University of Mumbai

Examination 2020 under cluster 5 (APSIT)

Program: Electronics and Telecommunication Engineering

Curriculum Scheme: Revised 2016

Examination: Second Year Semester III

Course Code: **ECC304** and Course Name: **Circuit Theory and Network**

Time: 1 hour | Max. Marks: 50

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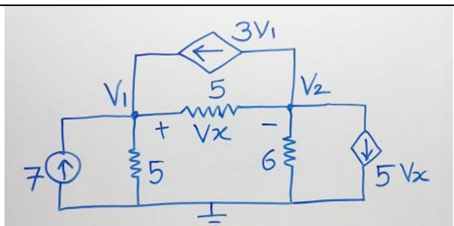
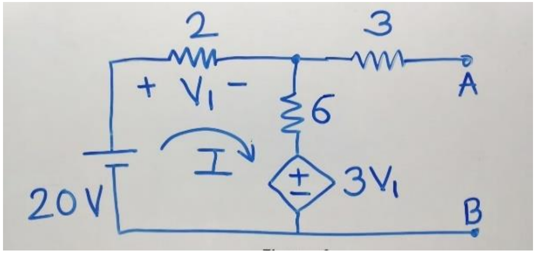
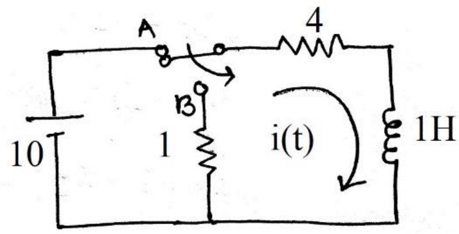
Note to the students:- All the Questions are compulsory and carry equal marks .

Q1.	 Figure - 1 Which of the following is correct Kirchhoff's Current Law equation at V_1 of figure – 1?
Option A:	$(V_1/5) + (V_1 - V_2)/5 - 7 - 3\,V_1 = 0$
Option B:	$(V_1/5) + (V_1 - V_2)/5 + 7 + 3\,V_1 = 0$
Option C:	$(V_1/5) + (V_1 + V_2)/5 + 7 + 3\,V_1 = 0$
Option D:	$(V_1/5) + (V_1 + V_2)/5 - 7 - 3\,V_1 = 0$
Q2.	Which of the following is simplified KCL equation ar V_1 node of figure -1?
Option A:	$-13\,V_1 - V_2 = 30$
Option B:	$13\,V_1 + V_2 = 35$
Option C:	$13\,V_1 + V_2 = 39$
Option D:	$-13\,V_1 - V_2 = 35$
Q3.	Which of the following represent Voltage across inductor?
Option A:	$L x dV_L(t)/dt$
Option B:	$C x di(t)/dt$
Option C:	$L x di(t)/dt$
Option D:	Integration of Current in inductor
Q4.	Maximum number of possible trees for given graph is given by
Option A:	$\| A\,A^T \|$
Option B:	$\| A\,Aa \|$
Option C:	B x A
Option D:	Q x B
Q5.	Which of the following is correct the KVL equilibrium equation in graph theory?
Option A:	$B\,Zb\,B^T\,I_l = B\,Zb\,I_S$
Option B:	$B\,Zb\,B^T\,I_l = B\,V_S - B\,Zb\,I_S$

Option C:	$B\ Zb\ I_l = B\ V_S - B\ Zb\ I_S$
Option D:	$Zb\ B^T\ I_l = B\ V_S - B\ Zb\ I_S$
Q6.	 Figure-2 Which of the following is correct ohm's law equation of network shown in figure – 2
Option A:	$3\ V_1 = 6\ I + 2\ V_1$
Option B:	$V_1 = 2\ I$
Option C:	$20 - V_1\ -6I + V1 = 0$
Option D:	$20 - 6\ I = 0$
Q7.	Write KVL equation for I loop shown in figure-2.
Option A:	$V_1 - 6I - 3\ V_1 = 0$
Option B:	$20 - V_1 - 6I = 0$
Option C:	$20 - 6I - 3\ V_1 = 0$
Option D:	$20 - 2\ I - 6I - 3\ V_1 = 0$
Q8.	If network consists of dependent sources, how to calculate Thevenin's equivalent resistor (R_{TH}) across load?
Option A:	Replace independent sources with equivalent resistance.
Option B:	Ratio of V_{TH} and I_{SC}
Option C:	Replace dependent sources with short circuit.
Option D:	Replace dependent sources with open circuit.
Q9.	In figure -3, if steady state condition reached before switching position. The value of i(t) at $t = 0^-$ is ---  Figure - 3
Option A:	0
Option B:	2.5 A
Option C:	2 A
Option D:	3 A
Q10.	In figure – 3 if steady state condition reached before switching position. The

