University of Mumbai

Examination 2021 under cluster __ (Lead College: _____)

Examinations Commencing from 15th June 2021 to 24th June 2021

Program: BE (Electronics and Telecommunication Engineering)

Curriculum Scheme: Revised 2016(CBCGS)

Examination: SE Semester III

Course Code: ECC301 and Course Name: Applied Mathematics-III

Time: 2 hour Max. Marks: 80

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Q1.	**All the Questions are compulsory and carry equal marks 2 marks each**
1.	Laplace Transform of $\sin(\frac{\sqrt{3}}{2}t)$ is
Option A:	$\frac{\sqrt{3}}{4s^2+3}$
Option B:	$\frac{2\sqrt{5}}{4s^2+3}$
Option C:	$\frac{2\sqrt{3}}{4s^2+3}$
Option D:	$\frac{2\sqrt{3}}{s^2+3}$
2.	If $f(x)=2x, 0\le x\le 2\pi$ then a_4 is given by
Option A:	π
Option B:	-4π
Option C:	4
Option D:	4π
3.	What is the Fourier series expansion of the function f(x) in the interval $(0,2l)$?
Option A:	$\sum_{n=1}^{\infty} a_n \cos(\frac{n\pi x}{l}) + \sum_{n=1}^{\infty} b_n \sin(\frac{n\pi x}{l})$
Option B:	$a_0 + \sum_{n=1}^{\infty} a_n \cos(\frac{n\pi x}{l})$
Option C:	$a_0 + \sum_{n=1}^{\infty} a_n \cos(\frac{n\pi x}{l}) + \sum_{n=1}^{\infty} b_n \sin(\frac{n\pi x}{l})$
Option D:	$a_0 + \sum_{n=1}^{\infty} b_n \sin(\frac{n\pi x}{l})$
4.	Laplace Transform of $e^{3t}\sin t$ is
Option A:	$\frac{1}{(s^2+6s+10)}$
Option B:	$\frac{1}{(s^2-6s-10)}$

Option C:	$\frac{3}{(s^2-6s+10)}$
Option D:	$\frac{1}{(s^2-6s+10)}$
5.	$J_{\frac{1}{2}}(x) = ---$
Option A:	$\sqrt{\frac{2}{\pi x}}\sin x$
Option B:	$nJ_n(x) - xJ_{n+1}(x)$
Option C:	$nJ_n(x) + xJ_{n+1}(x)$
Option D:	$\sqrt{\frac{2}{\pi x}}\cos x$
6.	$J_{-n}(x) = ----$
Option A:	$(-1)^n J_{n+1}(x)$
Option B:	$(-1)^n J_n(x)$
Option C:	$(-1)^{n+1} J_n(x)$
Option D:	$(-1)J_n(x)$
7.	$L^{-1}[\frac{s-1}{s^2-2s+5}] = -------$
Option A:	$e^t \cos 2t$
Option B:	$e^{-t} \cos 2t$
Option C:	$-e^t \cos 2t$
Option D:	$e^t \cos 4t$
8.	$\nabla r^n = ----$
Option A:	$nr^n r^-$
Option B:	$r^{n-2} r^-$
Option C:	$nr^{n+2} r^-$
Option D:	$nr^{n-2} r^-$
9.	The Fourier Coefficient a_n for $f(x) = x^2, 0 \prec x \prec 2l$ is
Option A:	$-\frac{4l^2}{n^2\pi^2}$
Option B:	$\frac{4l^2}{n^2\pi^2}$
Option C:	$\frac{l^2}{n^2\pi^2}$
Option D:	$\frac{4l^2}{\pi^2}$

10.	$\frac{d}{dx}[x^n J_n(x)] = ----$
Option A:	$x^{n-1} J_{n-1}(x)$
Option B:	$x^n J(x)$
Option C:	$-x^n J_n(x)$
Option D:	$x^n J_{n-1}(x)$
11.	If $u = x^2 - y^2$ then analytic function f(z) is
Option A:	z^2+c
Option B:	$-z^2$+c
Option C:	z^3+c
Option D:	$2z^2$+c
12.	The only function among the following, that is analytic ,is
Option A:	$f(z) = Riz$
Option B:	$f(z) = Rmz$
Option C:	$f(z) = z^-$
Option D:	$f(z) = \sin z$
13.	If f(z) is analytic and equals u(x,y)+iv(x,y) then $f'(z)$ equals
Option A:	$\frac{\partial u}{\partial x} - i\frac{\partial u}{\partial y}$
Option B:	$\frac{\partial u}{\partial x} - i\frac{\partial v}{\partial x}$
Option C:	$\frac{\partial v}{\partial y} - i\frac{\partial v}{\partial x}$
Option D:	$-\frac{\partial u}{\partial x} - i\frac{\partial u}{\partial y}$
14.	Which of the following is an “even” function of x?
Option A:	sinx
Option B:	$\|x\|$
Option C:	x^3
Option D:	x+1
15.	In a Half Range cosine series of a function which of the following Fourier coefficient is/are zero.
Option A:	a_n
Option B:	a_0
Option C:	b_n
Option D:	a_0, a_n
16.	If a force $F^- = 2x^2 yi + 3xyj$ displaces a particle in the xy-plane from (0,0) to (1,4) along a curve $y=4x^2$ then the work done is

Option A:	$\frac{104}{5}$
Option B:	$\frac{104}{25}$
Option C:	$-\frac{104}{5}$
Option D:	$\frac{10}{5}$
17.	In order that the function $f(z)=\frac{\lvert z\rvert^2}{z}, z\neq 0$ be continuous at z=0, we should define f(0) equal to
Option A:	2
Option B:	-1
Option C:	0
Option D:	1
18.	A unit normal to the surface $x^2y+2xz=4$ at the point (2,-2,2) is given by
Option A:	$\frac{-i+j+k}{\sqrt{3}}$
Option B:	$\frac{i+j+k}{\sqrt{3}}$
Option C:	$\frac{-i-j+k}{\sqrt{3}}$
Option D:	$\frac{-i+j+k}{\sqrt{2}}$
19.	A set of functions $f_1(x), f_2(x), f_3(x)$------$f_n(x)$--- is said to be orthonormal if
Option A:	$\int_a^b f_m(x)f_n(x)dx = \begin{cases}1, if\ m \neq n\\ 0, if\ m=n\end{cases}$
Option B:	$\int_a^b f_m(x)f_n(x)dx = \begin{cases}0, if\ m \neq n\\ 2, if\ m=n\end{cases}$
Option C:	$\int_a^b f_m(x)f_n(x)dx = \begin{cases}0, if\ m \neq n\\ 1, if\ m=n\end{cases}$
Option D:	$\int_a^b f_m(x)f_n(x)dx = \begin{cases}2, if\ m \neq n\\ 1, if\ m=n\end{cases}$
20.	$L^{-1}[\frac{2s+3}{s^2+2s+2}] = -----$
Option A:	$e^{-t}(2\cos t+\sin t)$
Option B:	$e^{-t}(2\cos t-\sin t)$
Option C:	$e^{-t}(\cos t+\sin t)$
Option D:	$e^{-t}(\cos t+2\sin t)$
Q2.	**Solve any Four out of Six** **5 marks each**

A	*Obtain a Fourier expression for* $f(x)=x^3,-\pi \prec x \prec \pi$
B	*Use Green's theorem to evaluate* $\int_c (x^2+xy)dx+(x^2+y^2)dy$ *where c is the square formed by the lines* $y=\pm 1, x=\pm 1$.
C	*Find the Laplace Transform of the Periodic function* $f(t)=\frac{kt}{T}, 0 \prec t \prec T, f(t+T)=f(t)$
D	Let $f(z)=u(r,\theta)+iv(r,\theta)$ be an analytic function. If $u=-r^3 \sin 3\theta$ then construct the corresponding analytic function f(z) in terms of z.
E	Find the value of 'n'for which the vector $r^n \bar{r}$ is solenoidal, where $\bar{r}=xi+yj+zk$
F	Solve the initial value problem $2\frac{d^2y}{dt^2}+5\frac{dy}{dt}+2y=e^{-2t}, y(0)=1, y'(0)=1$
Q3.	**Solve any Four out of Six** **5 marks each**
A	*Using the convolution theorem ,find* $L^{-1}[\frac{s^2}{(s^2+a^2)(s^2+b^2)}], a \neq b$
B	*A fluid motion is given by* $\bar{v}=(y\sin z-\sin x)i+(x\sin z+2yz)j+(xy\cos z+y^2)k$ *is the motion irrotational? If so, find the velocity potential.*
C	*Evaluate* $L[\frac{e^{-4t}\sin 3t}{t}]$
D	*Find the image of* $\lvert z-3i\rvert=3$ *under the mapping* $w=\frac{1}{z}$
E	*Using Stoke's theorem, evaluate* $\int_c [(2x-y)dx-yz^2dy-y^2zdz]$ *where c is the circle* $x^2+y^2=1$, *corresponding to the surface of sphere of unit radius.*
F	*Given that* $f(x)=x+x^2,-\pi \prec x \prec \pi$, *find the Fourier expression of f(x)*

