University of Mumbai

Examination 2020 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 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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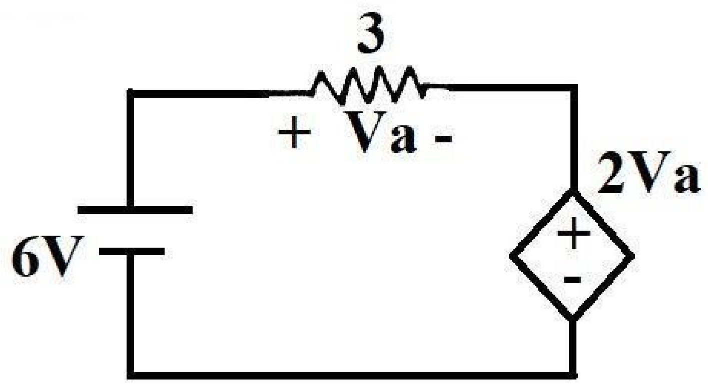
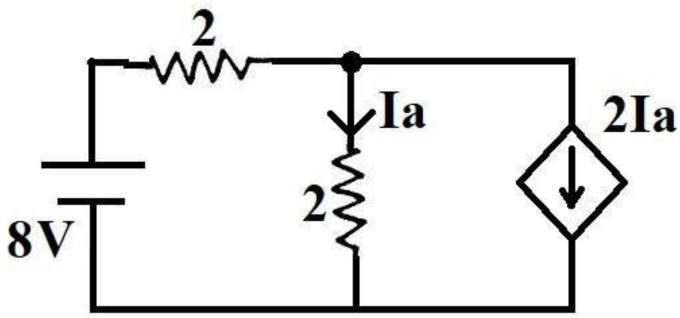
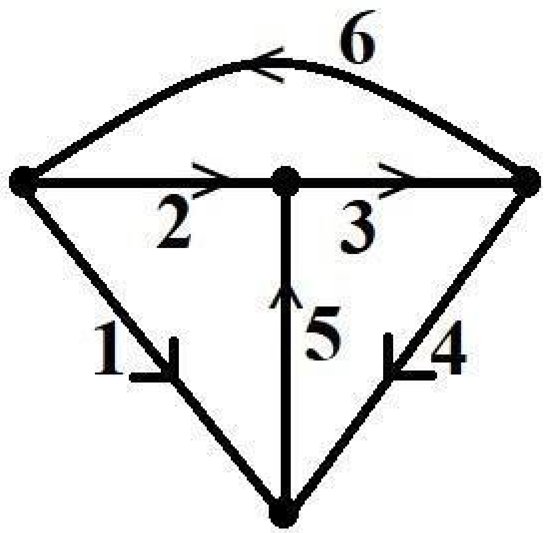
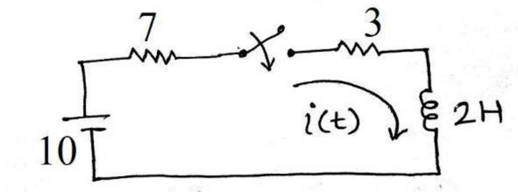
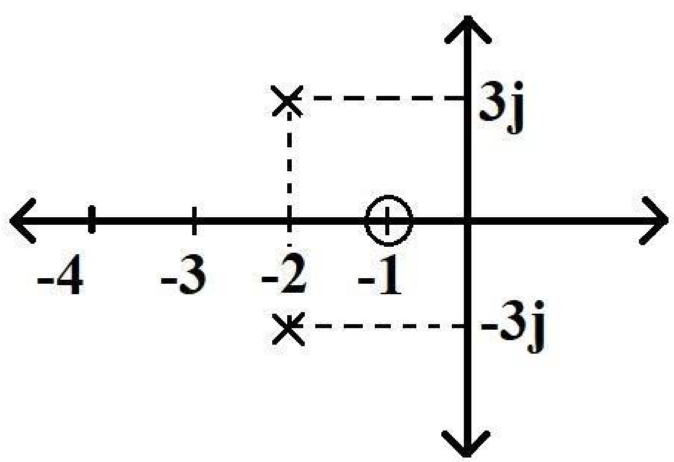
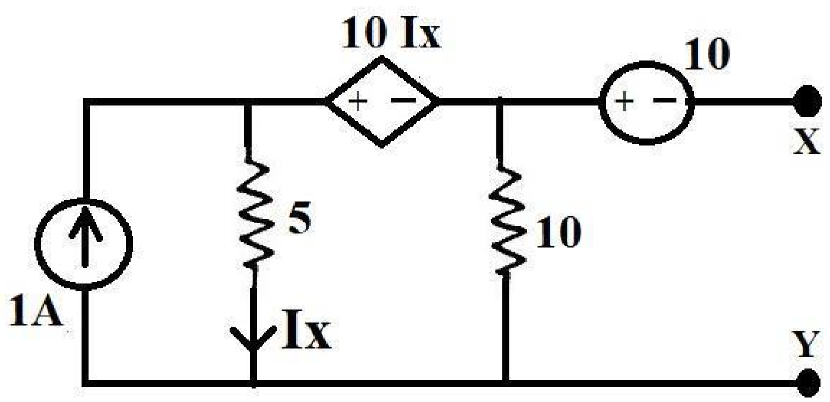
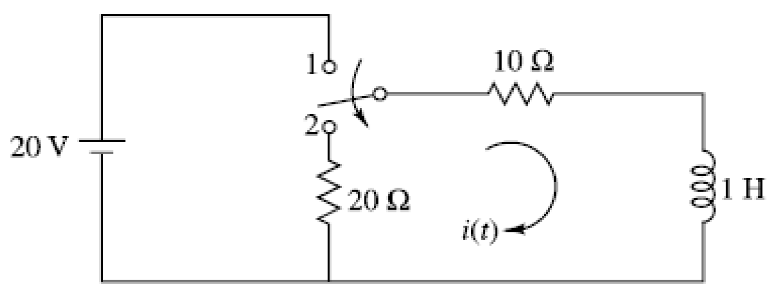
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of the following conditions delivers maximum power to the load?
Option A:	$R_L > R_{TH}$
Option B:	$R_L = R_{TH}$
Option C:	$R_L < R_{TH}$
Option D:	Depends upon source.
2.	Determine value of Va shown in the following figure. 
Option A:	1 V
Option B:	2 V
Option C:	3 V
Option D:	4 V
3.	Refer the following figure to find current Ia. 
Option A:	4 A

