University of Mumbai

Examinations Commencing from 10th April 2021 to 17th April 2021

Program: **BE Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev 2019 ‘C’ Scheme

Examination: SE Semester III

Course Code: **ECC301** and Course Name: **Engineering Mathematics III**

Time: 2 hour Max. Marks: 80

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Note: All Questions are compulsory.

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks. 2 marks each**
1.	Laplace Transform of $\{t\ sin3t\}$ is
Option A:	$-\frac{6s}{(s^2+9)^2}$
Option B:	$-\frac{3}{(s^2+9)^2}$
Option C:	$\frac{6s}{(s^2+9)^2}$
Option D:	$-\frac{6}{(s^2+9)^2}$
2.	Laplace Transform of $\{sin2t\ sin3t\}$ is
Option A:	$\frac{1}{2}\left[\frac{s}{s^2+1}-\frac{s}{s^2+25}\right]$
Option B:	$\frac{1}{2}\left[\frac{s}{s^2+1}+\frac{s}{s^2+25}\right]$
Option C:	$\frac{1}{2}\left[\frac{s}{s^2+25}-\frac{s}{s^2+1}\right]$
Option D:	$\left[\frac{s}{s^2+1}-\frac{s}{s^2+25}\right]$
3.	Laplace Transform of $\{e^{2t}(1+sint)\}$ is
Option A:	$\frac{1}{(s+2)}+\frac{1}{(s+2)^2+1}$
Option B:	$\frac{1}{(s-2)}+\frac{s}{(s-2)^2+1}$
Option C:	$\frac{1}{(s-2)}+\frac{1}{(s-2)^2+1}$
Option D:	$\frac{1}{(s-2)}+\frac{1}{(s-2)^2-1}$

4.	If $L\{f(t)\} = \frac{1}{s\sqrt{s+1}}$, then $L\{f(2t)\}$ is
Option A:	$\frac{1}{2s}\sqrt{\frac{2}{(s+2)}}$
Option B:	$\frac{1}{s}\sqrt{\frac{2}{(s+2)}}$
Option C:	$\frac{1}{2}\sqrt{\frac{s}{(s+2)}}$
Option D:	$\sqrt{\frac{2}{(s+2)}}$
5.	Inverse Laplace Transform of $\frac{1}{s^4}$ is
Option A:	$\frac{1}{3!}\ t^4$
Option B:	$\frac{1}{2!}\ t^4$
Option C:	$\frac{1}{3!}\ t^3$
Option D:	$\frac{1}{4!}\ t^4$
6.	Inverse Laplace Transform of $\frac{1}{s} + \frac{1}{(s+2)^2}$ is
Option A:	$1 - te^{-2t}$
Option B:	$1 + te^{2t}$
Option C:	$1 + e^{-2t}$
Option D:	$1 + te^{-2t}$
7.	Inverse Laplace Transform of $\frac{1}{(s-2)^2-1}$ is
Option A:	$e^{-2t}sinht$
Option B:	$e^{2t}sint$
Option C:	$e^{2t}sinht$
Option D:	$e^{2t}cosht$
8.	Find Fourier coefficient a_0 for the function $f(x) = 2x - 3x^2$, $0 \le x \le 2\pi$?
Option A:	$1 - 2\pi$

Option B:	$\pi(1-2\pi)$
Option C:	0
Option D:	$2\pi(1-2\pi)$
9.	Find Fourier coefficient b_1 in half range sine series for the function $f(x) = sinx,\ 0 < x < \pi$?
Option A:	$\frac{\pi}{2}$
Option B:	0
Option C:	1
Option D:	-1
10.	Find Fourier coefficient a_0 for the function $f(x) = 1 - x^2$, $-1 \le x \le 1$
Option A:	$\frac{2}{3}$
Option B:	$\frac{1}{3}$
Option C:	0
Option D:	$-\frac{2}{3}$
11.	Which of the following is related to Cauchy-Riemann equations?
Option A:	$u_x = v_y , u_y = v_x$
Option B:	$u_x = -v_y , u_y = v_x$
Option C:	$u_x = v_y , u_y = -v_x$
Option D:	$u_x = u_y , v_y = v_x$
12.	If the eigenvalues of a 4x4 matrix A are given as 2 ,-3,-13 and 7,then determinant of A is
Option A:	19
Option B:	45
Option C:	546
Option D:	25
13.	What is the divergence of the vector field $\vec{f} = 3x^2\hat{\imath} + 5xy^2\hat{\jmath} + xyz^3\hat{k}$ at the point (1, 2, 3)?
Option A:	89
Option B:	80
Option C:	124
Option D:	100

14.	The Eigen values of the following matrix are $A = \begin{bmatrix} -2 & 5 & 4 \\ 0 & 7 & 5 \\ 0 & 0 & 2 \end{bmatrix}$
Option A:	-3 , 12, -6
Option B:	2,4 , 5
Option C:	1, 2 ,3
Option D:	-2,2,7
15.	If $u = 2x + kx^3 + 3xy^2$ is harmonic then the value of the constant k is
Option A:	3
Option B:	-1
Option C:	2
Option D:	0
16.	A vector field which has a vanishing divergence is called as _____________
Option A:	Solenoidal field
Option B:	Rotational field
Option C:	Hemispheroidal field
Option D:	Irrotational field
17.	If all Eigen values are distinct then the matrix is
Option A:	Non-diagonalizable
Option B:	Diagonalizable
Option C:	Symmetric
Option D:	Singular
18.	If $f(z) = ze^z$ then it's real part u is given by
Option A:	$e^x \{ x\, siny + y\, cosy\}$
Option B:	$e^x \{ y\, siny + x\, cosy\}$
Option C:	$e^x \{ x\, cosy - y\, siny\}$
Option D:	$e^x \{ y\, siny - x\, cosy\}$
19.	If the Eigenvalues of a matrix A are 1,-2,-1 then the Eigenvalues of $A^2 - A - 2I\ are$
Option A:	-4,4,0
Option B:	2,4,1
Option C:	2,4,0
Option D:	-2,4,0
20.	Determine the constants a, b, c if $\bar{F}$ is irrotational where $\bar{F} = (axy + bz^3)i + (3x^2 - cz)j$
Option A:	-6,0,1
Option B:	6,0,0
Option C:	0,6,0
Option D:	6,6,1

Q2. (20 Marks)	**Solve any Four out of Six. 5 marks each**
A	Find $L[(t+sint)^2]$
B	Find $L^{-1}\left[\frac{4s+12}{s^2+8s+12}\right]$
C	Obtain the Fourier series for $f(x)=x$ in $(0,2\pi)$.
D	Find the analytic function f(z) $in\ terms\ of\ z$ whose real part is $u=x^3-3xy^2+3x^2-3y^2+1$.
E	Find the Eigenvalues of matrix $A=\begin{bmatrix}1 & 2 & 3\\ 2 & -1 & 4\\ 3 & 1 & -1\end{bmatrix}$ and Show that matrix satisfies the characteristic equation .
F	Show that $\bar{F}=(y^2-z^2+3yz-2x)i+(3xz+2xy)j+(3xy-2xz+2z)k$ is both irrotational and solenoidal.

Q3. (20 Marks)	**Solve any Four out of Six. 5 marks each**
A	Evaluate $\int_0^t \frac{\sin u}{u}\,du$
B	Find $L^{-1}\left[\frac{1}{s(s^2+9)}\right]$
C	Obtain half range Fourier sine series for $f(x)=x(\pi-x)$ in $(0,\pi)$.
D	Find the constants a,b,c,d,e if $f(z)=(ax^3+bxy^2+3x^2+cy^2+x)+i(dx^2y-2y^3+exy+y)$ is analytic.
E	Find Eigenvalues & Eigenvectors for the matrix $A=\begin{bmatrix}3 & -4\\ 2 & -3\end{bmatrix}$
F	Evaluate by using Green's theorem $\int_C (x^2-y)dx+(2y^2+x)dy$, where C is the closed region bounded $by\ y=4$ and $y=x^2$.

University of Mumbai
Examination 2021 under cluster 5 (Lead College: APSIT)
Examinations Commencing from 10th April 2021 to 17th April 2021

Program: **Bachelor of Engineering**

Curriculum Scheme: **Electronics & Telecommunication (Rev2019 'C' Scheme)**

Examination: **DSE** Semester **III**

Course Code: **ECC302** and Course Name: **Electronic Devices & Circuits**

Time: 2 hour Max. Marks: 80

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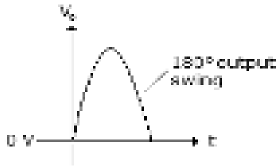
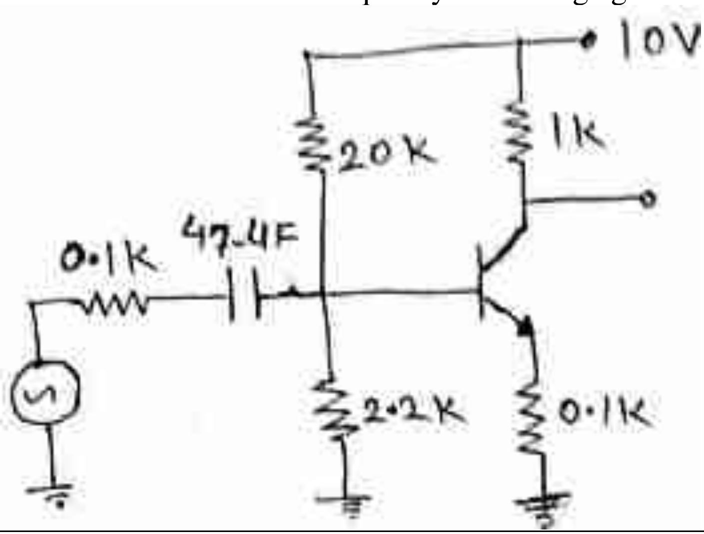
Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The ______ model suffers from being limited to a particular set of operating conditions if it is to be considered accurate.
Option A:	Hybrid equivalent (h-model)
Option B:	Re
Option C:	Hybrid pi
Option D:	Thevenin
2.	The process to getting all the DC sources to zero is associated with
Option A:	DC equivalent circuit
Option B:	AC equivalent circuit
Option C:	Entire amplifier circuit
Option D:	Voltage divider biased circuit
3.	In the load line concept when AC and DC load lines are intersect with each other, then that intersection point is called as
Option A:	Active Point
Option B:	Saturation Point
Option C:	Cutoff Point
Option D:	Operating Point
4.	In the amplifier circuit using transistor, the emitter resistance is used for
Option A:	To prevent increase in gain
Option B:	To increase gain
Option C:	To prevent thermal runaway
Option D:	To lower the output impedance
5.	In MOSFET, the input resistance (Ri) is not equal to zero is related to which configuration
Option A:	Common source configuration
Option B:	Common source configuration with source resistance
Option C:	Common gate configuration
Option D:	Common drain configuration
6.	Generally the E-MOSFET is known as normally-OFF MOSFET because it works only with _______