University of Mumbai

Examination June 2021

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

Program: **Electronics & Telecommunication**

Curriculum Scheme: Rev 2016

Examination: SE Semester III

Course Code: ECC302 and Course Name: Electronic Devices & Circuits-I

Time: 2 hour Max. Marks: 80

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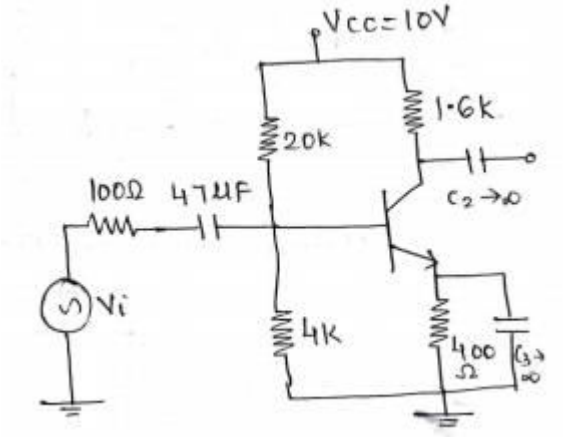
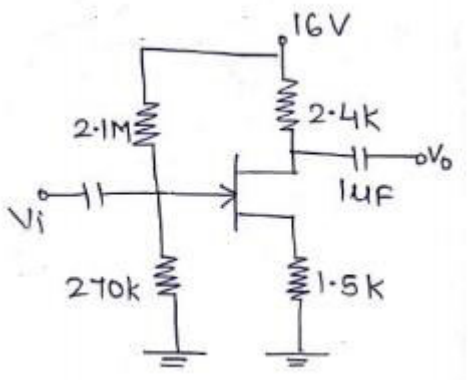
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks.**
1.	Gain bandwidth product is a transistor parameter that is constant and equal to__.
Option A:	Total frequency
Option B:	Unity gain frequency
Option C:	Sum of frequencies
Option D:	Critical frequency
2.	A capacitor having rating 50 µF, 6V and plus sign near to one of its terminals, the capacitor must be ___ .
Option A:	A mica capacitor
Option B:	A ceramic capacitor
Option C:	An electrolytic capacitor
Option D:	An Air Gang capacitor
3.	In a LC filter, the ripple factor ___ .
Option A:	Increases with the load current
Option B:	increases with the load resistance
Option C:	remains constant with the load current
Option D:	has the lowest value
4.	The input impedance of a FET is of the order of _____ .
Option A:	10 ^ 20 ohms
Option B:	Hundreds of Mega ohms
Option C:	Hundred ohms
Option D:	A few ohms
5.	In designing a CS JFET amplifier, which of the data is not provided by the datasheet?
Option A:	Transconductance (g_{m0})
Option B:	Pinch off voltage
Option C:	Voltage gain
Option D:	I_{DSS}
6.	A bipolar transistor is operating in the active region with a collector current of 1 mA. Assuming that the β of the transistor is 100 and the thermal voltage (V_T) is 25 mV. The transconductance and the input resistance (r_π) of the transistor in the common emitter configuration are

Option A:	$g_m = 25$ mA/V and $r_\pi = 15.625$ kΩ
Option B:	$g_m = 40$ mA/V and $r_\pi = 4$ kΩ
Option C:	$g_m = 25$ mA/V and $r_\pi = 2.5$ kΩ
Option D:	$g_m = 40$ mA/V and $r_\pi = 2.5$ kΩ
7.	For which of the following conditions the designing of the JFET amplifier cannot be done?
Option A:	Midpoint Biasing
Option B:	Variation in I_{DS}
Option C:	Zero temperature drift
Option D:	Variation in beta parameter
8.	For a CE amplifier with voltage divider biasing with bypassed R_E, $R_1 = 40$ kΩ, $R_2 = 10$ kΩ, $r_\pi = 1.15$ kΩ the input impedance of the amplifier using hybrid pi model is
Option A:	1.005 kΩ
Option B:	9.15 kΩ
Option C:	5.15 kΩ
Option D:	8.25 kΩ
9.	The % load regulation of a power supply should be ideally _____ & practically _____
Option A:	zero, small
Option B:	small, zero
Option C:	zero, large
Option D:	large, zero
10.	In a common-source JFET amplifier, the output voltage is ……
Option A:	180^o out of phase with the input
Option B:	in phase with the input
Option C:	90^o out of phase with the input
Option D:	taken at the source
11.	For a self-bias circuit, find drain to source voltage if V_{DD}=12V, I_D=1mA, R_s=R_D=1KΩ?
Option A:	1 V
Option B:	2 V
Option C:	10 V
Option D:	5 V
12.	Generally, the gain of a transistor amplifier falls at high frequency due to the
Option A:	Internal capacitance of the device
Option B:	Coupling capacitor at the input
Option C:	Skin effect
Option D:	Coupling capacitor at the output
13.	For design of self-bias CS JFET circuit, if the lower cut of frequency is 20 Hz, R_G is 1 MΩ then the value of input coupling capacitor is ___ .
Option A:	8 nF
Option B:	80 nF

Option C:	8 μF
Option D:	80 μF
14.	In a small signal equivalent model of an FET, what does $g_m V_{GS}$ stand for?
Option A:	A pure resistor
Option B:	Voltage controlled current source
Option C:	Current controlled current source
Option D:	Voltage controlled voltage source
15.	Which resistance in the hybrid π model of transistor represents the bulk resistance present between the external base terminal and the virtual base?
Option A:	Collector-to-emitter resistance (r_{ce})
Option B:	Base spreading resistance ($\acute{r}_{bb}$)
Option C:	Virtual base to emitter resistance ($\acute{r}_{be}$)
Option D:	Emitter resistance (R_E)
16.	In voltage divider bias, V_{CC} = 25 V; R_1 = 10 kΩ; R_2 = 5 kΩ; V_{BE} =0.7 V, R_C = 2kΩ, β =100 and R_E =1 kΩ. What is the emitter voltage?
Option A:	3.71 V
Option B:	5.35 V
Option C:	4.96V
Option D:	7.38 V
17.	If RC and RL represent the collector resistance and load resistance respectively in a single stage transistor amplifier, then a.c. load is ……..
Option A:	RL + RC
Option B:	RC ‖ RL
Option C:	RL – RC
Option D:	RC
18.	In a shunt capacitor filter, the mechanism that helps the removal of ripples is_____ .
Option A:	The current passing through the capacitor
Option B:	The voltage variations produced by shunting the capacitor
Option C:	The property of capacitor to store electrical energy
Option D:	Uniform charge flow through the rectifier
19.	Which effect plays a critical role in producing changes in the frequency response of the BJT.?
Option A:	Thevenin's effect
Option B:	Miller effect
Option C:	Tellegen's effect
Option D:	Norton's effect
20.	Zener diode is designed to specifically work in which region without getting damaged?
Option A:	Active region
Option B:	Breakdown region
Option C:	Forward bias
Option D:	Reverse bias

Q2	**Solve any Two Questions out of Three** **10 marks each**
A	Design the resistors for a single stage RC coupled CE amplifier to meet the following specifications Vo=2V, Av=90, S=8, f_L=20 Hz.
B	Draw a neat circuit diagram of CS FET amplifier and derive the expression for input impedance, output impedance and voltage gain.
C	For the circuit shown below, the transistor parameters are $V_{BE(on)}$ =0.7 V, β = 100, find the lower cut off frequency of the circuit. 

Q3	**Solve any Two Questions out of Three** **10 marks each**
A	For the circuit shown below, I_{DSS} = 8 mA, V_P = - 4 V, determine V_{GS}, V_{DS} and I_D 
B	A full wave rectifier with center tapped transformer and 2 diodes gives dc output voltage at 18 V to a resistive load and a current of 75±25 mA. If ripple factor is to be 0.06 design an inductor filter.
C	Define stability factor. Derive the equation for stability factor. State which biasing technique is more stable. Justify your answer.

University of Mumbai

Examination June 2021

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

Program: BE Electronics and Telecommunication

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: ECC303and 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 representation of octal number (531.2)8 in decimal is
Option A:	(346.25)10
Option B:	(532.864)10
Option C:	(345.25)10
Option D:	(531.668)10
2.	Representation of hexadecimal number (6FC)H in decimal:
Option A:	$6 * 16^2 + 13 * 16^1 + 14 * 16^0$
Option B:	$6 * 16^2 + 15 * 16^1 + 12 * 16^0$
Option C:	$6 * 16^2 + 12 * 16^1 + 13 * 16^0$
Option D:	$6 * 16^2 + 14 * 16^1 + 15 * 16^0$
3.	2's complement of 10101011 is _____
Option A:	01010101
Option B:	11010100
Option C:	00110101
Option D:	11100010
4.	On subtracting (01010)2 from (11100)2 using 1's complement, we get _____.
Option A:	01001
Option B:	10010
Option C:	10101
Option D:	10100
5.	How many truth table entries are necessary for a three-input circuit?
Option A:	4
Option B:	12
Option C:	8
Option D:	16
6.	Which input values will cause an AND logic gate to produce a HIGH output?
Option A:	At least one input is HIGH
Option B:	At least one input is LOW
Option C:	All inputs are HIGH
Option D:	All inputs are LOW

7.	Exclusive-OR (XOR) logic gates can be constructed from what other logic gates?
Option A:	AND gates, OR gates, and NOT gates
Option B:	OR gates only
Option C:	OR gates and NOT gates
Option D:	AND gates and NOT gates
8.	Transistor-transistor logic (TTL) is a class of digital circuits built from _____ .
Option A:	JFET only
Option B:	Bipolar junction transistors (BJT)
Option C:	Resistors
Option D:	Bipolar junction transistors (BJT) and resistors
9.	TTL devices consume substantially _____ power than equivalent CMOS devices at rest.
Option A:	Less
Option B:	More
Option C:	Equal
Option D:	Very High
10.	CMOS technology is used in _____
Option A:	Inverter
Option B:	Microprocessor
Option C:	Digital logic
Option D:	Both microprocessor and digital logic
11.	One application of an S-R flip-flop is as _____
Option A:	Transition pulse generator
Option B:	Racer
Option C:	Switch debouncer
Option D:	Astable oscillator
12.	The truth table for an S-R flip-flop has how many VALID entries?
Option A:	1
Option B:	2
Option C:	3
Option D:	4
13.	What is a trigger pulse?
Option A:	A pulse that starts a cycle of operation
Option B:	A pulse that reverses the cycle of operation
Option C:	A pulse that prevents a cycle of operation
Option D:	A pulse that enhances a cycle of operation
14.	A counter circuit is usually constructed of _____
Option A:	A number of latches connected in cascade form
Option B:	A number of NAND gates connected in cascade form
Option C:	A number of flip-flops connected in cascade
Option D:	A number of NOR gates connected in cascade form
15.	Which one of the following has capability to store data in extremely high densities?

Option A:	Register
Option B:	Capacitor
Option C:	Semiconductor
Option D:	Flip-Flop
16.	A shift register that will accept a parallel input or a bidirectional serial load and internal shift features is called as?
Option A:	Tristate
Option B:	End around
Option C:	Universal
Option D:	Conversion
17.	A 5-bit asynchronous binary counter is made up of five flip-flops, each with a 12 ns propagation delay. The total propagation delay (tp(tot)) is _____
Option A:	12 ms
Option B:	24 ns
Option C:	48 ns
Option D:	60 ns
18.	Which is not a type of shift register?
Option A:	Serial in/parallel in
Option B:	Serial in/parallel out
Option C:	Parallel in/serial out
Option D:	Parallel in/parallel out
19.	Which of the following is not a type of VHDL modeling?
Option A:	Behavioral modeling
Option B:	Dataflow modeling
Option C:	Structural modeling
Option D:	Component modeling
20.	The difference between a PAL & a PLA is _____
Option A:	PALs and PLAs are the same thing
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 a programmable OR plane and a programmable AND plane, while the PLA only has a programmable AND plane
Option D:	The PAL has more possible product terms than the PLA

Q2 **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	Write a short note on Gray code.
B	Write a short note on VHDL.