Option B:	3 A
Option C:	2 A
Option D:	1 A
4.	Two inductively coupled coils are connected in series with the Aiding method, where L1=6mH, L2=6mH and M=1mH. Determine Total inductance of combination.
Option A:	12 mH
Option B:	13 mH
Option C:	14 mH
Option D:	10 mH
5.	Number of fundamental cutsets in following oriented graphs are --------. 
Option A:	3
Option B:	4
Option C:	5
Option D:	6
6.	Which of the following is the correct generalized KCL equation in graph theory?
Option A:	$B.Z_b.B^T I_l = B.Vs - B.Z_b I_S$
Option B:	$QY_b\, Q^T.V_t = Q\, I_S - Q\, Y_b\, Vs$
Option C:	$Y = QY_b\, Q^T$
Option D:	$QY_b\, Q^T.V_t = Q\,(1 - Q\, Y_b\, Vs)$
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.	Laplace transform of $\int_0^t f(t).\,dt$ is equal to --------.
Option A:	d F(S) / dS

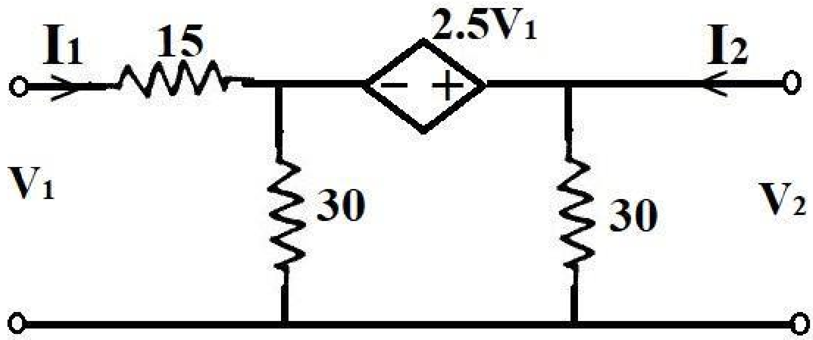
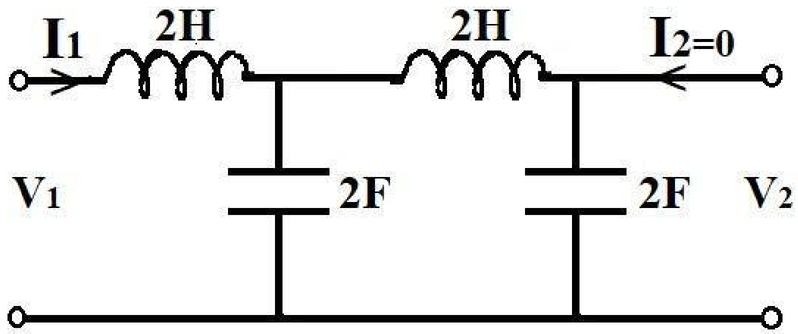
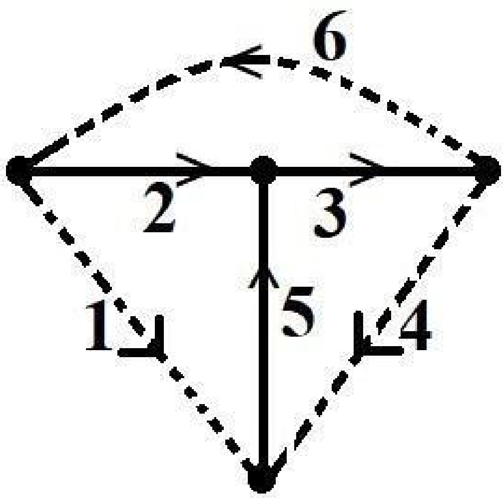
Option B:	S F(S) – f(0)
Option C:	F(S) / S
Option D:	F(S+a)
9.	Voltage source V is applied to series connected R and L networks. Equation of the current in the inductor is -------.
Option A:	i(t) = V(1 - $e^{\frac{}{R}}$) / R
Option B:	0
Option C:	i(t) = V (1 - $e^{-\frac{}{L}}$) / R
Option D:	i(t) = ($e^{-\frac{}{L}}$)
10.	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
11.	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
12.	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:	$\frac{H\ (S+2-3j)(S+2+3j)}{(S+1)}$
Option B:	$\frac{H\ (S-1)}{(S-2-3j)(S-2+3j)}$