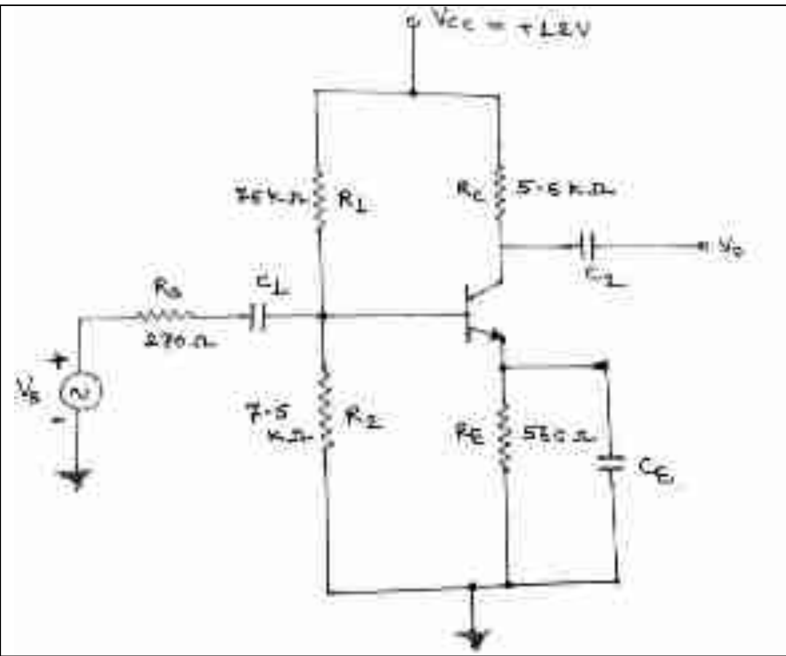
Option A:	Large positive drain voltage
Option B:	Large positive gate voltage
Option C:	Large negative drain voltage
Option D:	Large negative gate voltage
7.	The ______ of the two values of higher cutoff frequencies is the dominant frequency of the complete system.
Option A:	Highest
Option B:	Lowest
Option C:	Middle
Option D:	Average
8.	Which BJT transistor has a better high frequency response?
Option A:	NPN
Option B:	PNP
Option C:	Depends on type of coupling
Option D:	Depends on other components
9.	What should be the gain of an amplifier at 20 kHz if the half power frequencies are fL = 20 Hz and fH = 15 kHz along with mid band gain = 80?
Option A:	28.28
Option B:	48.07
Option C:	62.47
Option D:	78.77
10.	An amplifier has an output voltage of 7.6 V p-p at the midpoint of the frequency range. What is the output at fc?
Option A:	3.8 V p-p
Option B:	3.8 Vrms
Option C:	5.4 Vrms
Option D:	5.4 V p-p
11.	If the voltage gain of a CE amplifier is -57 and its internal capacitances are $C\pi$ = 20 pF and $C\mu$ = 2.4 pF. Its output Miller capacitance will be
Option A:	2.44 pF
Option B:	20.34 pF
Option C:	140.23 pF
Option D:	1.17 pF
12.	Miller's theorem is applicable in a single stage CE hybrid π model in order to deal with _________
Option A:	Series combination of CC and r'bc
Option B:	Series combination of Ce and r'be
Option C:	Parallel combination of CC and r'bc
Option D:	Parallel combination of Ce and r'be
13.	Miller theorem is generally used to
Option A:	Determine the higher cut–off frequencies.
Option B:	Determine the voltage gain of the circuits.
Option C:	Simplify the analysis of feedback elements.

Option D:	Determine the equivalents capacitance.
14.	Which class of power amplifier has the output swing as shown below 
Option A:	A
Option B:	B
Option C:	AB
Option D:	C
15.	Power amplifier generally uses transformer coupling because transformer permits
Option A:	Cooling of circuits
Option B:	Impedance matching
Option C:	Distortionless output
Option D:	Good frequency response
16.	A transformer coupled class A power amplifier has a load of 100Ω on the secondary. If the turns ratio is 10: 1 what is the value of load appearing on primary?
Option A:	10k Ω
Option B:	5k Ω
Option C:	20k Ω
Option D:	100k Ω
17.	If Ad= 3500 and Acm = 0.35, the CMRR is ……….
Option A:	25 dB
Option B:	40 dB
Option C:	60 dB
Option D:	80 dB
18.	The common-mode gain should be
Option A:	very high
Option B:	very low
Option C:	always unity
Option D:	Infinite
19.	In class A operation , the operating point is generally located ______ of the d.c. load line
Option A:	At cut off point
Option B:	At the middle
Option C:	At the saturation
Option D:	Just above the cutoff but below the center of load line
20.	A class A power amplifier has maximum a.c. power output of 30W . Find the power rating of the transistor.
Option A:	60W
Option B:	15W
Option C:	30W

Option D:	90W

Q2	Solve any Two Questions out of Three 10 marks each
A	Derive the equation of Av, Zi and Zo of CS amplifier using bypass RS.
B	For the circuit shown in Fig. 1, the transistor parameter are VBE (on) = 0.7 V, β = 200, VA = ∞, Derive the expression for lower cutoff frequency due to input coupling capacitor. Determine lower cut-off frequency and voltage gain 
C	In a class A transformer coupled amplifier, the collector current alternates between 3mA and 110 mA and its Quiescent value is 58mA. The load resistance is 13Ω and when referred to primary winding , it is 325Ω. The supply voltage is 20V. Calculate (i) transformer turn ratio (ii) a.c. output power (iii) collector efficiency

Q3.	Solve any Two Questions out of Three 10 marks each
A	Calculate the Voltage gain(AVS),input impedance(Zi),Output impedance(Zo) and Current gain(AIS) for the circuit shown in the following figure using hybrid-π model. Assume β=120,VBE(on)=0.7 V and VA=100 V.

	
B	Draw a high frequency equivalent circuit of MOSFET CS amplifier with Rs un-bypassed and self- bias. Derive the expression for input and output upper cutoff frequencies with considering input signal resistor (Rsig) and load resistor (RL).
C	Explain the MOS differential pair amplifier with a common-mode input voltage vCM.

University of Mumbai
Examination 2021 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 10th April 2021 to 17th April 2021

Program: **Bachelor of Engineering**

Curriculum Scheme: **Electronics & Telecommunication (Rev2019 'C' Scheme)**

Examination: **DSE** Semester **III**

Course Code: **ECC303** and Course Name: **Digital System Design**

Time: 2 hour Max. Marks: 80

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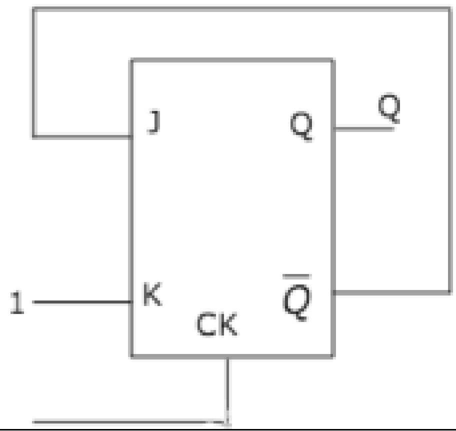
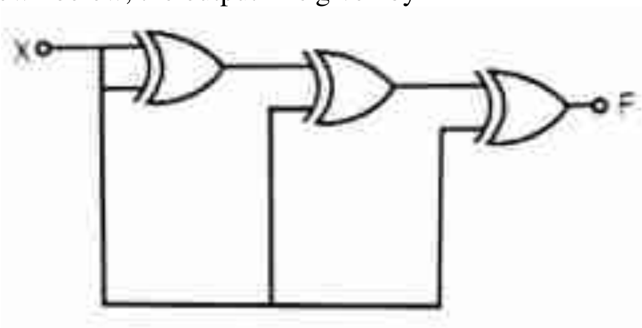
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks.**
1.	The decimal equivalent of hex number 1A53 is
Option A:	$(2053)_{10}$
Option B:	$(6739)_{10}$
Option C:	$(2050)_{10}$
Option D:	$(6736)_{10}$
2.	Which one of the following statements best describes the operation of a negative edge triggered D flip flop?
Option A:	The logic level at D input is transferred to Q at the negative edge of the clock
Option B:	The Q output is always identical to the clock input if the D input is high
Option C:	The Q output is always equal to the D input when the clock is positive
Option D:	The Q output is always equal to the D input
3.	In a J K flip flop, we have J =Q' and K=1. Assume the flip flop was initially cleared and then clocked for 6 pulses, the sequence at the output will be 
Option A:	010000
Option B:	011001
Option C:	010010
Option D:	010101
4.	In a positive edge triggered JK flip flop, a low J and low K produces?
Option A:	High state
Option B:	Low state

Option C:	Toggle state
Option D:	No Change State
5.	Decimal 43 in Hexadecimal and BCD number system is respectively
Option A:	B2, 0100 0011
Option B:	2B, 0100 0011
Option C:	2B, 0011 0100
Option D:	B2, 0100 0100
6.	On subtracting (01010)2 from (11110)2 using 1's complement, we get ___________
Option A:	01001
Option B:	11010
Option C:	10101
Option D:	10100
7.	The Boolean expression Y= AB+CD is to be realized using only 2 input NAND gates. The minimum number of gates required is
Option A:	2
Option B:	3
Option C:	4
Option D:	5
8.	For the circuit shown below, the output F is given by 
Option A:	F=1
Option B:	F=0
Option C:	F=X
Option D:	F=X'
9.	The output of a logic gate is '1' when all its inputs are at logic '0'. The gate is either
Option A:	a NAND or an EX-OR gate
Option B:	a NOT or an EX-NOR gate
Option C:	an OR or an EX-NOR gate
Option D:	an AND or an EX-OR gate
10.	The canonical sum of product form of the function y(C,D) = C + D is ___________
Option A:	CD + DD + C'C
Option B:	CD + CD' + C'D
Option C:	DC + DC' + C'D'