C	Explain carry look ahead adder with necessary diagram.
D	Explain Master-Slave JK flip-flop.
E	Explain Flash memories.
F	Differentiate between Moore and Mealy circuits.

Q3. **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	Explain De-Morgan's theorems and prove it.
B	Compare TTL and CMOS logic families.
C	Convert J-K flip flop to T flip flop.
D	Differentiate between PAL and PLA.
E	Explain Johnson's counter.
F	Design 16:1 multiplexer using 4:1 multiplexer.

University of Mumbai

Examination June 2021

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

Program: **Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev-2016

Examination: SE Semester III

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

Time: 2 Hour Max. Marks: 80

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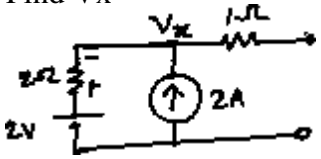
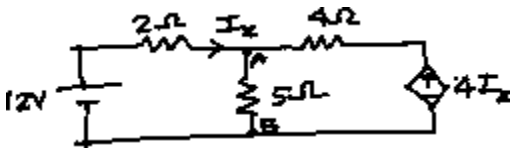
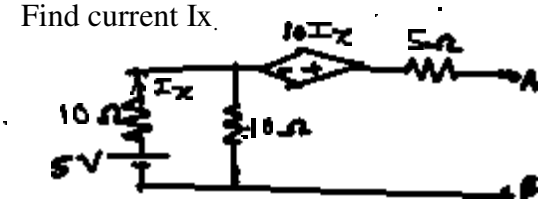
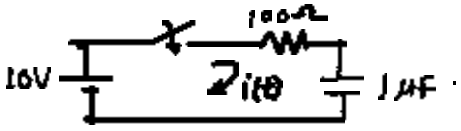
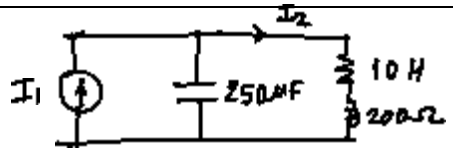
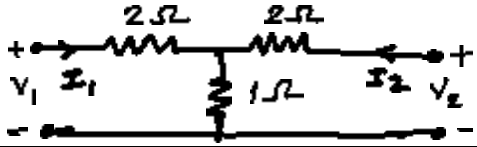
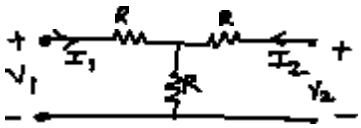
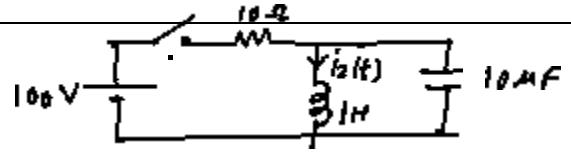
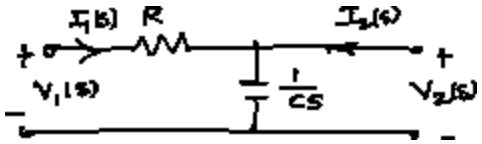
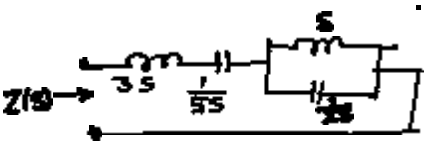
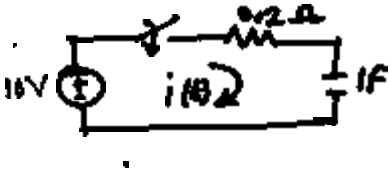
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Laplace equivalent of Inductor(L) with zero initial condition is given by ----.
Option A:	1/L
Option B:	LS
Option C:	1/LS
Option D:	L/S
2.	Find Vx 
Option A:	6 V
Option B:	2 V
Option C:	7 V
Option D:	9 V
3.	In nodal analysis, if there are 6 nodes in the circuit then how many equations will be written to solve the network?
Option A:	7
Option B:	6
Option C:	5
Option D:	4
4.	The Thevenin voltage at terminal A-B is 
Option A:	9.6 V
Option B:	2.5 V
Option C:	14.5 V

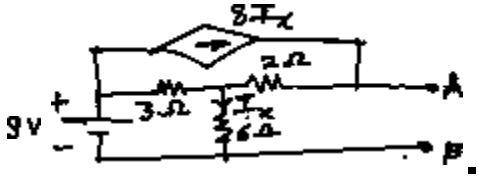
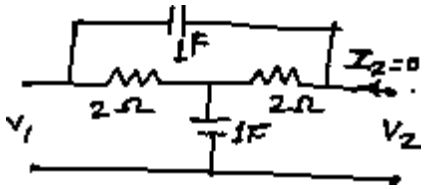
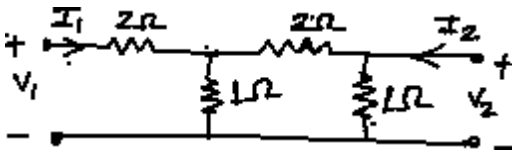
Option D:	15 V
5.	Find current Ix 
Option A:	2 A
Option B:	0.25 A
Option C:	0.50 A
Option D:	0.17 A
6.	How many tie sets will be generated for a graph with 4 nodes and 5 branches?
Option A:	2
Option B:	5
Option C:	7
Option D:	3
7.	If Y-parameters are Y_{11} = 0.5 Ʊ, Y_{22} = 1 Ʊ and $Y_{12} = Y_{21}$ = -O.2 Ʊ, what would be the value of ΔY.
Option A:	2
Option B:	3
Option C:	0.32
Option D:	0.46
8.	Reverse voltage gain with output port open circuited in Transmission-parameters is a unitless quantity and generally equivalent to
Option A:	V_1 /I_1 (keepingV_2 =0)
Option B:	I_2 / I_1 (keeping V_2 = 0)
Option C:	V_1 / V_2 (keeping I_2 = 0)
Option D:	I_2 / V_2 (keeping I_1 = 0)
9.	In the following RC series circuit, switch is closed at t=0,Find i(o+). 
Option A:	0.1 A
Option B:	0.2 A
Option C:	0.3 A
Option D:	2 A
10.	Find I_2 /I_1

	
Option A:	200/(S^2+20S+400)
Option B:	S/(S+2)
Option C:	400/(S^2+20S+400)
Option D:	(S+4)/S(S+1)
11.	Superposition theorem is not applicable to network containing
Option A:	Nonlinear element
Option B:	Linear element
Option C:	Dependent current source
Option D:	Dependent voltage source
12.	Find Z_{11} for the network 
Option A:	3
Option B:	2
Option C:	4
Option D:	5
13.	In which properties of realization of function is that Highest as well as lowest power of Numerator and denominator differ by unity.
Option A:	RC
Option B:	LC
Option C:	RL
Option D:	RLC
14.	A 2-port network is shown in the figure. The parameter h_{21} for this network can be given by 
Option A:	-0.5
Option B:	-0.25
Option C:	-2
Option D:	-4.5
15.	In the network, switch is closed and a steady state is reached in network, At t=0,switch is opened ,Find $i_2(0^-)$

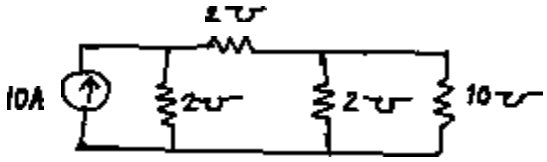
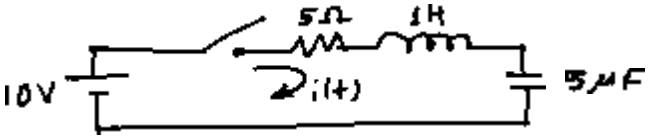
	
Option A:	10 A
Option B:	20 A
Option C:	30 A
Option D:	40 A
16.	Find voltage transfer function $V_2(S)/V_1(S)$ of two port network. 
Option A:	1/(RCS+1)
Option B:	R+CS
Option C:	RCS+1
Option D:	R/CS
17.	The driving point impedance function Z(S) of the network is 
Option A:	$(20S^4+22S^2+1)/5S(3S^2+1)$
Option B:	$(30S^4+S^2+1)/5S(2S^2+1)$
Option C:	1.5(S+2)/S+1.5
Option D:	$(30S^4+22S^2+1)/5S(2S^2+1)$
18.	Assume zero voltage across capacitor at t=0, $i(0^+)$ is 
Option A:	20 A
Option B:	50A
Option C:	30 A
Option D:	40 A
19.	Which of following is not Hurwitz polynomial?
Option A:	S^4+4S^3+5S+1
Option B:	$S^5+ S^4+4S^3+5S+8$

Option C:	$(S+1)(S^2+2S+3)$
Option D:	$S^5+ S^4+4S^3-5S+1$
20.	Which of following positive real function F(S), residue test is carried out?
Option A:	$(S+3)/(S+1)$
Option B:	$(S^2+1)/(S^3+4S)$
Option C:	$(S^3+6S^2+7S+3)/(S^2+2S+1)$
Option D:	$(S^2+6S+5)/(S^2+9S+14)$

subjective/descriptive questions

Q2	**Solve any Two Questions out of Three** **10 marks each**
A	Find Nortons equivalent network at terminal A and B 
B	For the network shown, determine $Z_{11}(S)$, $G_{12}(S)$ and $Z_{12}(S)$. 
C	Two Identical sections of network are connected in cascade, obtain ABCD Parameters of overall connections 

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	**Obtain equilibrium equation on node basis for the network**

	
B	**In the Network, switch is closed, assuming all initial conditions as zero,Find i,di/dt,d^2i/dt^2 .** 
C	**Realize Impedance function in Foster I and Foster II form.** **$Z(s)=S(S^2+4)/(S^2+1)(S^2+9)$**

University of Mumbai

Examination June 2021

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

Program: Electronics and Telecommunication Engineering

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: ECC 305 and Course Name: Electronic Instrumentation and Control

