12} = 3, Z_{21} = 7, Z_{22} = 8$
Option B:	$Z_{11} = 3,\ Z_{12} = 5, Z_{21} = 8, Z_{22} = 7$
Option C:	$Z_{11} = 5,\ Z_{12} = 8, Z_{21} = 3, Z_{22} = 7$
Option D:	$Z_{11} = 3,\ Z_{12} = 5, Z_{21} = 7, Z_{22} = 8$
18.	Polynomial $P(S) = S^3 + 4S^2 + 3S + 6$ is to be tested for Hurwitz. Elements in the first column of Routh's array are --------.
Option A:	1, 4, -1.5, 6
Option B:	1, 3, 4, 6
Option C:	1, 4, 3, 6
Option D:	1, 4, 1.5, 6
19.	Driving point admittance function $Y(S) = \frac{14S}{S^2+4}$ is -----.
Option A:	Parallel combination of two resistors
Option B:	Series combination of inductor and resistor
Option C:	Series combination of Inductor and capacitor
Option D:	Parallel combination of Inductor and capacitor
20.	Driving point impedance function Z(S) = 5 + 4s is ----
Option A:	Parallel combination of resistors and inductor.
Option B:	Series combination of resistor and inductor
Option C:	Parallel combination of Capacitor and inductor.
Option D:	Series combination of two inductors

Q2	**Solve any Two Questions out of Three**	**10 marks each**
A	For the circuit shown below, find the current through the 3 ohms resistor, using superposition theorem. 	
B	Synthesize the following driving point impedance function in Cauer-I and Cauer-II forms. $Z(S) = \frac{S^2+4S+3}{S^2+2S}$	
C	Find $\frac{V1}{I1}$, $\frac{V2}{V1}$ and $\frac{V2}{I1}$ for the network shown in figure. 	

Q3	**Solve any Two Questions out of Three**	**10 marks each**
A	In the network shown in figure, switch was at position A for a long time. At t=0, the switch is moved from A to B, determine current i(t) for t>0. 	

B	Find ABCD parameters of the network shown in figure. 
C	Circuit and its tree are shown below. Write tie set matrix and obtain the network equation in matrix form using KVL. Calculate loop current. 

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