Option D:	CD’ + C’D + C’D’
11.	Complement of the expression A’B + CD’ is __________
Option A:	(A’ + B)(C’ + D)
Option B:	(A + B’)(C’ + D)
Option C:	(A’ + B')(C’ + D)
Option D:	(A’ + B')(C’ + D')
12.	If each successive code differs from its preceding code by a single bit only then this code is called as
Option A:	BCD code
Option B:	Weighted code
Option C:	Gray code
Option D:	Binary code
13.	The bit sequence 0010 is serially entered (right-most bit first) into a 4-bit parallel out shift register that is initially clear. What are the Q outputs after two clock pulses?
Option A:	0000
Option B:	0010
Option C:	1000
Option D:	1111
14.	Which of the following describes the structure of a VHDL code correctly?
Option A:	Library Declaration; Configuration; Entity Declaration; Architecture Declaration
Option B:	Library Declaration; Entity Declaration; Architecture Declaration; Configurations
Option C:	Library Declaration; Entity Declaration; Configuration; Architecture Declaration
Option D:	Library Declaration; Configuration; Architecture Declaration; Entity Declaration
15.	The difference between a PLA and a PAL is
Option A:	the PAL has a programmable OR plane and a programmable AND plane, while the PLA only has a programmable AND plane
Option B:	the PLA has a programmable OR plane and a programmable AND plane, while the PAL only has a programmable AND plane
Option C:	the PAL has more possible product terms than the PLA
Option D:	PALs and PLAs are the same thing.
16.	Which of the following cannot be an output of a magnitude comparator
Option A:	A < B
Option B:	A > B
Option C:	A – B
Option D:	A = B
17.	The number of flip-flops required to construct an 8-bit shift register will be
Option A:	32
Option B:	16
Option C:	4
Option D:	8
18.	Which of the following VHDL design units contain the description of the circuit?
Option A:	Configurations
Option B:	Architecture

Option C:	Library
Option D:	Entity
19.	The addition of binary numbers 10011011010 and 010100101 is
Option A:	10101111111
Option B:	1100110110
Option C:	10011010011
Option D:	0111001000
20.	A product term containing all K variables of the function in either complemented or uncomplemented form is called
Option A:	Minterm
Option B:	Maxterm
Option C:	Midterm
Option D:	Least term

Q2.	**Answer the following:**
A	**Solve any Two** **5 marks each**
i.	Convert J-K flip flop to D flip flop.
ii.	Prove that NAND and NOR gates are universal gates.
iii.	Compare PAL with PLA.
B	**Solve any One** **10 marks each**
i.	What is a shift register? Explain working of Serial In Serial Out shift register?
ii.	Minimize the following expression using Quine McClusky technique. F (A, B, C, D) = ∑m (1,3,7,11,15) + d (0,2,5)

Q3.	**Answer the following:**
A	**Solve any Two** **5 marks each**
i.	Convert $(365.24)_8$ into decimal, binary and hexadecimal.
ii.	Write VHDL code for the full subtractor.
iii.	For the given minterms, obtain the simplified POS expression F(A, B, C, D)= ∑m (2,3,5,7,12) + d(6, 13, 14, 15)
B	**Solve any One** **10 marks each**
i.	With the help of a truth table explain the full adder circuit and implement it using logic gates.
ii.	Design 3 bit binary to gray code converter.

University of Mumbai

Examination 2021 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 10th April 2021 to 17th April 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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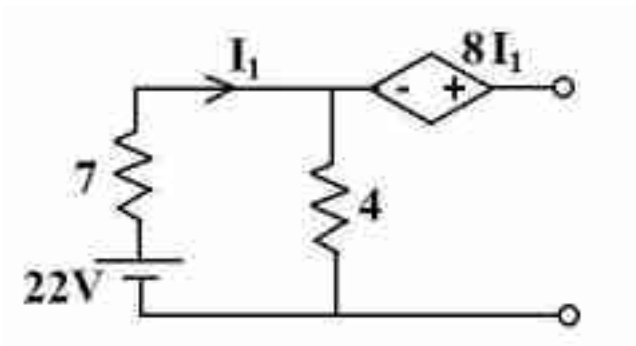
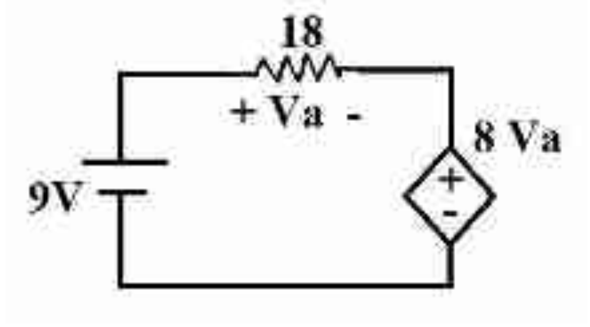
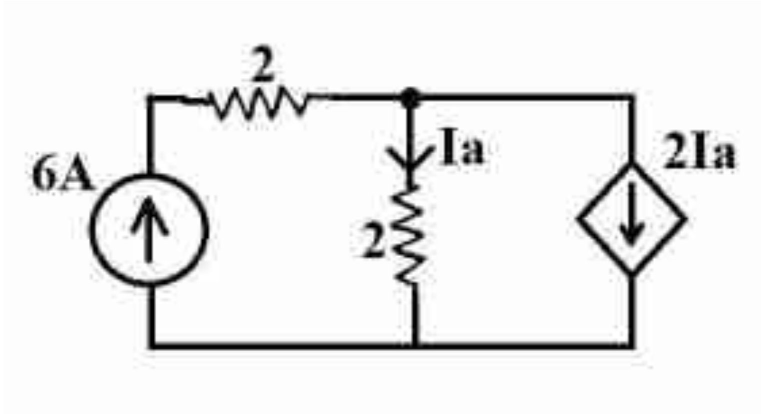
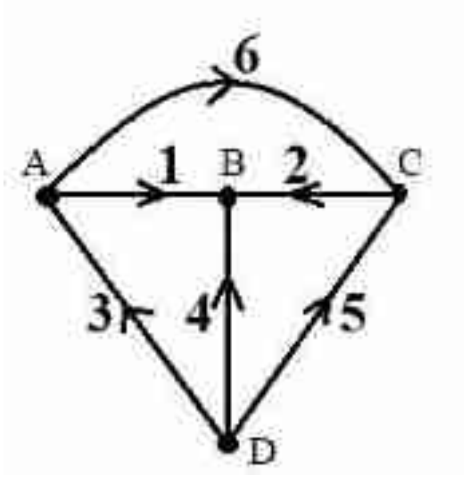
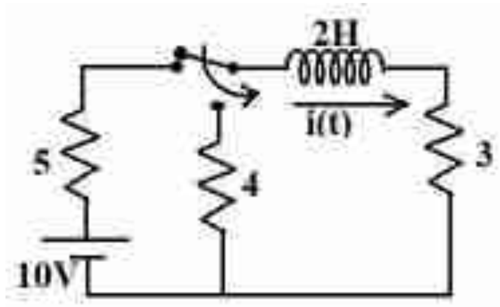
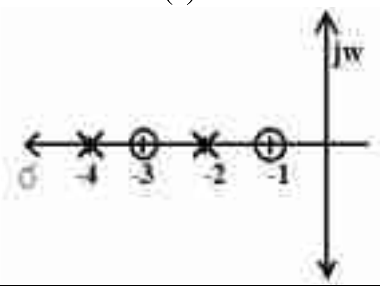
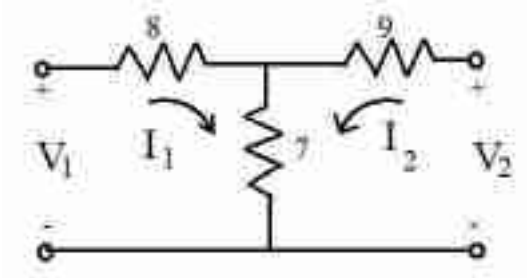
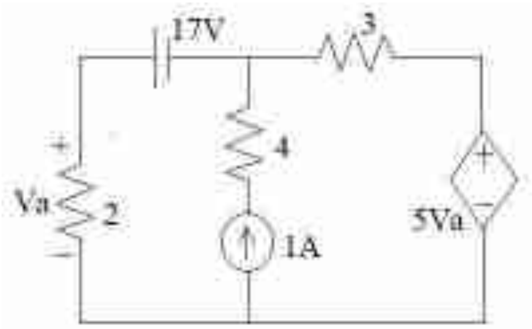
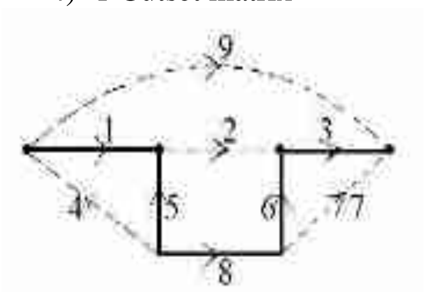
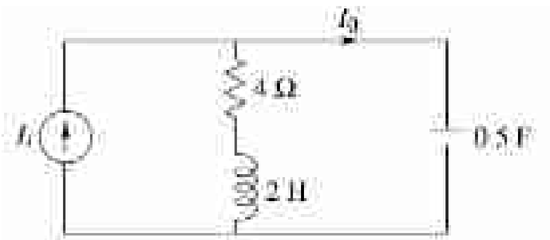
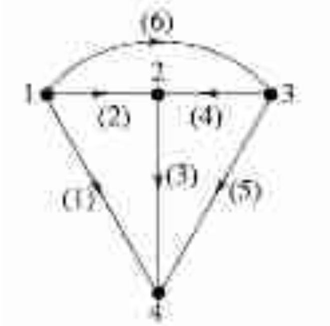
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks.**
1.	Which of the following conditions delivers maximum power to the load?
Option A:	$R_L > R_{TH}$
Option B:	$R_L = R_{TH}$
Option C:	$R_L < R_{TH}$
Option D:	Depends upon source.
2.	A network consists of dependent current source with value $4V_X$. Which type of dependent source it is?
Option A:	Voltage Controlled Current Source
Option B:	Current Controlled Current Source
Option C:	Voltage Controlled Voltage Source
Option D:	Current Controlled Voltage Source
3.	Refer the following figure and determine current I_1. 
Option A:	0.5 A
Option B:	1 A
Option C:	2 A
Option D:	7 A
4.	Refer the following figure to find voltage Va.