Time: 2 Hour | Max. Marks: 80

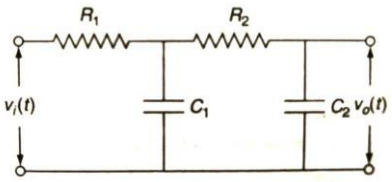
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Wheatstone bridge is used to measure the d.c. resistance of various types of wires for
Option A:	computing the power dissipation
Option B:	determining their effective resistance
Option C:	maintaining a source of constant e.m.f.
Option D:	quality control of wire
2.	Smallest change that a sensor can detect is
Option A:	Resolution
Option B:	Accuracy
Option C:	Precision
Option D:	Scale
3.	Commonly used D.C. Bridges are
Option A:	Maxwell inductance and capacitance
Option B:	Schering and Anderson
Option C:	Wheatstone and Kelvin
Option D:	DeSauty and Wagner
4.	Which one of the following represents an active transducer?
Option A:	Strain gauge
Option B:	Thermocouple

Option C:	LVDT
Option D:	Thermistor
5.	In wire wound strain gauges, the change in resistance is due to
Option A:	Change in diameter of the wire but not in length
Option B:	Change in length of the wire but not in diameter
Option C:	Change in both length and diameter
Option D:	Change in resistivity
6.	Strain gauge, LVDT and thermocouple are examples of
Option A:	Active transducers
Option B:	Passive transducers
Option C:	Analog transducers
Option D:	Digital transducers
7.	Transfer function of the system is defined as the ratio of Laplace transform of the output to that of the input with an assumption that initial conditions are all
Option A:	0
Option B:	1
Option C:	2
Option D:	infinity
8.	Oscillations in the transient response of a given system is due to
Option A:	Negative feedback
Option B:	Positive feedback
Option C:	No feedback
Option D:	Feed-forward connection
9.	In force-voltage analogy, velocity is analogous to
Option A:	capacitance
Option B:	inductance

Option C:	charge
Option D:	current
10.	For an open control system, which of the following statements is incorrect?
Option A:	Less expensive
Option B:	Construction is simple and maintenance easy
Option C:	Recalibration is not required for maintaining the required quality of the output
Option D:	Errors are caused by disturbances
11.	If an instrument is used in wrong manner, then it will results in
Option A:	Systematic error
Option B:	Random error
Option C:	Instrument error
Option D:	Environmental error
12.	For the system to be stable, all the terms in the first column of Routh's array must have
Option A:	positive sign
Option B:	negative sign
Option C:	same sign
Option D:	any random sign
13.	For the standard second order system, with a value of zeta = 0, the nature of closed loop poles in s-plane is
Option A:	purely imaginary
Option B:	complex conjugates with negative real parts
Option C:	real, unequal and negative
Option D:	real, equal and negative
14.	In the unit step response, the peak overshoot is 25 % and it occurs at t = 10 sec. The value of natural frequency of oscillations is
Option A:	0.5 rad/sec

Option B:	1 rad/sec
Option C:	0.3434 rad/sec
Option D:	3.4 rad/sec
15.	Select the TYPE of the system that follows ramp input with minimum error
Option A:	TYPE 0
Option B:	TYPE 1
Option C:	TYPE 2
Option D:	TYPE 3
16.	For a second-order system with the closed-loop transfer function $T(s) = \frac{9}{s^2+4s+9}$, the settling time for 5% error band, is
Option A:	1.4 sec
Option B:	1.5 sec
Option C:	2.2 sec
Option D:	3.4 sec
17.	For the second order closed-loop system with unity feedback having forward path transfer function, $G(s) = \frac{4}{s(s+4)}$, what is the natural frequency in radians/second?
Option A:	16
Option B:	4
Option C:	2
Option D:	1
18.	What are the guidelines for the branches approaching infinity in root locus?
Option A:	Asymptotes
Option B:	Breakaway point
Option C:	Centroid
Option D:	Angles of departure
19.	Phase crossover frequency is one at which angle G(jw)H(jw) is

Option A:	0 deg
Option B:	-90 deg
Option C:	-180 deg
Option D:	90 deg
20.	A feedback control system has a gain margin of 40. At which point Nyquist plot crosses the negative real axis?
Option A:	-40
Option B:	-4
Option C:	-0.2
Option D:	-0.025

Q2	**Answer the following**
A	**Solve any Two** **5 marks each**
i.	Explain principle of working of Kelvin's double bridge. What are its limitations?
ii.	Explain various types of errors in measurement systems.
iii.	Derive the transfer function of the network shown 
B	**Solve any One** **10 marks each**
i.	Using Routh's stability criterion, determine stability of the following system $s^5+s^4+3s^3+3s^2+4s+8=0$
ii.	Sketch Nyquist plot for a system having $G(s)H(s) = \frac{150}{s(s+4)(s-1)}$. Also comment on stability of the system.

Q3	**Answer the following**
A	**Solve any Two** **5 marks each**

i.	Explain basic telemetry system.
ii.	What is Mason's gain formula and why is it used?
iii.	Draw polar plot of $G(s) = \frac{8}{s(s+1)}$
B	**Solve any One** **10 marks each**
i.	Sketch root locus plot of the unity feedback system has that has an open-loop transfer function, $G(s) = \frac{K}{s(s^2+4s+13)}$.
ii.	Draw the Bode plot for the system and determine gain cross-over frequency $G(s)H(s) = \frac{10}{s(1+0.5s)(1+0.01s)}$.

University of Mumbai

Examination 2021 under cluster __(Lead College: _____)

Examinations Commencing from 15th June 2021 to 24th June 2021

Program: **BE Electronics & 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 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 e^{-10t}
Option A:	$\frac{1}{s-10}$
Option B:	$\frac{1}{s+10t}$
Option C:	$\frac{10}{s+10t}$
Option D:	$\frac{1}{s+10}$
2.	If $L[f(t)] = \frac{4s}{s^2-9}$, find $L[f(2t)]$
Option A:	$\frac{s}{s^2-36}$
Option B:	$\frac{4s}{s^2-36}$
Option C:	$\frac{4s}{s^2-9}$
Option D:	$\frac{4s}{s^2-18}$
3.	Find $L\left[\frac{sint}{t}\right]$
Option A:	$cot^{-1}(s)$
Option B:	$tan^{-1}(s)$
Option C:	$cot^{-1}\left(\frac{s}{a}\right)$
Option D:	Does not exists
4.	Find $L\left[\int_0^t cos2u\ du\right]$
Option A:	$\frac{s}{s^2+4}$

Option B:	$\frac{s}{s^2+1}$
Option C:	$\frac{1}{s^2+4}$
Option D:	$\frac{1}{s^2+1}$
5.	$L^{-1}\left[\frac{4s-3}{s^2+9}\right]$ =?
Option A:	$4cos3t - sin3t$
Option B:	$4cos3t + sin3t$
Option C:	$4cos3t - 3\,sin3t$
Option D:	$4sin3t - cos3t$
6.	Find $L^{-1}\left[\frac{s+2}{s^2+4s+13}\right]$
Option A:	$e^{2t}cos3t$
Option B:	$e^{-2t}cos3t$
Option C:	$e^{2t}sin3t$
Option D:	$e^{-2t}sin3t$
7.	In Fourier series of $f(x) = x + x^3$ in $(-\pi, \pi)$. The coefficient of $cos2x$ is
Option A:	-1
Option B:	$\frac{-1}{2}$
Option C:	1
Option D:	0
8.	$f(x) = x^2 + sinx$ is
Option A:	Even as well as odd function
Option B:	neither even nor odd function
Option C:	odd function
Option D:	Even function
9.	In the half range sine Series of $f(x) = x - x^2$ in (0 , 1) coefficient b_2 is
Option A:	0
Option B:	$\frac{1}{\pi^2}$
Option C:	$\frac{8}{\pi^3}$
Option D:	$\frac{4}{\pi^3}$
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.	Find the corresponding analytic function for harmonic function v = $3x^2y+6xy-y^3$ is
Option A:	z^3-z^2+c
Option B:	z^2+3z^3+c
Option C:	z^3+3z^2+c
Option D:	z^3-3z^2+c
12.	Which of the following statement is true
Option A:	A bilinear transformation is a combination of basic transformations translation, rotation and inversion
Option B:	A bilinear transformation is known as Mobius Transformation
Option C:	Every Bilinear transformation is conformal
Option D:	All options are TRUE
13.	If u and v are the harmonic functions then which of the following function is not harmonic function
Option A:	uv
Option B:	$u+v$
Option C:	$\frac{u}{v}$
Option D:	$u-v$
14.	Find the eigen values of matrix A , Where $A=\begin{bmatrix}7 & 4 & -1\\ 4 & 7 & -1\\ -4 & -4 & 4\end{bmatrix}$
Option A:	$\lambda=3,\ 3,\ 12$
Option B:	$\lambda=12,-3,-3$
Option C:	$\lambda=7,\ 7,4$
Option D:	$\lambda=-12,\ 3,3$
15.	If $A=\begin{bmatrix}1 & 2\\ 2 & -1\end{bmatrix}$ find A^4.
Option A:	$5I$
Option B:	$25I$
Option C:	$125I$
Option D:	$625I$

16.	If A = $\begin{bmatrix} 2 & 0 & 0 \\ 3 & -1 & 0 \\ -4 & 5 & 0 \end{bmatrix}$ Find Eigen Values of $A^2 + 2A + I$
Option A:	9,0,0
Option B:	9,0,1
Option C:	3,0,0
Option D:	9,4,1
17.	If the matrix A has eigen value -1,-1,2 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 $\bar{a} = 3i - j + 2k$ 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.	If the vector $\vec{F} = (x + 2y + az)i + (bx - 3y - z)j + (4x + cy + 2z)k$ is irrotational; find the constants a, b, c.
Option A:	a=1, b=2, c=4
Option B:	a=-1, b=4, c=2
Option C:	a=4, b=2, c=1
Option D:	a=4, b=2, c=-1
20.	Evaluate $\int_C ydx + x\,dy$ along $y = x$ from A(0,0) to B(1,1)
Option A:	1
Option B:	2xy
Option C:	-1
Option D:	0