Option C:	$\frac{H\ (S+1)}{(S+2-3j)(S+2+3j)}$
Option D:	$\frac{H\ (S+1)}{(S-2-3j)(S-2+3j)}$
13.	Polynomial $P(S) = 3S^3 + 4S^2 + 2S + 1$ is to be tested for Hurwitz. Elements in the first column of Routh's array are --------.
Option A:	3, 4, 2, 1
Option B:	3, 4, -1.25, 1
Option C:	3, 4, -2, 1
Option D:	3, 4, 1.25, 1
14.	If inductor and capacitor are connected in series then equivalent impedance is ---
Option A:	L+ C
Option B:	LS + 1 / CS
Option C:	$\frac{LC+1}{CS}$
Option D:	(S + L) C
15.	Two two port networks are connected in parallel. The combination is to be represented as a single two-port network. The parameters obtained by adding individuals are ----.
Option A:	Z-parameter matrix
Option B:	h-parameter matrix
Option C:	ABCD-parameter matrix
Option D:	Y-parameter matrix
16.	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
17.	A two port network is said to be symmetrical if ----
Option A:	Voltage to current ratio at one port is the same as the voltage to current ratio at another port with one port open circuited.
Option B:	Voltage gain and current gain are the same.
Option C:	Ratio of excitation at one port to response at another port is the same if excitation and response is interchanged.
Option D:	Current gain is same if ports are interchanged
18.	Driving point impedance function $Z(S) = \frac{3}{S+4}$ is -----
Option A:	Series combination of two inductors
Option B:	Parallel combination of Inductor and Resistor
Option C:	Parallel combination of resistor and capacitor
Option D:	Series combination of two capacitors

19.	Realization of function using Cauer-II can be obtained by -----.
Option A:	Partial fraction expansion on Y(S)
Option B:	Partial fraction expansion on Z(S)
Option C:	Division operation on Z(S)
Option D:	Continued fraction expansion
20.	Function F(S) = $\frac{(S-3)}{S^2+9S+20}$ is not positive real function because ---
Option A:	A zero is right half of S-Plane
Option B:	Poles are lies on left side of S plane
Option C:	A zero is at left half of S plane
Option D:	All poles lie on left half of S-Plane

Q2	**Solve any Two Questions out of Three** **10 marks each**
A	Find Thevenin's equivalent across X and Y terminals for a given network. 
B	Realize the following function using Cauer-I and Cauer-II form Z(S) = $\frac{S^2+4S+3}{S^2+2S}$
C	The switch is changed from position-1 to position-2 at t=0. Steady state condition was reached before switching. Determine i(t), $\frac{di(t)}{dt}$ and $\frac{d^2i(t)}{dt^2}$ at t=0+. 

Q3	**Solve any Two Questions out of Three** **10 marks each**

A	Find ABCD parameters of a given network. 
B	Find network function $\frac{V1}{I1}$, $\frac{V2}{I1}$, $\frac{V2}{V1}$ 
C	The graph of the network shown in below. Obtain f-tieset, f-cutset and Incidence matrix. 

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