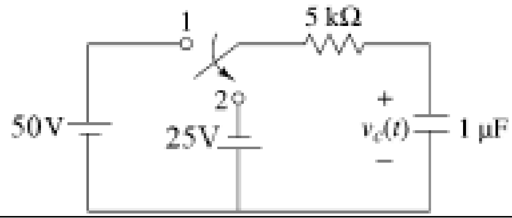
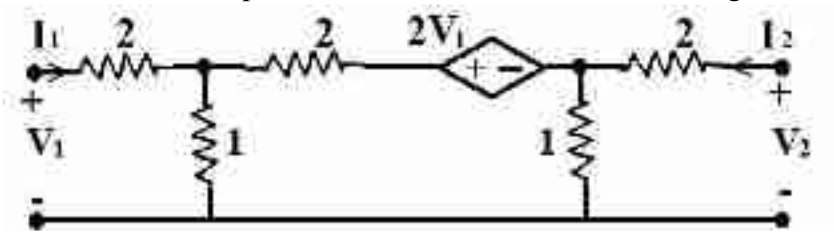
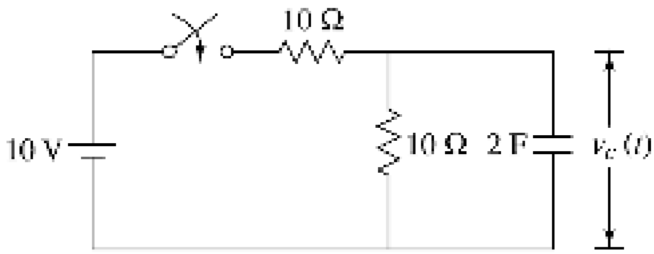
	
Option A:	2 V
Option B:	8 V
Option C:	18 V
Option D:	1 V
5.	Refer the following figure to find current Ia. 
Option A:	3 A
Option B:	2 A
Option C:	1 A
Option D:	0.5 A
6.	If the graph consists of 4 nodes and 6 branches then the number of twigs and number of links are ------ and ------ respectively.
Option A:	5, 5
Option B:	4, 4
Option C:	3, 4
Option D:	3, 3
7.	For the graph shown in figure, the number of rows in complete incidence matrix are -------.

	
Option A:	5
Option B:	4
Option C:	3
Option D:	6
8.	The number of maximum possible trees for a graph is calculated by ------.
Option A:	N -1
Option B:	b – (n+1)
Option C:	b + n -1
Option D:	$\lvert A A^T \rvert$
9.	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:	$B.Z_b.B^T I_l = - B.Vs$
Option D:	$QY_b Q^T.V_t = Q Y_b + Q I_S Vs$
10.	Refer the following figure and determine current i(t) in at $t=0^-$. 
Option A:	0 A
Option B:	1.25A
Option C:	1.1A
Option D:	1 A
11.	If u(t) signal is applied to the R-C network where R = 1 KΩ and C = 1 uF are connected in series. Calculate RC time constant (τ).
Option A:	3 uSec
Option B:	63.2 mSec
Option C:	1 mSec

Option D:	2 mSec
12.	Time constant of a series connected R-L network is -------.
Option A:	L/R
Option B:	R/L
Option C:	Product of R and L
Option D:	LS
13.	Which of the following represent Voltage across inductors in time domain?
Option A:	Lx$\frac{di(t)}{dt}$
Option B:	L$\int$ $i(t).dt$
Option C:	Lxi(t)
Option D:	LxI(S)
14.	If the inductor and capacitor are connected in series then equivalent impedance is ---.
Option A:	1/LS + CS
Option B:	S(L+C)
Option C:	LS + 1/CS
Option D:	S^2(1+1/LC)
15.	Pole-zero location of the transfer function T(s) is shown in the following figure. Determine T(s). 
Option A:	H x $\frac{(S-1)(S-3)}{(S-2)(S-4)}$
Option B:	H x $\frac{(S-2)(S-4)}{(S-1)(S-3)}$
Option C:	H x $\frac{(S+1)(S+3)}{(S+2)(S+4)}$
Option D:	H x $\frac{(S+2)(S+4)}{(S+1)(S+3)}$
16.	A system is represented by transfer function T(s) = $\frac{18}{(S+3)(S+2)}$, the DC gain of this system is -------.
Option A:	18
Option B:	3
Option C:	2
Option D:	6

17.	Which among the following represents the precise condition of reciprocity for transmission parameters?
Option A:	AD-BC=1
Option B:	AB-CD=1
Option C:	AC-BD=1
Option D:	A=D
18.	A two port network is represented by the following equation. $I_1 = 65\ V_2 + 86\ I_2$ $V_1 = 43\ V_2 + 24\ I_2$ A and B parameters of the networks are given by ------- and ------ respectively.
Option A:	43, 24
Option B:	65, 86
Option C:	65, -86
Option D:	43, -24
19.	Determine Z_{11} and Z_{12} parameters of the following network. 
Option A:	$Z_{11} = 15\ \Omega$, $Z_{12} = -7\ \Omega$,
Option B:	$Z_{11} = 17\ \Omega$, $Z_{12} = 15\ \Omega$,
Option C:	$Z_{11} = 7\ \Omega$, $Z_{12} = 15\ \Omega$,
Option D:	$Z_{11} = 15\ \Omega$, $Z_{12} = 7\ \Omega$,
20.	Z parameter of two port network are $Z_{11} = 20\ \Omega$, $Z_{22} = 30\ \Omega$ and $Z_{12}=Z_{21}=10\ \Omega$. Then the network is -------.
Option A:	Reciprocal
Option B:	Non-Reciprocal
Option C:	Symmetrical
Option D:	Neither reciprocal nor symmetrical

Q2.	Answer the following:
A	**Solve any One** **10 marks each**
i.	For the circuit shown in below, find current through 3 Ω using superposition theorem. 
ii.	For the graph shown in figure find, 1) Complete incidence matrix 2) Reduced incidence matrix 3) f-Tie-set matrix and 4) f-Cutset matrix 
B	**Solve any two** **5 marks each**
i.	For the network shown in figure, plot poles and zeros function of $\frac{I0}{Ii}$. 
ii.	Derive condition of symmetry for Z parameters.
iii.	Calculate number of possible trees of following graphs. 

Q3.	**Answer the following :**
A	**Solve any One** **10 marks each**
i.	In the network shown in figure, the switch was at 1^{st} position for a long time and then it is moved to 2^{nd} position at t=0. Determine Vc(t). 
ii.	Determine ABCD parameter for the network shown in figure. 
B	**Solve any One** **10 marks each**
i.	The switch in the network shown was opened for a long time, then it is closed at t = 0. Determine the voltage across the capacitor using Laplace. 
ii.	Write any five necessary conditions for driving point functions and transfer functions.

University of Mumbai

Examination 2021 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 10th April 2021 to 17th April 2021

Program: **Bachelor of Engineering**

Curriculum Scheme: **Electronics & Telecommunication (Rev2019 'C' Scheme)**

Examination: **DSE** Semester **III**

Course Code: **ECC305** and Course Name: **Electronic Instrumentation & Control Systems**

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.	Poles are those values of s which makes
Option A:	Numerator of transfer function=0
Option B:	Numerator of transfer function=1
Option C:	Denominator of transfer function=0
Option D:	Denominator of transfer function =1
2.	Megger is used to measure
Option A:	Unknown Resistance of Low value
Option B:	Unknown Resistance of High value
Option C:	Unknown Capacitance of Low value
Option D:	Unknown Capacitance of High value
3.	Following is the phase angle for the factor (1+jω/3)
Option A:	$\tan^{-1} 3/\omega$
Option B:	$\tan^{-1} \omega/3$
Option C:	$-\tan^{-1} \omega/3$
Option D:	$-\tan^{-1} 3/\omega$
4.	In a bode magnitude plot, which one of the following slopes would be exhibited at high frequencies by a 4th order all-pole system?
Option A:	-80 dB/decade
Option B:	-40 dB/decade
Option C:	40 dB/decade
Option D:	80 dB/decade
5.	When the number of poles is equal to the number of zeroes, how many branches of root locus tends towards infinity?
Option A:	0
Option B:	1
Option C:	2
Option D:	3
6.	The unknown capacitance of Schering bridge is given by
Option A:	$C_x = \frac{C_2 R_4}{R_3}$

Option B:	$C_x = \frac{R_2 R_4}{R_3}$
Option C:	$C_x = \frac{R_2 C_4}{C_3}$
Option D:	$C_x = \frac{R_2 C_3}{C_4}$
7.	For the given system the poles and zeros are $G(s) = \frac{s(s+1)}{(s+3)(s+4)}$
Option A:	P=1, Z=3,4
Option B:	P=3,4, Z=0,1
Option C:	P=-3,-4, Z=0,-1
Option D:	P=-3,-4, Z=-1
8.	The forward path transfer function of a unity feedback system is given by $(s) = \frac{100}{(s^2+10s+100)}$. The frequency response of this system will exhibit the resonance peak at:
Option A:	10 rad/sec
Option B:	8.66 rad/sec
Option C:	7.07 rad/sec
Option D:	5 rad/sec
9.	The phase angle for the open loop transfer function $G(s)H(s) = \frac{5}{s(s+1)(s+3)}$
Option A:	$\phi = -90^0 - \tan^{-1}\omega - \tan^{-1}\omega/3$
Option B:	$\phi = -90^0 - \tan^{-1}\omega - \tan^{-1}\omega/5$
Option C:	$\phi = -90^0 - \tan^{-1}\omega - \tan^{-1}3\omega$
Option D:	$\phi = -90^0 - \tan^{-1}\omega - \tan^{-1}5\omega$
10.	The place where the locii meet while moving to or from infinity is called
Option A:	Centroid
Option B:	Intersection with imaginary axis
Option C:	Root point
Option D:	Breakaway point
11.	Consider the open loop transfer function $G(s) = \frac{K(s+6)}{(s+3)(s+5)}$. In the root locus diagram the centroid will be located at:
Option A:	-4
Option B:	-1
Option C:	-2
Option D:	-3
12.	Attenuation, amplification and filtering is done by
Option A:	Signal conditioner
Option B:	A/D converter
Option C:	Display systems
Option D:	Transducer