Q2. **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	*Find* $L\left[\int_0^t e^{2u}\cos^2 u\,du\right]$
B	$L^{-1}\left[\tan^{-1}\left(\frac{2}{s^2}\right)\right]$
C	*Obtain the Fourier series for* $f(x) = x$ *in* $(0,2\pi)$
D	*Find the analytic function* $f(z)$*whose real part is* $\frac{1}{2}\log(x^2 + y^2)$
E	*Show that* $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{bmatrix}$ *satisfies Cayley-Hamilton theorem. Hence*

	find A^{-1}
F	Evaluate by using Green's theorem $\int_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$, where C is the closed region bounded by $y = \sqrt{x}$ and $y = x^2$

Q3. **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	*Evaluate* $\int_0^\infty e^{-t}\left(\frac{cos3t-cost}{t}\right)dt$
B	*Find the inverse Laplace transform by using convolution theorem* $\frac{s+3}{(s^2+6s+13)^2}$
C	*Obtain the half range Fourier cosine series expansion for* $f(x) = x(2-x)$ *in* $(0,2)$
D	*Obtain the orthogonal trajectories for the family of curves* $e^{-x}\,cosy = C$.
E	*Find the eigen values and eigen vector for* $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$
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 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: **ECC302** and Course Name: **Electronic Devices & Circuits**

Time: 2 hour Max. Marks: 80

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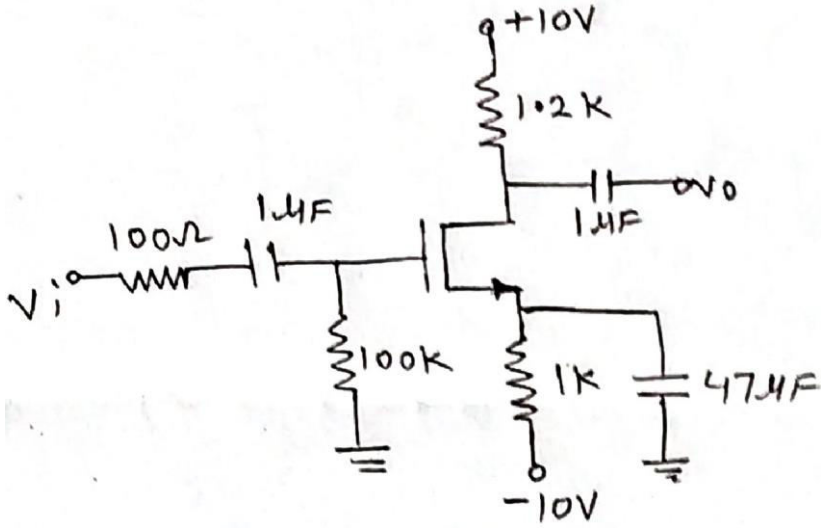
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	In AC load line, slope is generally
Option A:	Greater than slope of DC load line
Option B:	Less than slope of DC load line
Option C:	Same as that of DC load line
Option D:	Greater than as well as less than slope of DC load line
2.	In AC load line ,the slope is represented by an equation is
Option A:	Y = -1 / Rac
Option B:	Y = 1 / Rac
Option C:	Y = -1 / RL
Option D:	Y = 1 / RL
3.	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:	2.2 KΩ
Option B:	2.35 KΩ
Option C:	2.5 KΩ
Option D:	2.45 KΩ
4.	The SI units of transconductance is
Option A:	Volt/ Ampere
Option B:	Ohm
Option C:	Siemens
Option D:	Ampere/ Volt
5.	The enhancement MOSFET is
Option A:	Normally open MOSFET
Option B:	Useful as a very good constant voltage source
Option C:	Widely used because of easy in its fabrication
Option D:	Normally close MOSFET
6.	A CS amplifier has a voltage gain of
Option A:	$g_m (r_d \| \| R_D)$
Option B:	$g_m r_d$
Option C:	gm Rs

Option D:	gm rs / (1+gm rs)
7.	For which of the following frequency region(s) can the coupling and bypass capacitors no longer be replaced by the short-circuit approximation?
Option A:	Low-frequency
Option B:	Mid-frequency
Option C:	High-frequency
Option D:	All frequency
8.	What is the normalized gain expressed in dB for the cut-off frequencies?
Option A:	–3 dB
Option B:	+3 dB
Option C:	–6 dB
Option D:	–20 dB
9.	The larger capacitive elements of the design will determine the _____ frequency.
Option A:	Lower cut off
Option B:	Middle
Option C:	Higher cut off
Option D:	Intermediate
10.	What is the ratio of the capacitive reactance XCS to the input resistance Ri of the input RC circuit of a single-stage BJT amplifier at the low-frequency cut-off?
Option A:	0.25
Option B:	0.50
Option C:	0.75
Option D:	1.0
11.	Which of the lower cutoff -frequency determined by Cin, Cout, and CE will be the predominant factor in determining the low-frequency response for the complete system?
Option A:	Lowest
Option B:	Middle
Option C:	Highest
Option D:	Average
12.	Which of the following elements is (are) important in determining the gain of the system in the high-frequency region?
Option A:	Coupling capacitances
Option B:	Bypass capacitances
Option C:	Transconductance
Option D:	Inter-electrode, wiring and miller effect capacitances
13.	In a multistage amplifier, the overall frequency response is determined by the
Option A:	Frequency response of each stage depending on the relationships of the critical frequencies.
Option B:	Frequency response of the first amplifier.
Option C:	Frequency response of the last amplifier.
Option D:	Lower critical frequency of the first amplifier and the upper critical frequency of

	the final amplifier.
14.	In the mid frequency region, coupling capacitor acts as a _____ circuits and stray capacitance acts as a _____ circuits.
Option A:	Open, Short
Option B:	Short, Open
Option C:	Short, Short
Option D:	Open, Open
15.	Differential Amplifier amplifies
Option A:	Input signal with higher voltage
Option B:	Input voltage with smaller voltage
Option C:	Sum of the input voltage
Option D:	Difference between the input voltage
16.	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
17.	To increase the value of CMRR, which circuit is used to replace the emitter resistance R_E in differential amplifiers?
Option A:	Constant current bias
Option B:	Resistor in parallel with R_E
Option C:	Resistor in series with R_E
Option D:	Diode in parallel with R_E
18.	The input stage of an op amp is usually a
Option A:	Swamped amplifier
Option B:	Class B push-pull amplifier
Option C:	CE amplifier
Option D:	Differential amplifier
19.	Class _____power amplifier has highest collector efficiency
Option A:	A
Option B:	B
Option C:	C
Option D:	AB
20.	The maximum efficiency of transformer coupled class A power amplifier is _____
Option A:	78.5 %
Option B:	50%
Option C:	30%
Option D:	25%

Q2	**Solve any Two Questions out of Three**	**10 marks each**

A	Explain the concept of multistage amplifier with advantage, disadvantage and application.
B	For the circuit shown in Fig. 1, Transistor parameters are Kn = 1 mA/V^2, Vtn = 0.7 V, Cgs = 2 pF, Cgd = 0.2 pF, λ = 0, find the mid band voltage gain, miller capacitance and upper cut-off frequency.  Fig.1
C	Draw a small signal equivalent structure of Diff-amp and derive the equation for its CMRR.

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Derive the equation of Av, Zi and Zo of CE amplifier using un-bypass R_E.
B	Explain the effects of coupling, bypass capacitor and parasitic capacitor on frequency response of single stage amplifier.
C	Draw a neat diagram of a transformer coupled Class A power amplifier and explain its working, hence find its efficiency.

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

Time: 2 hour Max. Marks: 80

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	In AC load line, slope is generally
Option A:	Greater than slope of DC load line
Option B:	Less than slope of DC load line
Option C:	Same as that of DC load line
Option D:	Greater than as well as less than slope of DC load line
2.	In AC load line ,the slope is represented by an equation is
Option A:	Y = -1 / Rac
Option B:	Y = 1 / Rac
Option C:	Y = -1 / RL
Option D:	Y = 1 / RL
3.	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:	2.2 KΩ
Option B:	2.35 KΩ
Option C:	2.5 KΩ
Option D:	2.45 KΩ
4.	The SI units of transconductance is
Option A:	Volt/ Ampere
Option B:	Ohm
Option C:	Siemens
Option D:	Ampere/ Volt
5.	The enhancement MOSFET is
Option A:	Normally open MOSFET
Option B:	Useful as a very good constant voltage source
Option C:	Widely used because of easy in its fabrication
Option D:	Normally close MOSFET
6.	A CS amplifier has a voltage gain of
Option A:	$g_m (r_d \| \| R_D)$
Option B:	$g_m r_d$
Option C:	gm Rs

Option D:	gm rs / (1+gm rs)
7.	For which of the following frequency region(s) can the coupling and bypass capacitors no longer be replaced by the short-circuit approximation?
Option A:	Low-frequency
Option B:	Mid-frequency
Option C:	High-frequency
Option D:	All frequency
8.	What is the normalized gain expressed in dB for the cut-off frequencies?
Option A:	–3 dB
Option B:	+3 dB
Option C:	–6 dB
Option D:	–20 dB
9.	The larger capacitive elements of the design will determine the _____ frequency.
Option A:	Lower cut off
Option B:	Middle
Option C:	Higher cut off
Option D:	Intermediate
10.	What is the ratio of the capacitive reactance XCS to the input resistance Ri of the input RC circuit of a single-stage BJT amplifier at the low-frequency cut-off?
Option A:	0.25
Option B:	0.50
Option C:	0.75
Option D:	1.0
11.	Which of the lower cutoff -frequency determined by Cin, Cout, and CE will be the predominant factor in determining the low-frequency response for the complete system?
Option A:	Lowest
Option B:	Middle
Option C:	Highest
Option D:	Average
12.	Which of the following elements is (are) important in determining the gain of the system in the high-frequency region?
Option A:	Coupling capacitances
Option B:	Bypass capacitances
Option C:	Transconductance
Option D:	Inter-electrode, wiring and miller effect capacitances
13.	In a multistage amplifier, the overall frequency response is determined by the
Option A:	Frequency response of each stage depending on the relationships of the critical frequencies.
Option B:	Frequency response of the first amplifier.
Option C:	Frequency response of the last amplifier.
Option D:	Lower critical frequency of the first amplifier and the upper critical frequency of