	value of $\frac{d\,i(t)}{dt}$ at t= 0^+ is ----.
Option A:	2 A/sec
Option B:	10 A/sec
Option C:	12.5 A/sec
Option D:	-12.5 A / Sec
Q11.	If 100 u(t) signal is applied to the R-C network where R = 1000 ohm and C = 1 uF connected in series. Calculate time constant (τ).
Option A:	3 mSec
Option B:	2 mSec
Option C:	1 mSec
Option D:	63.2 mSec
Q12.	Time constant of series connected R-L network is -------.
Option A:	L / R
Option B:	R / L
Option C:	RxL
Option D:	LS
Q13.	If inductor and capacitor are connected in series then equivalent impedance is ---
Option A:	LS
Option B:	LS + 1/ CS
Option C:	CS + 1/LS
Option D:	(S + L + C)
Q14.	Transfer function of two port network is ----
Option A:	Ratio of response transform to an excitation transform at two different port.
Option B:	Ratio of excitation and response are measured at same port of the network.
Option C:	Ration of output current to input current
Option D:	Ratio of output voltage to input voltage
Q15.	If Polynomial P(S) = $S^4 + S^3 + 2\,S^2 + 3\,S + 2$ is tested using Routh's array. Elements of 1st column of Routh's array are --
Option A:	1, 1, -1, 2
Option B:	1, 1, 5, 2
Option C:	1, 1, 2, 3
Option D:	1, 1, -1, 5, 2
Q16.	Determine location of poles of following transfer function $F(S) = \frac{S^2+1}{S^3+4S}$
Option A:	0, 2j
Option B:	1j, -1j
Option C:	0, 2j, -2j
Option D:	-3, -4

Q17.	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:	$Y_{11} = Y_{22}$
Q18.	Two port network are connected in parallel. The combination is to be represented as a single two-port network. The parameters obtained by adding individual are --.
Option A:	Z-parameter matrix
Option B:	h-parameter matrix
Option C:	Y-parameter matrix
Option D:	ABCD-parameter matrix
Q19.	Z parameter of two port network are Z_{11} = 20 ohm, Z_{22} = 30 ohm and $Z_{12}=Z_{21}=10$ ohm. Then network is -------.
Option A:	Not reciprocal
Option B:	Reciprocal
Option C:	Symmetrical
Option D:	Neither reciprocal nor symmetrical
Q20.	A two port network is said to be symmetrical if ----
Option A:	Voltage to current ratio at one port is same as the voltage to current ratio at other port with one port open circuited.
Option B:	Voltage gain and current gain are same.
Option C:	Ratio of excitation at one port to response at other port is same if excitation and response is interchanged.
Option D:	Output voltage to input voltage
Q21.	Driving point admittance function Y(S) = $\frac{(\frac{1}{R})S}{S+1/RC}$ is -----
Option A:	Series combination of two inductors
Option B:	Parallel combination of Inductor and capacitor
Option C:	Series combination of resistor and capacitor
Option D:	Series combination of two capacitors
Q22.	Function F(S) =$\frac{(S-9)}{S^2-9S+20}$ is not positive real function because ---
Option A:	A zero and poles are at right half of S-Plane
Option B:	Highest power of numerator and denominator is differ by more than unity
Option C:	Poles and zeros are not interlaced
Option D:	All poles lie on left half of S-Plane
Q23.	Realization of network using Foster-II can be obtained by -----
Option A:	Partial fraction expansion on Z(S)

Option B:	Partial fraction expansion on Y(S)
Option C:	Continued fraction expansion Z(S)
Option D:	Continued fraction expansion Y(S)
Q24.	Realization of network using Foster-I can be obtained by -----
Option A:	Partial fraction expansion on Z(S)
Option B:	Partial fraction expansion on Y(S)
Option C:	Continued fraction expansion Z(S)
Option D:	Continued fraction expansion Y(S)
Q25.	Z(S) = 4 + 5 S is impedance function consist of ----
Option A:	Capacitor=4 and Resistor = 5
Option B:	Resistor = 4 and Inductor = 5
Option C:	Inductor = 4 and Capacitor = 5
Option D:	Capacitor = 4 and Inductor=5