13.	For Nyquist contour, the size of radius is _______
Option A:	25
Option B:	0
Option C:	1
Option D:	∞
14.	Kelvin’s double bridge is a modified Wheatstone’s bridge which consider
Option A:	Galvanometer error
Option B:	Contact Resistance
Option C:	High Resistance
Option D:	Battery error
15.	The number of branches terminating at infinity is given by _________ , where P is number of open loop poles and Z is number of open loop zeros.
Option A:	P+Z
Option B:	P-Z
Option C:	P*Z
Option D:	P/Z
16.	The breakaway point calculated mathematically __________
Option A:	Does not lie on root locus
Option B:	May or may not lie on root locus
Option C:	Always lie on root locus
Option D:	Lies on no root locus area only.
17.	The polar plot of the open loop transfer function of a feedback control system intersects the real axis at -2. The gain margin of the system is
Option A:	-5 dB
Option B:	0 dB
Option C:	- 6 dB
Option D:	40 dB
18.	The bridge is balanced when ___________
Option A:	Detector or galvanometer voltage is infinity
Option B:	Detector or galvanometer current is zero
Option C:	Detector or galvanometer voltage is zero
Option D:	Detector or galvanometer current is infinity
19.	The polar plot of a transfer function passes through the critical point (-1,0). Gain margin is __________
Option A:	Zero
Option B:	1 dB
Option C:	100 dB
Option D:	Infinity
20.	____________ is an undesired phenomenon
Option A:	Accuracy
Option B:	Precision
Option C:	Hysterisis
Option D:	Sensitivity

Q2.	**Answer the following :**
A	**Solve any Two** **5 marks each**
i.	Explain in detail the components of a generalized measurement system with the help of block diagram.
ii.	List and explain all the general rules for constructing root locus.
iii.	What is the relationship between frequency domain specifications and time domain specifications?
B	**Solve any One** **10 marks each**
i.	State the advantages of Kelvin's double bridge over Wheatstone bridge and derive expression for finding unknown resistance using Kelvin's double bridge.
ii.	Draw the polar plot for the given system $G(s)H(s)= \frac{100}{s^2(s+2)(s+4)(s+8)}$

Q3.	**Answer the following :**
A	**Solve any Two** **5 marks each**
i.	Differentiate between Accuracy and Precision.
ii.	Explain in detail one bridge circuit used for measuring inductance.
iii.	Find the intersection points with imaginary axis for the given system $G(s)H(s)= \frac{k}{s(s+3)(s+6)}$
B	**Solve any One** **10 marks each**
i.	Sketch the root locus for the given system (draw it on normal paper) $G(s)H(s)= \frac{k}{(s+2)^3}$
ii.	List the magnitude plot and phase plot table for the given system: $G(s)H(s)= \frac{0.75(1+0.2s)}{s(1+0.5s)(1+0.1s)}$

University of Mumbai

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: **BE Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev 2019 'C' Scheme

Examination: SE Semester III

Course Code: **ECC301** and Course Name: **Engineering Mathematics III**

Time: 2 hour Max. Marks: 80

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Note : Q1 carrying 40 marks. Q2 and Q3 are carrying 20 equal marks.

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Find Laplace transform of $f(t) = 1,\ 0 < t < 5;\quad f(t) = 0,\ t > 0$
Option A:	$\frac{1 - e^{-5s}}{s}$
Option B:	$\frac{1}{s} e^{-5s}$
Option C:	$\frac{1}{s}$
Option D:	$\frac{1 + e^{-5s}}{s}$
2.	If $L[f(t)] = log\left(\frac{s+3}{s+1}\right)$, find $L[f(2t)]$
Option A:	$2\ log\left(\frac{s+3}{s+1}\right)$
Option B:	$2\ log\left(\frac{s+6}{s+2}\right)$
Option C:	$\frac{1}{2} log\left(\frac{s+3}{s+1}\right)$
Option D:	$\frac{1}{2} log\left(\frac{s+6}{s+1}\right)$
3.	Find $L[te^{-3t} sint]$
Option A:	$\frac{2s-6}{(s^2-6s+10)^2}$
Option B:	$\frac{2s+6}{(s^2+6s+10)^2}$
Option C:	$\frac{1}{(s+3)^2+1}$
Option D:	$\frac{1}{(s^2-6s+10)^2}$
4.	Find $L\left[\int_0^t u\ sin3u\ du\right]$
Option A:	$\frac{2}{(s^2+1)^2}$
Option B:	$\frac{2}{(s^2+3)^2}$
Option C:	$\frac{6}{(s^2+9)^2}$

Option D:	$\frac{2s}{(s^2+1)^2}$
5.	$L^{-1}\left[\frac{s+5}{s^2-25}\right]$ =?
Option A:	$cos5t + 5\ sin5t$
Option B:	$cosh5t + 5\ sinh5t$
Option C:	$cosh5t + sinh5t$
Option D:	$cosht + 5\ sinht$
6.	Find $L^{-1}\left[\frac{s-2}{s^2-4s+13}\right]$
Option A:	$e^{2t}\frac{sin3t}{3}$
Option B:	$e^{-2t}\frac{sin3t}{3}$
Option C:	$e^{2t}sin3t$
Option D:	$e^{2t}cos3t$
7.	In Fourier series of $f(x) = xcosx$ in $(-\pi, \pi)$. The value of a_n is
Option A:	0
Option B:	$\frac{-1}{2}$
Option C:	$\frac{(-1)^n}{n^2-1}$
Option D:	$\frac{1}{n^2-1}$
8.	$f(x) = \begin{cases} cosx, & -\pi < x < 0 \\ -cosx, & 0 < x < \pi \end{cases}$ is
Option A:	Both even and odd function
Option B:	neither even nor odd
Option C:	odd function
Option D:	Even function
9.	The Fourier series for f(x) in $(0,2\pi)$ is $f(x) = \frac{\pi}{2} - \frac{1}{\pi}\sum_{n=1}^{\infty}\frac{1}{n^2}\cos nx.$ Find the value of $\frac{1}{2\pi}\int_0^{2\pi}[f(x)]^2\ dx$
Option A:	$\frac{\pi^3}{4} + \frac{1}{\pi}\sum_{n=1}^{\infty}\frac{1}{n^4}$
Option B:	$\frac{\pi^2}{4} + \frac{1}{2\pi^2}\sum_{n=1}^{\infty}\frac{1}{n^4}$
Option C:	$\frac{\pi^3}{2} - \frac{1}{\pi}\sum_{n=1}^{\infty}\frac{1}{n^4}$
Option D:	0
10.	A function f(t) is periodic with period 2π if

Option A:	$f(t+2\pi)=0$
Option B:	$f(t+2\pi)=2\pi$
Option C:	$f(t+2\pi)=f(2\pi)$
Option D:	$f(t+2\pi)=f(t)$
11.	Which of the following functions is NOT analytic
Option A:	Sinhz
Option B:	Cosz
Option C:	$\bar{z}$
Option D:	z^2+z
12.	For $\mathrm{f(z) = u + iv}$ analytic, which of the following statement is correct
Option A:	f(z) may satisfy Cauchy-Riemann equation.
Option B:	f(z) is constant function
Option C:	f(z) =0
Option D:	$\mathrm{u, v}$ both are harmonic
13.	Find k such that $f(z)=\frac{1}{2}\log(x^2+y^2)+itan^{-1}\frac{kx}{y}$ is analytic
Option A:	K=1
Option B:	K=-1
Option C:	K=0
Option D:	K=2
14.	Find the characteristic roots of matrix A , Where $A=\begin{bmatrix}3 & -1 & 1\\ -1 & 5 & -1\\ 1 & -1 & 3\end{bmatrix}$
Option A:	$\lambda=1,\ 2,\ \ 3$
Option B:	$\lambda=1,\ 1,\ \ -2$
Option C:	$\lambda=2,\ 3,6$
Option D:	$\lambda=-2,-3,-6$
15.	$\lambda=5$ is one of the eigenvalues of $\mathrm{A}=\begin{bmatrix}1 & 2 & 2\\ 2 & 1 & 2\\ 2 & 2 & 1\end{bmatrix}$. Find the eigenvector corresponding to eigenvalue $\lambda=5$ is
Option A:	$[1\ -1\ 0]'$
Option B:	$[1\ 1\ 1]'$
Option C:	$[1\ -1\ -1]'$

Option D:	[1 0 − 1]’
16.	If A = $\begin{bmatrix} 1 & 2 & 8 \\ 0 & -1 & 3 \\ 0 & 0 & 2 \end{bmatrix}$ Find Eigen Values of $A^2 + 3A + 2A^{-1} + I$
Option A:	7,-3,12
Option B:	6,-4,11
Option C:	1,-1,2
Option D:	7,-3,15
17.	If the matrix A has eigen value 1,1,5 then algebraic multiplicity of A for $\lambda = 1$ is
Option A:	-1
Option B:	0
Option C:	1
Option D:	2
18.	The divergence and curl of $\bar{a} = 2i - 3j + k$ is
Option A:	div $\bar{a}$=0 , curl $\bar{a}$=5
Option B:	div $\bar{a}$=2 , curl $\bar{a}$=0
Option C:	div $\bar{a}$=3 , curl $\bar{a}$=3
Option D:	div $\bar{a}$=0 , curl $\bar{a}$=0
19.	Find the value of a if $\bar{F} = (x - 2z)i + (y - 5x)j + (az + 2x)k$ is solenoidal
Option A:	$a = 2$
Option B:	$a = -2$
Option C:	$a = -4$
Option D:	$a = 4$
20.	Evaluate $\int_C ydx + x\,dy$ along $y = x^2$ from A(0,0) to B(1,1)
Option A:	0
Option B:	2xy
Option C:	-1
Option D:	1

Q2. **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	$Find\ L\left[e^{-t}\int_0^t e^u\ coshu\ du\right]$
B	$L^{-1}\left[log\left(1+\frac{4}{s^2}\right)\right]\ s$
C	*Obtain the Fourier series for* e^{-x} *in* $(0,2\pi)$
D	*Find the analytic function* $f(z)$ *whose imaginary part is* $e^{-x}(ysiny + xcosy)$

E	*Show that* $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ *satisfies Cayley-Hamilton theorem. Hence find* A^{-1}
F	Evaluate by using Green's theorem $\int_C (x^2 - y)dx + (2y^2 + x)dy$, *w*here C is the closed region bounded *by* $y = 4$ and $y = x^2$

Q3. **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	*Evaluate* $\int_0^\infty e^{-3t} \left(\frac{sinht\ sint}{t}\right) dt$
B	*Find* $L^{-1}\left[\frac{S}{(s^2+4s+13)^2}\right]$
C	*Obtain the half range Fourier sine series expansion for* $f(x) = (x - x^2)$ *in* $(0,2)$
D	*Obtain the orthogonal trajectories for the family of curves* $e^{-x}\ cosy = C$.
E	*Check whether the matrix* $A = \begin{bmatrix} 2 & 3 & 4 \\ 0 & 2 & -1 \\ 0 & 0 & 1 \end{bmatrix}$ *is diagonalizable*
F	Show that $\bar{F} = (y^2 - z^2 + 3yz - 2x)i + (3xz + 2xy)j + (3xy - 2xz + 2z)k$ is both irrotational and solenoidal.