	the final amplifier.
14.	In the mid frequency region, coupling capacitor acts as a _____ circuits and stray capacitance acts as a _____ circuits.
Option A:	Open, Short
Option B:	Short, Open
Option C:	Short, Short
Option D:	Open, Open
15.	Differential Amplifier amplifies
Option A:	Input signal with higher voltage
Option B:	Input voltage with smaller voltage
Option C:	Sum of the input voltage
Option D:	Difference between the input voltage
16.	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
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17.	To increase the value of CMRR, which circuit is used to replace the emitter resistance R_E in differential amplifiers?
Option A:	Constant current bias
Option B:	Resistor in parallel with R_E
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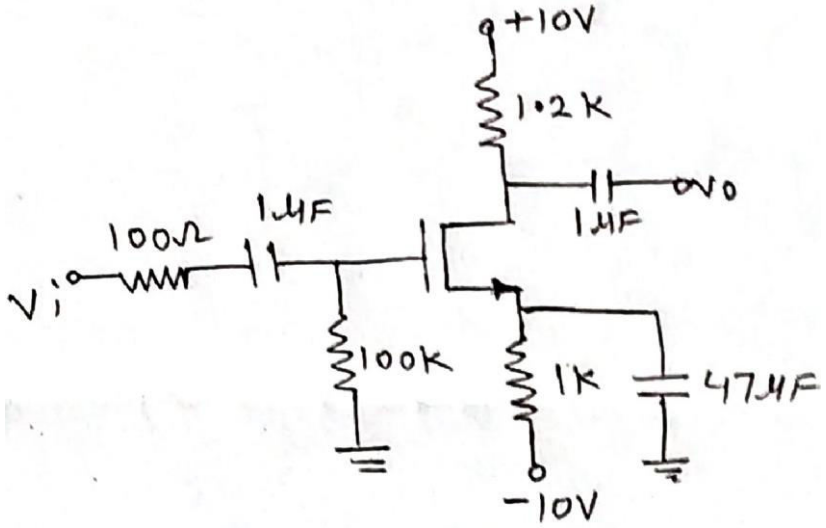
18.	The input stage of an op amp is usually a
Option A:	Swamped amplifier
Option B:	Class B push-pull amplifier
Option C:	CE amplifier
Option D:	Differential amplifier
19.	Class _____power amplifier has highest collector efficiency
Option A:	A
Option B:	B
Option C:	C
Option D:	AB
20.	The maximum efficiency of transformer coupled class A power amplifier is _____
Option A:	78.5 %
Option B:	50%
Option C:	30%
Option D:	25%

Q2	**Solve any Two Questions out of Three**	**10 marks each**

A	Explain the concept of multistage amplifier with advantage, disadvantage and application.
B	For the circuit shown in Fig. 1, Transistor parameters are Kn = 1 mA/V^2, Vtn = 0.7 V, Cgs = 2 pF, Cgd = 0.2 pF, λ = 0, find the mid band voltage gain, miller capacitance and upper cut-off frequency.  Fig.1
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A	Derive the equation of Av, Zi and Zo of CE amplifier using un-bypass R_E.
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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: **ECC302** and Course Name: **Electronic Devices & Circuits**

Time: 2 hour Max. Marks: 80

==========

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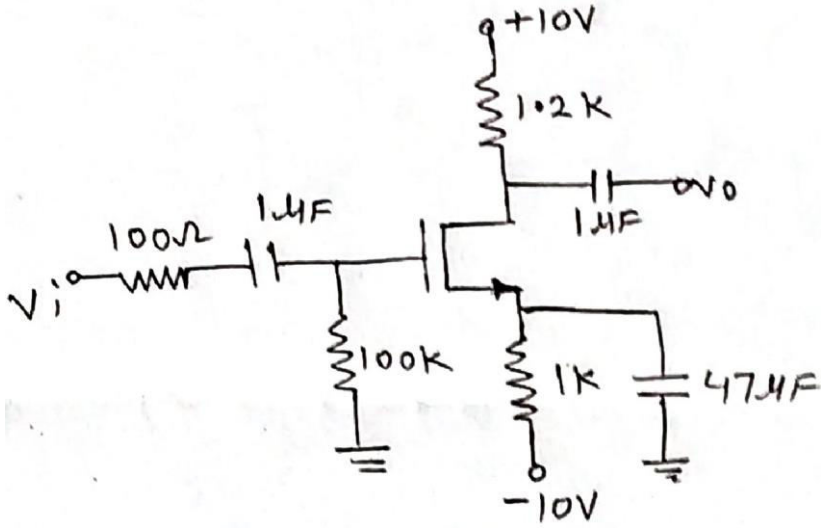
Q2	**Solve any Two Questions out of Three**	**10 marks each**

A	Explain the concept of multistage amplifier with advantage, disadvantage and application.
B	For the circuit shown in Fig. 1, Transistor parameters are Kn = 1 mA/V^2, Vtn = 0.7 V, Cgs = 2 pF, Cgd = 0.2 pF, λ = 0, find the mid band voltage gain, miller capacitance and upper cut-off frequency.  Fig.1
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Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Derive the equation of Av, Zi and Zo of CE amplifier using un-bypass R_E.
B	Explain the effects of coupling, bypass capacitor and parasitic capacitor on frequency response of single stage amplifier.
C	Draw a neat diagram of a transformer coupled Class A power amplifier and explain its working, hence find its efficiency.

University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 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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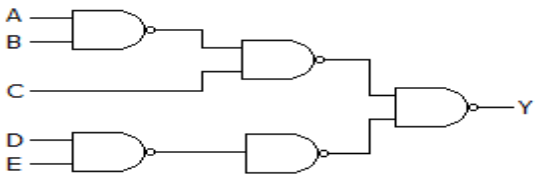
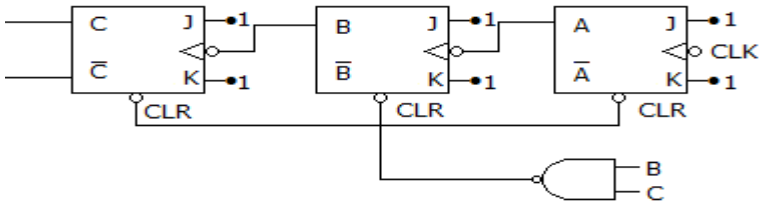
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	A full adder can be made out of ……
Option A:	two half adders
Option B:	two half adders and a OR gate
Option C:	two half adders and a NOT gate
Option D:	three half adders
2.	The circuit of the given figure realizes the function …… 
Option A:	$Y = (\overline{A} + \overline{B})\,C + \overline{DE}$
Option B:	$Y = \overline{A} + \overline{B} + \overline{C} + \overline{D} + \overline{E}$
Option C:	AB + C +DE
Option D:	AB + C(D + E)
3.	What is the hex equivalent of 916, a 4-bit binary number?
Option A:	11112
Option B:	10012
Option C:	01102
Option D:	11002
4.	Which of the following logic families dissipates minimum power ?
Option A:	CMOS
Option B:	ECL
Option C:	TTL
Option D:	DTL
5.	The counter in the given figure is ……

	
Option A:	Mod 3
Option B:	Mod 6
Option C:	Mod 8
Option D:	Mod 7
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, it is required 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.	If enable input is high then the multiplexer is _____
Option A:	Enable
Option B:	Disable
Option C:	Saturation
Option D:	High Impedance
11.	In D flip-flop, if clock input is LOW, the D input _____
Option A:	Has no effect
Option B:	Goes high
Option C:	Goes low
Option D:	Has effect
12.	Why is a demultiplexer called a data distributor?
Option A:	The input will be distributed to one of the outputs

Option B:	One of the inputs will be selected for the output
Option C:	The output will be distributed to one of the inputs
Option D:	Single input gives single output
13.	The difference between a PAL & a PLA is _____
Option A:	PALs and PLAs are the same thing
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 a programmable OR plane and a programmable AND plane, while the PLA only has a programmable AND plane
Option D:	The PAL has more possible product terms than the PLA
14.	PROMs are available in _____
Option A:	Bipolar and MOSFET technologies
Option B:	MOSFET and FET technologies
Option C:	FET and bipolar technologies
Option D:	MOS and bipolar technologies
15.	The use of VHDL can be done in _____ ways.
Option A:	2
Option B:	3
Option C:	4
Option D:	5
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 **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	Compare TTL and CMOS Logic Families.
B	Design full adder using 3:8 decoder.
C	Convert (532.125) base 8, into decimal, binary and hexadecimal.
D	VHDL Code for full subtractor.
E	Convert SR Flip Flop to JK Flip Flop.
F	Compare SRAM with DRAM .

Option 2

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

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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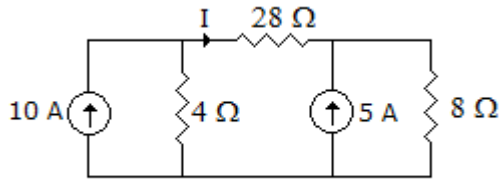
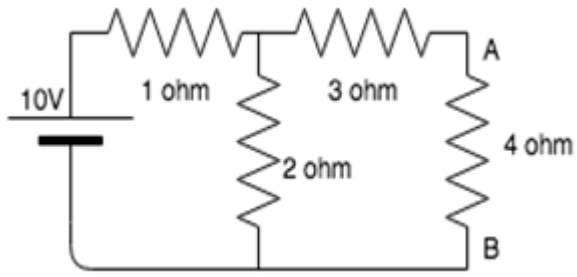
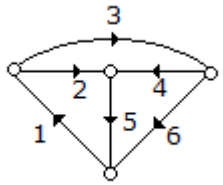
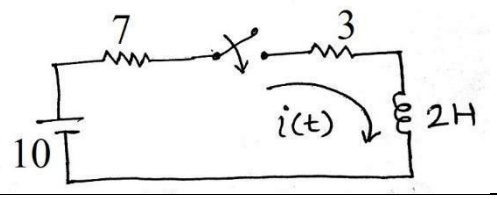
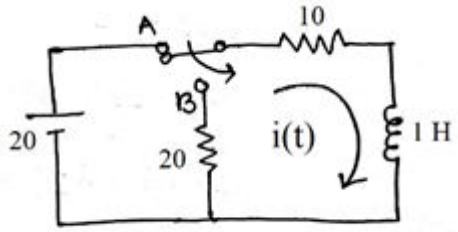
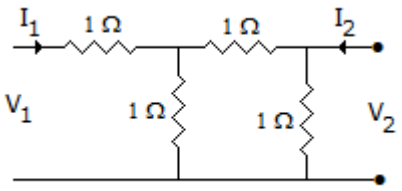
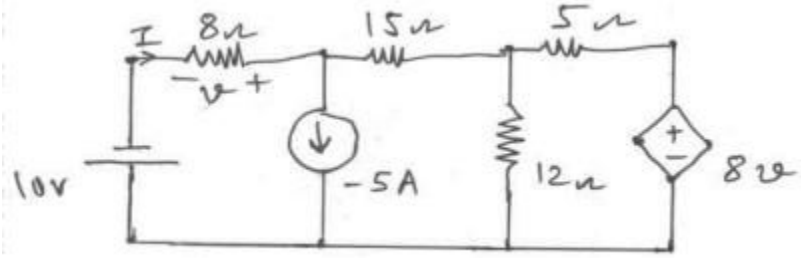
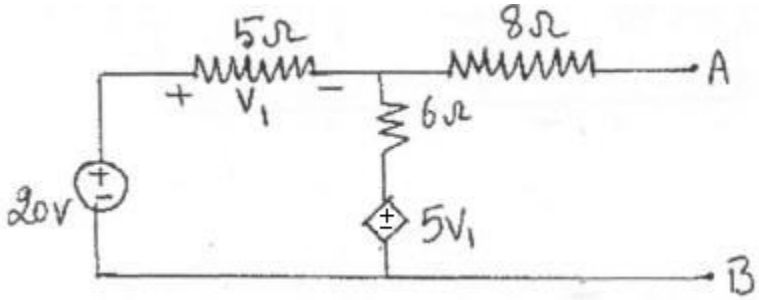
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks.**
1.	Norton's theorem states that a complex network connected to a load can be replaced with an equivalent impedance
Option A:	in series with a current source
Option B:	in parallel with a 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