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: ECC302 and Course Name: Electronic Devices and Circuits

Time: 2 Hour Max. Marks: 80

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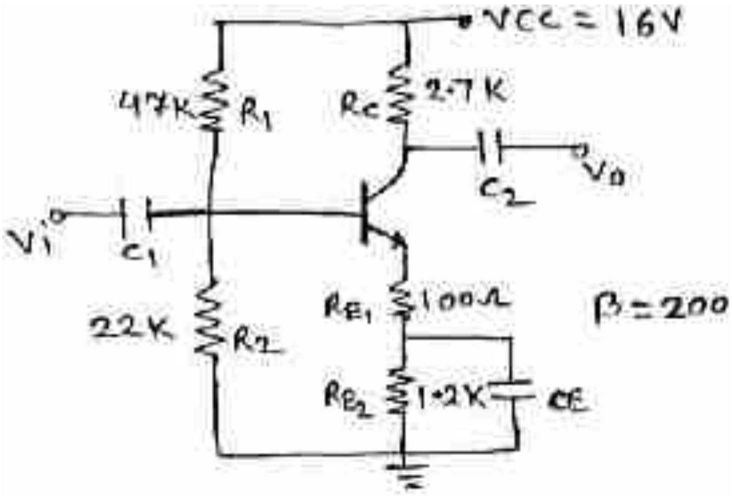
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Cut in voltage for Si and Ge diode is _________ respectively
Option A:	0.7 V and 0.3 V
Option B:	0.3 V and 0.7 V
Option C:	0.5 V and 0.3 V
Option D:	0.7 V and 0.5 V
2.	In forward bias diode current increases ______________
Option A:	linearly
Option B:	exponentially
Option C:	parabolic
Option D:	hyperbolic
3.	In reverse bias current suddenly increase after ___________
Option A:	breakdown
Option B:	breakover
Option C:	cut in
Option D:	cut out
4.	If temperature increases VI characteristics sifts to ________ and if decreases it shifts to _____
Option A:	left, right
Option B:	right, left
Option C:	left, remains constant
Option D:	right, remains constant
5.	For Zener diode as a voltage regulator , line regulation means __________________
Option A:	fixed input voltage and fixed load resistor
Option B:	variable input voltage and variable load resistor
Option C:	fixed input voltage and variable load resistor
Option D:	variable input voltage and fixed load resistor

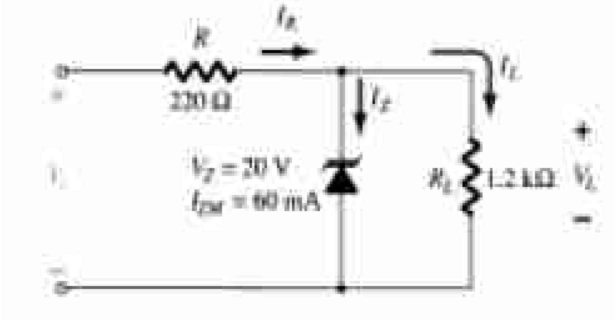
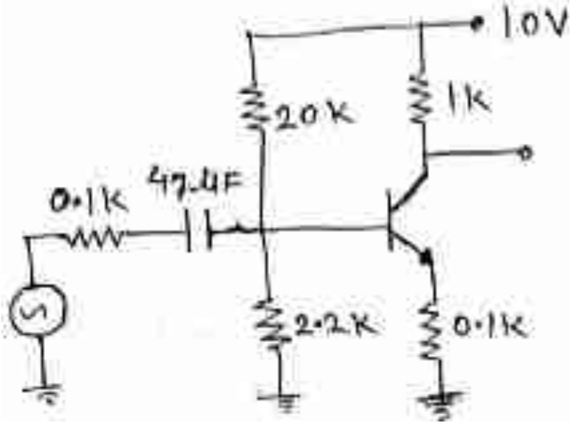
6.	The value of thermal voltage Vt at room temprature T=300K is calculated by __________ and it is ______.
Option A:	KT/q, 26mV
Option B:	KT/q, 28mV
Option C:	q/KT, 26mV
Option D:	q/KT, 28mV
7.	A silicon pn junction at T = 300 K has a reverse saturation current of IS = 2 × 10exp−14 A. Determine the required forward-bias voltage to produce a current of ID = 1 mA.
Option A:	641V
Option B:	6.41V
Option C:	64.1V
Option D:	0.641V
8.	A transistor with β = 120 is biased to operate at a dc collector current of 1.2 mA. Find the value of rπ.
Option A:	625 ohm
Option B:	1250 ohm
Option C:	2500 ohm
Option D:	5000 ohm
9.	The phase difference between the output and input voltages of a CE amplifier is
Option A:	180°
Option B:	0°
Option C:	90°
Option D:	270°
10.	When a transistor amplifier is operating, the current in any branch is _______
Option A:	Sum of AC and DC
Option B:	AC only
Option C:	DC only
Option D:	Difference of AC and DC
11.	The point of intersection of d.c. and a.c. load lines is called ……………..
Option A:	Saturation point
Option B:	Cut off point
Option C:	Operating point
Option D:	Critical point
12.	To amplify low frequency signal, _________________is used in multistage amplifiers.
Option A:	RC coupling
Option B:	transformer coupling

Option C:	impedance coupling
Option D:	direct coupling
13.	Which of the following is the fastest switching device?
Option A:	MOSFET
Option B:	Triode
Option C:	JFET
Option D:	BJT
14.	Before the invention of power amplifiers for the amplification of audio signals generally device was used
Option A:	Diode
Option B:	OPAMP
Option C:	Vacuum tubes
Option D:	SCR
15.	Power amplifier directly amplifies ____________
Option A:	Voltage of signal but not Current
Option B:	Current of the signal but not Voltage
Option C:	Power of the signal but not Voltage and Current
Option D:	Voltage, Current and Power of the signal
16.	In a multistage amplifier, generally the output stage is also called ……………
Option A:	Mixer stage
Option B:	Power stage
Option C:	Detector stage
Option D:	Amplifier stage
17.	The maximum efficiency of resistance loaded class A power amplifier is ……..
Option A:	5 %
Option B:	50 %
Option C:	30 %
Option D:	25 %
18.	The Maximum and minimum output of the Differential amplifiers is defined as:
Option A:	$V_{max} = V_{DD}$, $V_{min} = -V_{DD}$
Option B:	$V_{max} = V_{DD}$, $V_{min} = R_D \times I_{ss}$
Option C:	$V_{max} = V_{DD}$, $V_{min} = V_{DD} - R_D \times I_{ss}$
Option D:	$V_{max} = -V_{DD}$, $V_{min} = -V_{DD}$
19.	In Common Mode Differential Amplifier, the outputs $Vout_1$ and $Vout_2$ are related as:
Option A:	$Vout_2$ is in out of phase with $Vout_1$ with same amplitude.
Option B:	$Vout_2$ and $Vout_1$ have same amplitude but the phase difference is 90 degrees

Option C:	$Vout_1$ and $Vout_2$ have same amplitude and are in phase with each other and their respective inputs.
Option D:	$Vout_1$ and $Vout_2$ have same amplitude and are in phase with each other but out of phase with their respective inputs.
20.	If output is measured between two collectors of transistors, then the Differential amplifier with two input signal is said to be configured as
Option A:	Dual Input Balanced Output
Option B:	Dual Input Unbalanced Output
Option C:	Single Input Balanced Output
Option D:	Single Input Unbalanced Output

Q2.	**Solve any Two Questions out of Three 10 marks each**
A	Determine the following for the network given below Fig. 1 Voltage gain, Current gain, input impedance and output impedance  Fig. 1
B	With neat diagram derive the efficiency of transformer coupled class –A power amplifier? State its uses.
C	Explain construction and working of n-channel E-MOSFET with output characteristics

Q3.	
A	**Solve any Two 5 marks each**
i.	Compare BJT and JFET
ii.	Explain working of pn junction diode with the help of VI characteristics.
iii.	Determine the range of values of Vi that will maintain the Zener diode of Fig. 2 in the “on” state.

	 Fig. 2
B	**Solve any One 10 marks each**
i.	For the circuit shown in Fig. 3, the transistor parameter are V_{BE} (on) = 0.7 V, β = 200, VA = ∞, i. Derive the expression for lower cutoff frequency due to input coupling capacitor. ii. Determine lower cut-off frequency and voltage gain  Fig. 3
ii.	Explain the MOS differential pair amplifier with a common-mode input voltage v_{CM}.

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**

Curriculum Scheme: Rev2019

Examination: SE Semester III

Course Code: ECC303 and Course Name: Digital System Design

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.	A full adder can be made out of …………
Option A:	two half adders
Option B:	two half adders and a OR gate
Option C:	two half adders and a NOT gate
Option D:	three half adders
2.	POS expressions can be implemented using ………logic circuit.
Option A:	2-level OR-AND
Option B:	2-level OR-AND and NOR
Option C:	2-level XOR
Option D:	2-level NOR
3.	To program basic logic functions which type of PLD should be used?
Option A:	PAL
Option B:	PLA
Option C:	CPLD
Option D:	SLD
4.	Sequential structure of VHDL
Option A:	Library Declaration; Configuration; Entity Declaration; Architecture Declaration
Option B:	Library Declaration; Entity Declaration; Configuration; Architecture Declaration
Option C:	Library Declaration; Configuration; Architecture Declaration; Entity Declaration
Option D:	Library Declaration; Entity Declaration; Architecture Declaration; Configuration
5.	VHDL is based on which programming language
Option A:	C
Option B:	PHP
Option C:	Assembly
Option D:	ADA
6.	TTL inputs are the emitters of a _____________
Option A:	Transistor-transistor logic
Option B:	Multiple-emitter transistor
Option C:	Resistor-transistor logic
Option D:	Diode-transistor logic

7.	In case of XOR/XNOR simplification we have to look for the following__________
Option A:	Both Diagonal and Straight Adjacencies
Option B:	Only Offset Adjacencies
Option C:	Both Offset and Straight Adjacencies
Option D:	Both Diagonal and Offset Adjacencies
8.	On addition of 28 and 18 using 2's complement, we get ____________
Option A:	00101110
Option B:	0101110
Option C:	00101111
Option D:	1001111
9.	One example of the use of an S-R flip-flop is as ___________
Option A:	Transition pulse generator
Option B:	Racer
Option C:	Switch debouncer
Option D:	Astable oscillator
10.	Being a universal gate, it is possible for NOR gate to get converted into AND gate by inverting the inputs ______.
Option A:	before getting applied to NOR gate
Option B:	after getting applied to NOR gate
Option C:	before getting applied to AND gate
Option D:	after getting applied to AND gate
11.	On subtracting (01010)2 from (11110)2 using 1's complement, we get ____________
Option A:	01001
Option B:	11010
Option C:	10101
Option D:	10100
12.	Which of the following is the most widely employed logic family?
Option A:	Emitter-coupled logic
Option B:	Transistor-transistor logic
Option C:	CMOS logic family
Option D:	NMOS logic
13.	The time required for a gate or inverter to change its state is called
Option A:	Rise time
Option B:	Decay time
Option C:	Propagation time
Option D:	Charging time
14.	Internal propagation delay of asynchronous counter is removed by ____________
Option A:	Ripple counter
Option B:	Ring counter
Option C:	Modulus counter
Option D:	Synchronous counter

15.	One of the major drawbacks to the use of asynchronous counters is that _____________
Option A:	Low-frequency applications are limited because of internal propagation delays
Option B:	High-frequency applications are limited because of internal propagation delays
Option C:	Asynchronous counters do not have major drawbacks and are suitable for use in high- and low-frequency counting applications
Option D:	Asynchronous counters do not have propagation delays, which limits their use in high-frequency applications
16.	What is the preset condition for a ring shift counter?
Option A:	All FFs set to 1
Option B:	All FFs cleared to 0
Option C:	A single 0, the rest 1
Option D:	A single 1, the rest 0
17.	In a positive edge triggered JK flip flop, a low J and low K produces?
Option A:	High state
Option B:	Low state
Option C:	Toggle state
Option D:	No Change State
18.	Which is the major functioning responsibility of the multiplexing combinational circuit?
Option A:	Decoding the binary information
Option B:	Generation of all minterms in an output function with OR-gate
Option C:	Generation of selected path between multiple sources and a single destination
Option D:	Encoding of binary information
19.	The octal number (651.124)8 is equivalent to ______
Option A:	(1A9.2A)16
Option B:	(1B0.10)16
Option C:	(1A8.A3)16
Option D:	(1B0.B0)16
20.	The addition of +19 and +43 results as _________ in 2's complement system.
Option A:	11001010
Option B:	101011010
Option C:	00101010
Option D:	0111110

Subjective/Descriptive Questions

Option 1

Q2 (Total 20 Marks)	Solve any Four out of Six **5 marks each**
A	Compare SRAM with DRAM.
B	Design full adder using 3:8 decoder.
C	Convert (532.125) base 8, into decimal, binary and hexadecimal.
D	VHDL Code for full Adder.
E	Convert JK Flip Flop to T Flip Flop.
F	Compare TTL and CMOS Logic Families.

Option 2

Q3. (Total 20 Marks)	Solve any Two Questions out of Three **10 marks each**
A	Design 3 bit gray to binary converter.
B	Minimize the following expression using Quine Mc-cluskey technique. F(A,B,C,D)=∑M(0,1,2,3,5,7,9,11)
C	Design Synchronous counter using T-type flip flops for getting the following sequence 0-2-4-6-0.take care of lockout condition.

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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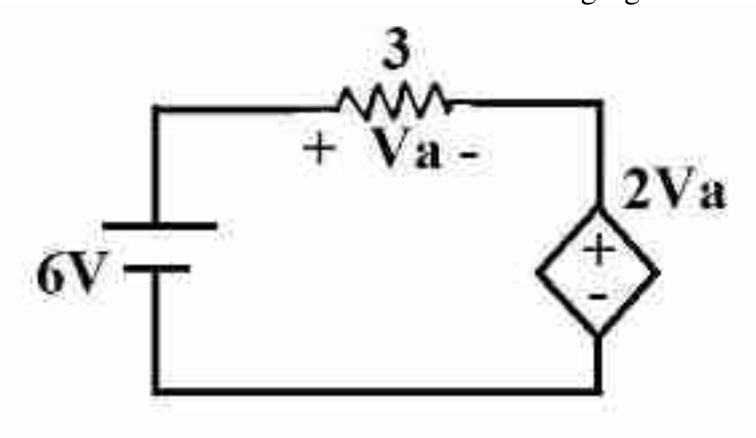
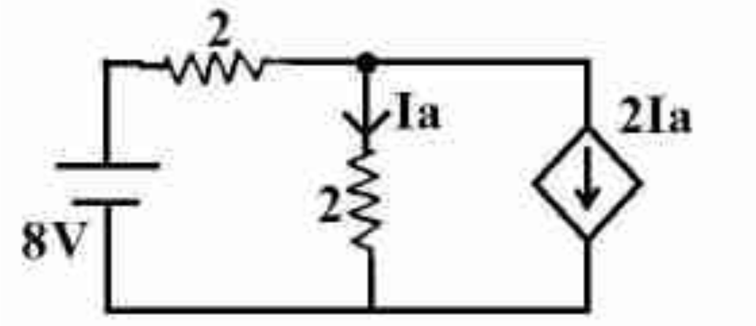
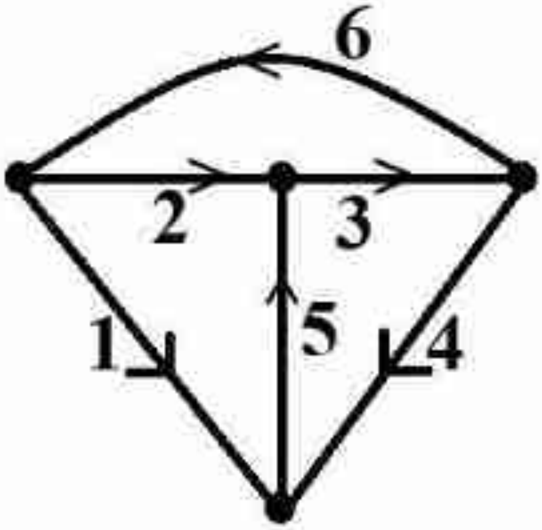
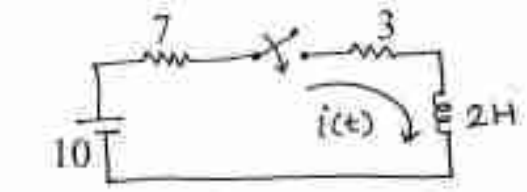
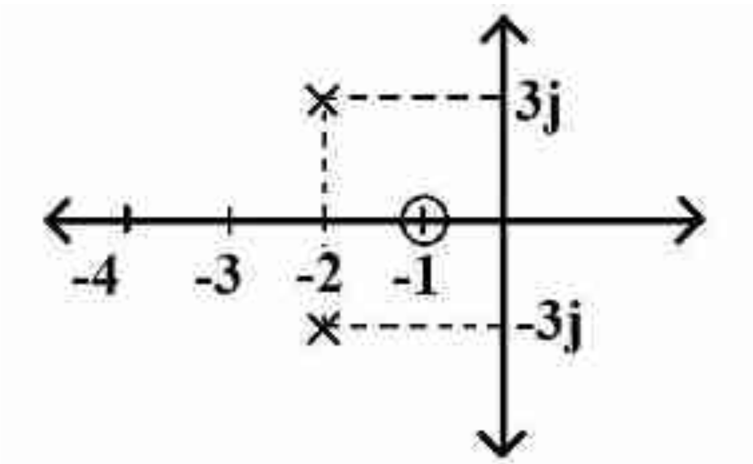
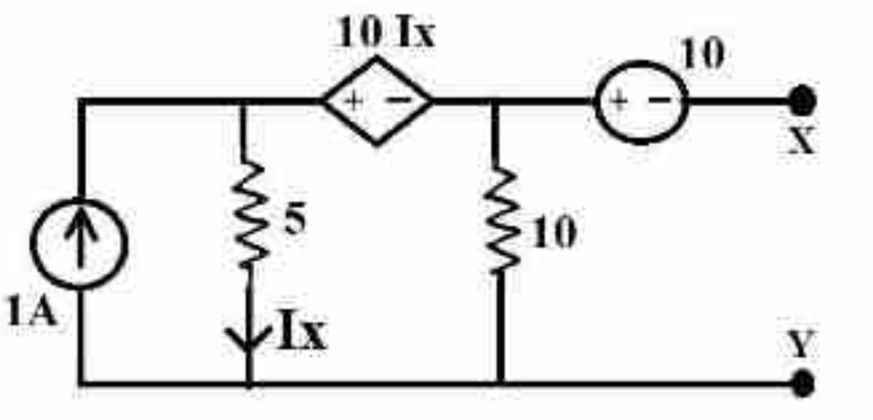
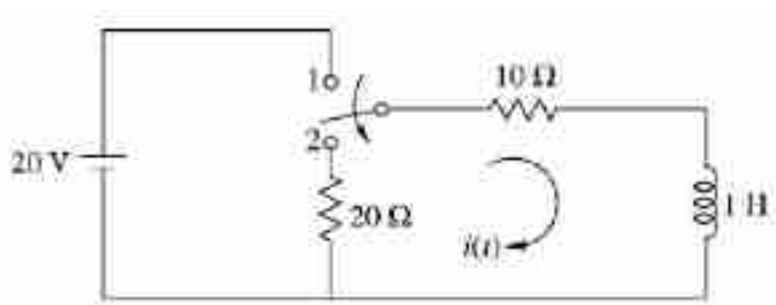
Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Which of the following conditions delivers maximum power to the load?
Option A:	$R_L > R_{TH}$
Option B:	$R_L = R_{TH}$
Option C:	$R_L < R_{TH}$
Option D:	Depends upon source.
2.	Determine 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:	$\mid A\, A^T \mid$
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)