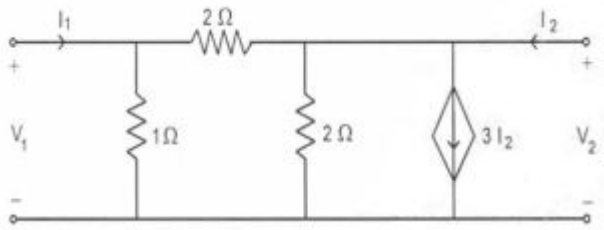
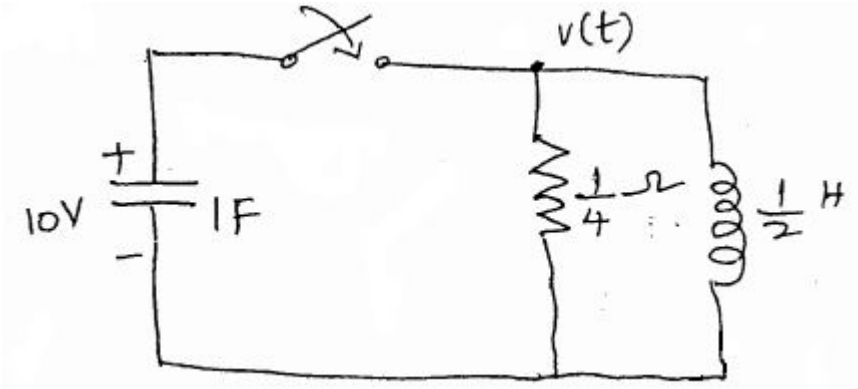
4.	Which one of the following is a cut set of the graph in the given figure? 
Option A:	1, 2, 3, and 4
Option B:	2, 3, 4, and 6
Option C:	1, 4, 5, and 6
Option D:	1, 3, 4, and 5
5.	If 10 V independent voltage source is connected in series with 100 ohm and R_L load. Maximum power that can be transferred 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:	$\| A A^T \|$
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

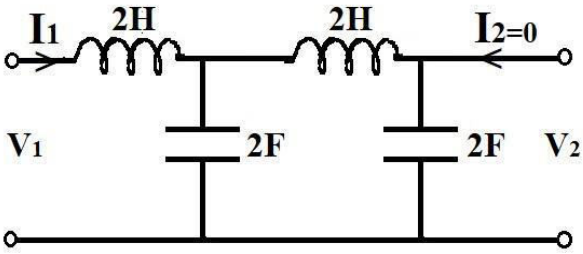
10.	In figure, switch is at position A for long time, what is current at t = 0^- ? 
Option A:	20 A
Option B:	3 A
Option C:	1.81 A
Option D:	2 A
11.	Determine location of poles of following transfer function $F(S) = \frac{S^2+1}{S^2+4}$
Option A:	0, 2j
Option B:	1j, -1j
Option C:	-3, -4
Option D:	2j, -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:	$B.Z_b.I_l = B.Z_bI_S$
Option B:	$Z_b.B.B^TI_l = B(Z_bI_S - V_S)$
Option C:	$B.Z_b.B^TI_l = B.Vs - B.Z_bI_S$
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 $\frac{V1}{I1}, \frac{V2}{I1}, \frac{V2}{V1}$


I1
2H
2H
I2=0
V1
2F
2F
V2

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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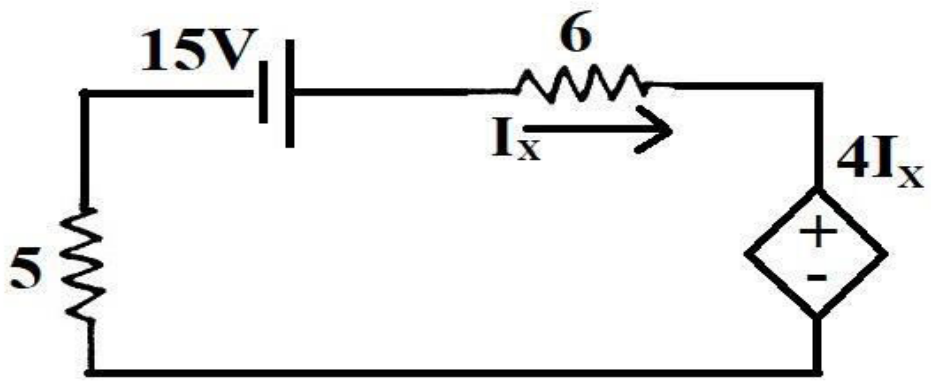
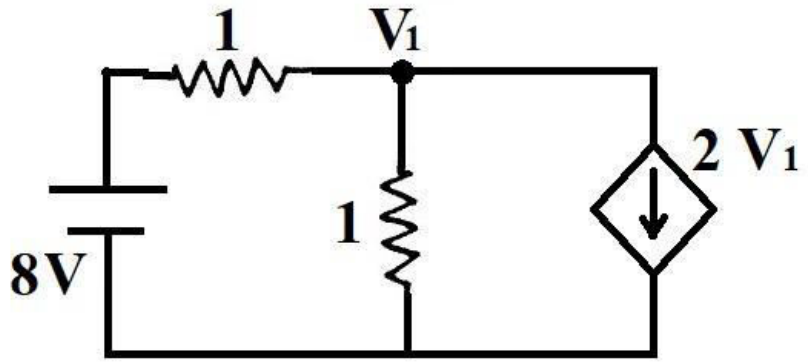
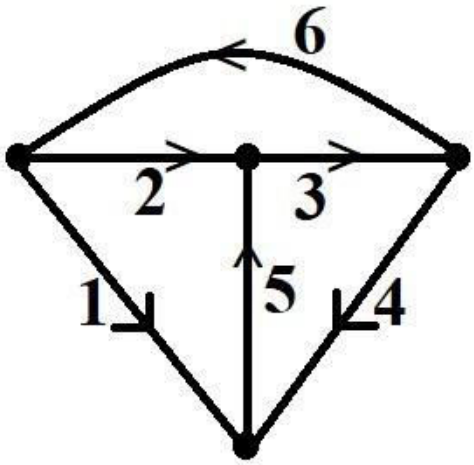
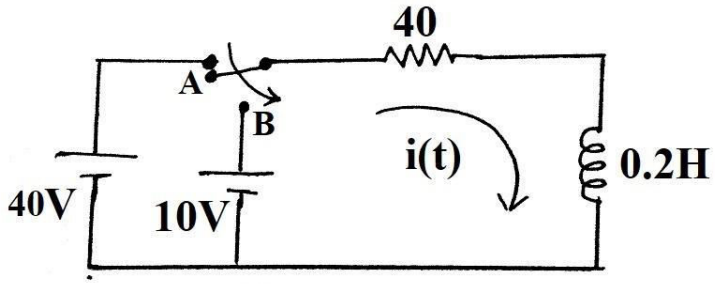
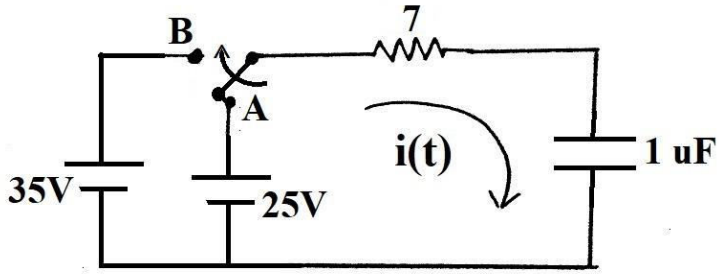
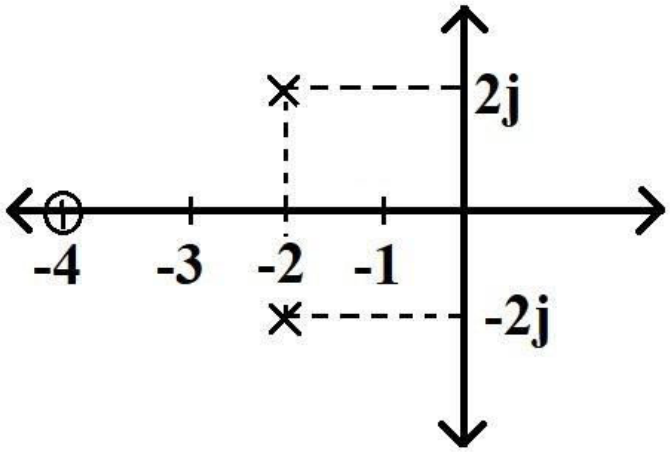
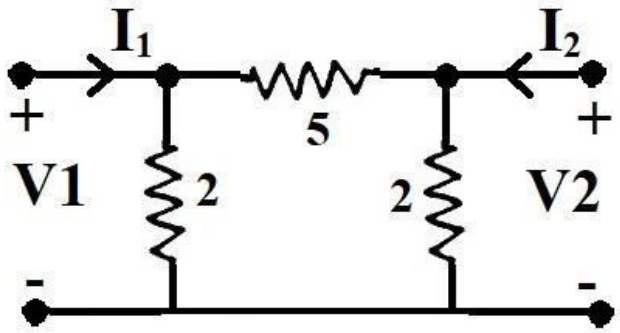
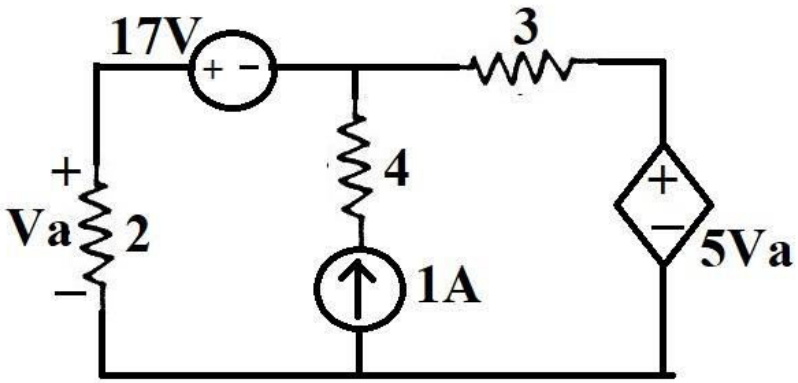
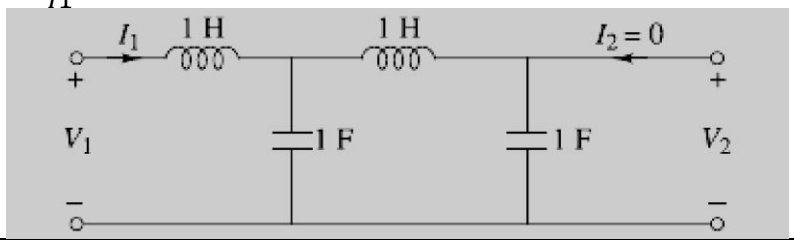
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks.**
1.	In which theorem equivalent circuit is shown with parallel combination of current source, equivalent resistor and Load?
Option A:	Norton's Theorem
Option B:	Superposition Theorem
Option 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.