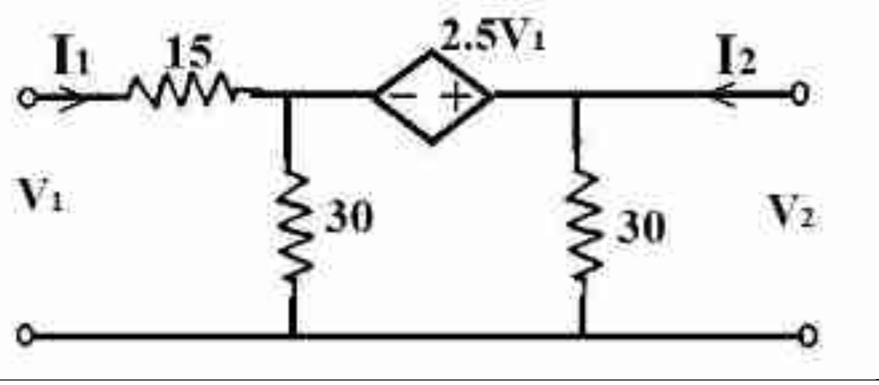
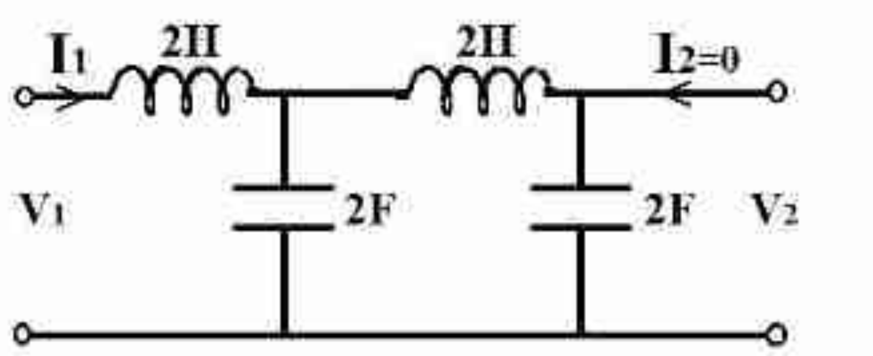
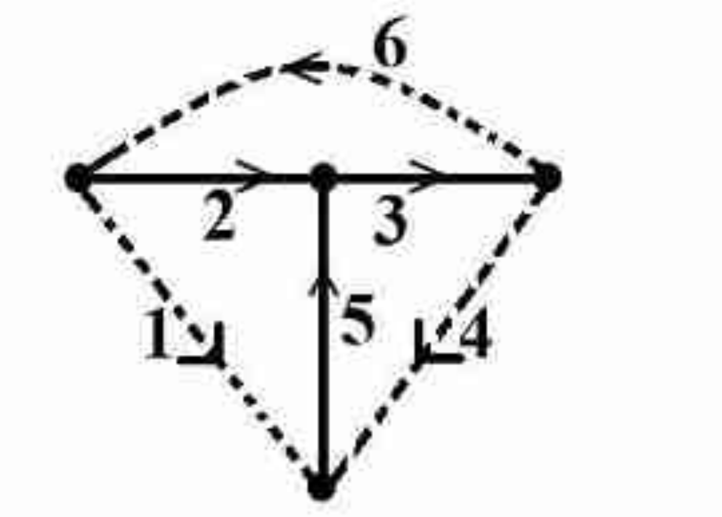
9.	Voltage source V is applied to series connected R and L networks. Equation of the current in the inductor is -------.
Option A:	i(t) = V(1 - $e^{-\frac{Lt}{R}}$) / R
Option B:	0
Option C:	i(t) = V (1 - $e^{-\frac{Rt}{L}}$) / R
Option D:	i(t) = ($e^{-\frac{Rt}{L}}$)
10.	In the following figure, a switch 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. 

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: **Bachelor of Engineering**

Curriculum Scheme: **Electronics & Telecommunication (Rev2019 "C")**

Examination: **SE Semester III**

Course Code: **ECC305** and Course Name: **Electronic Instrumentation & Control Systems**

Time: 2 Hour Max. Marks: 80

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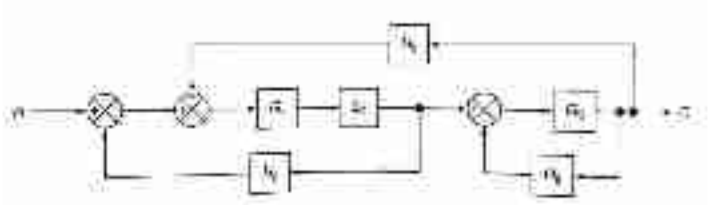
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	On which principle Wheatstone bridge works?
Option A:	full deflection
Option B:	partial deflection
Option C:	null deflection
Option D:	no diffraction
2.	The simplest type of bridge used for the measurement of medium inductance is a - - - -
Option A:	Maxwell
Option B:	Schering
Option C:	Hey
Option D:	Wheatstone
3.	The principle of Homogeneity and superposition is applied to - - - -
Option A:	Linear time-variant system
Option B:	Non-linear time-variant system
Option C:	Linear time-invariant system
Option D:	Non-linear time-invariant system
4.	In Force-Voltage analogy, damper is analogous to - - - -
Option A:	Inductance
Option B:	Charge
Option C:	Current
Option D:	Resistance
5.	A Schering bridge can be used for the - - - -
Option A:	protecting the circuit from temperature rises
Option B:	testing capacitors
Option C:	measuring voltages
Option D:	measuring currents
6.	The overall transfer function, from block diagram reduction, for parallel blocks is - - - -
Option A:	Sum of individual gain
Option B:	Difference of individual gain

Option C:	Product of individual gain
Option D:	Division of individual gain
7.	The steady state error due to a step input *Au(t)* is given by - - - -
Option A:	*A/(1+Kp)*
Option B:	*A/Kp*
Option C:	*1/AKp*
Option D:	*Kp/(1+A)*
8.	What is the Type and the Order of the system, $G(s) = \frac{100(s+5)(s+30)}{s^3(s+2)(s^2+3s+10)}$.
Option A:	4 and 9
Option B:	4 and 7
Option C:	3 and 5
Option D:	3 and 6
9.	Which among the following second order systems will take more time to reach it's steady state value?
Option A:	Undamped system
Option B:	Critically damped system
Option C:	Overdamped system
Option D:	Underdamped system
10.	The characteristic equation of a system is given below. Find the range of values for k. $s^3+3ks^2+(k+2)s+4=0$
Option A:	0<k<0.523
Option B:	0.527<k<infinity
Option C:	0.678<k<infinity
Option D:	0.21<k<0.527
11.	Function of transducer is to convert - - - -
Option A:	Electrical signal into non electrical quantity
Option B:	Electrical signal into mechanical quantity
Option C:	Non electrical quantity into electrical signal
Option D:	To do nothing
12.	The change in loading and unloading curves is known as - - - -
Option A:	Zero drift characteristics
Option B:	Sensitivity drift
Option C:	Hysteresis
Option D:	Zero drift plus sensitivity drift characteristics

13.	Phase margin of the system is used to specify - - - -
Option A:	relative stability
Option B:	absolute stability
Option C:	time response
Option D:	frequency response
14.	If damping ratio of a given system is 0.5, then the lines joining complex poles with origin are inclined to negative real axis at - - - -
Option A:	±90 deg
Option B:	±60 deg
Option C:	±45 deg
Option D:	±30 deg
15.	In Bode diagram, the factor *1/(jw)(jw)* in the transfer function gives a line having slope
Option A:	20 dB per decade
Option B:	40 dB per decade
Option C:	-20 dB per decade
Option D:	-40 dB per decade
16.	Where are the closed loop poles of the following system located? $G(s)H(s) = \frac{1}{s^2+49}$
Option A:	They are located on negative real axis
Option B:	They are located on *jw* axis
Option C:	They are located on right half of s-plane
Option D:	They are located, one on the right half and one on the left half
17.	The open loop transfer function of a unity feedback system is given by $G(s) = \frac{K(s+2)}{s(s^2+2s+2)}$. The centroid is ----
Option A:	0
Option B:	-1/2
Option C:	-2/3
Option D:	1/2
18.	Gain margin is the reciprocal of the gain at the frequency at which the phase angle is - - - -
Option A:	90 deg
Option B:	180 deg
Option C:	-180 deg
Option D:	0 deg
19.	A system has 8 poles and 3 zeros. The slope of its highest frequency asymptote in its magnitude plot is - - - -
Option A:	-40 dB/decade
Option B:	-60 dB/decade
Option C:	-100 dB/decade
Option D:	-150 dB/decade
20.	Settling time is inversely proportional to product of the damping ratio and - - - -

Option A:	Time constant
Option B:	Maximum overshoot
Option C:	Peak time
Option D:	Undamped natural frequency

Q2.	**Answer the following :**
A	**Solve any Two** **5 marks each**
i.	Explain functional blocks of a measurement system.
ii.	Compare temperature transducers RTD and Thermocouple.
iii.	Find resonance peak and resonance frequency for a unity feedback system having forward path transfer function as $G(s) = \frac{36}{s(s+8)}$.
B	**Solve any One** **10 marks each**
i.	Obtain transfer function of the block diagram shown in figure – 
ii.	Sketch the root locus for the following system with $K>0$ $G(s)H(s) = \frac{K}{s(s+1)(s+2)(s+4)}$.

Q3.	**Answer the following :**
A	**Solve any Two** **5 marks each**
i.	Explain the working principle of LVDT with a neat sketch.
ii.	What are compensators? Why are they needed in control systems?
iii.	Sketch polar plot of $G(s) = \frac{1}{s(s+a)(s+b)}$.
B	**Solve any One** **10 marks each**
i.	Draw Bode plot for a unity feedback control system with open loop transfer function, $G(s) = \frac{K}{s(1+s)(1+0.1s)}$.
ii.	Investigate the stability of the system that has the characteristic equation : $s^5+2s^4+24s^3+48s^2-25s-50=0$