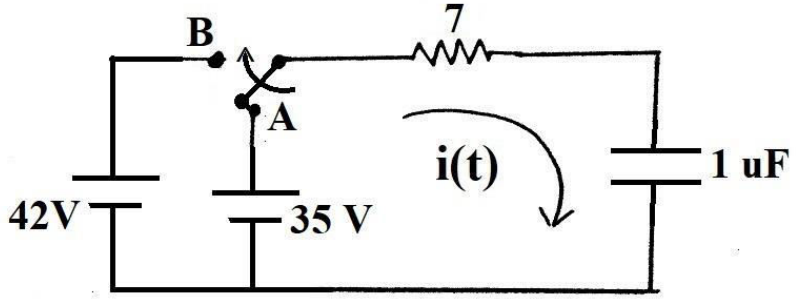
	
Option A:	4 V
Option B:	1 V
Option C:	3.2 V
Option D:	2 V
5.	If the graph consists of 5 nodes and 8 branches then the number of twigs and number of links are ------ and ------ respectively.
Option A:	5, 8
Option B:	6, 3
Option C:	5, 3
Option D:	4, 4
6.	The graph shown in figure, number of rows in reduced 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:	$\lvert A A^T \rvert$

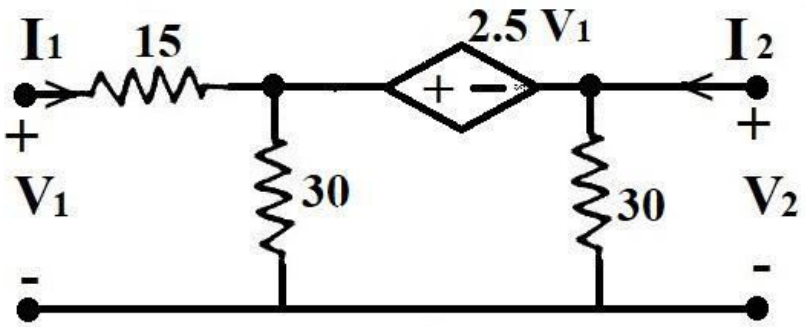
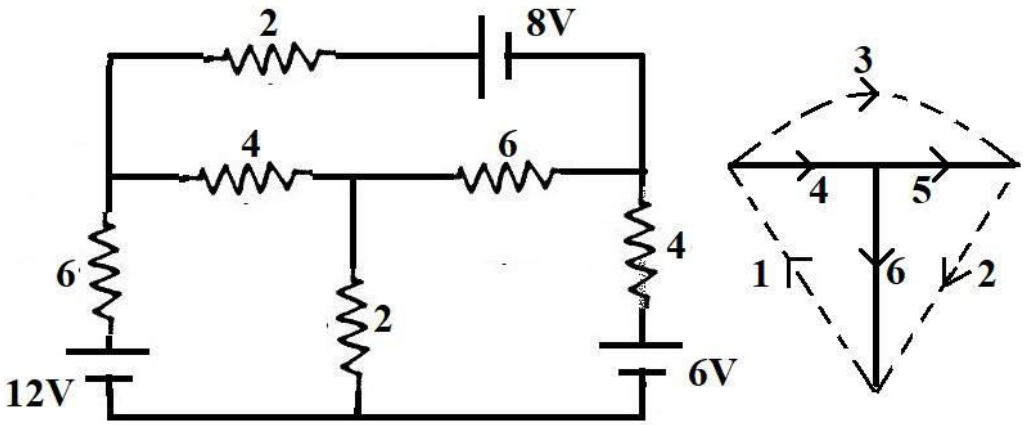
8.	The Laplace transform of the time function *f*(t-a) is --------.
Option A:	$e^{-as}F(S)$
Option B:	F(S-a)
Option C:	$e^{as}F(S)$
Option D:	F(S+a)
9.	In a given network, the switch is at position A for a long time and moved to position B at t=0. Current in the inductor at t=0+ is equal to --------. 
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. 

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: **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.	A bridge circuit uses which method of measurement?
Option A:	Absolute
Option B:	Differential
Option C:	Comparison
Option D:	Relative
2.	The process of measurement _____ .
Option A:	Always disturbs the system being measured
Option B:	Never disturbs the system being measured
Option C:	It may or may not disturb the system being measured
Option D:	Always give errors
3.	Resonance peak M_r is computed as
Option A:	$\frac{1}{\omega n\sqrt{1-2\xi\hat{}2}}$
Option B:	$\frac{1}{2\xi\sqrt{1-\xi\hat{}2}}$
Option C:	$\frac{3\omega n}{2\xi\sqrt{1-\xi\hat{}2}}$
Option D:	$\frac{3}{2\omega n\sqrt{1-\xi\hat{}2}}$
4.	What is the relation between the balance equation and the magnitude of input voltage in a bridge circuit?
Option A:	directly proportional
Option B:	inversely proportional
Option C:	independent
Option D:	depends on the null indicator
5.	The difference between the measured value and the true value is known as
Option A:	Relative error
Option B:	Random error

Option C:	Absolute error
Option D:	Systematic error
6.	When the number of poles equals the number of zeros, how many branches of root locus tends towards infinity?
Option A:	Zero
Option B:	One
Option C:	Two
Option D:	Number of zeros
7.	The starting point(s) of a root locus is
Option A:	Open – loop pole(s)
Option B:	Open – loop zero(s)
Option C:	Closed – loop pole(s)
Option D:	Closed – loop zero(s)
8.	The simplest type of bridge used for the measurement of medium inductance is
Option A:	Hey
Option B:	Schering
Option C:	Maxwell
Option D:	Kelvin
9.	The break-away point of the root locus occurs at
Option A:	Real axis
Option B:	Imaginary axis
Option C:	Multiple roots of characteristic equation
Option D:	Either A or B
10.	Low resistance refers to
Option A:	resistances of the order of 1mΩ
Option B:	resistances of the order of 1Ω
Option C:	resistances of the order of 1kΩ
Option D:	resistances of the order of 1MΩ
11.	What is the corner frequency of the given system having transfer function $(s) = \frac{40}{s(s+4)}$?
Option A:	0
Option B:	1
Option C:	2
Option D:	4
12.	The zero factor (1+jwT) has a slope of
Option A:	0 dB/decade
Option B:	20 dB/decade
Option C:	40 dB/decade
Option D:	-20 dB/decade
13.	AC bridge is an outcome of
Option A:	Kelvin bridge

Option B:	Megger
Option C:	De Sauty bridge
Option D:	Wheatstone's bridge
14.	A system has eight poles and two zeros. Its high frequency asymptote plot has a slope of how many dB/decades?
Option A:	100 dB/decade
Option B:	120 dB/decade
Option C:	-120 dB/decade
Option D:	-160 dB/decade
15.	Gain margin is the reciprocal of the gain at the frequency at which the phase angle is how many degrees ?
Option A:	90
Option B:	180
Option C:	-180
Option D:	0
16.	Function of a transducer is to convert
Option A:	Electrical signal into non electrical quantity
Option B:	Electrical signal into mechanical quantity
Option C:	Non electrical signal into electrical quantity
Option D:	Mechanical signal into mechanical quantity
17.	Time constant form of the given system $G(s) = \frac{20}{s(s+1)(s+2)}$ is
Option A:	$G(s) = \frac{20}{s(s+1)(\frac{s}{2}+1)}$
Option B:	$G(s) = \frac{10}{s(s+1)(\frac{s}{2}+1)}$
Option C:	$G(s) = \frac{40}{s(s+1)(\frac{s}{2}+1)}$
Option D:	$G(s) = \frac{20}{s(s+1)(s+1)}$
18.	What are the guidelines for the branches approaching infinity in root locus?
Option A:	Asymptotes
Option B:	Centroid
Option C:	Angle of departure
Option D:	Break-away points
19.	The open-loop transfer function of a unity feedback control system is $G(s) = \frac{10}{(s+5)\text{^}3}$. The gain margin of the system will be
Option A:	20 dB

Option B:	40 dB
Option C:	60 dB
Option D:	80 dB
20.	Gain crossover frequency is one at which magnitude of G(jw)H(jw) is
Option A:	Equal to 1
Option B:	Equal to -1
Option C:	Greater than 1
Option D:	Smaller than -1

Q2.	**Answer the following :**
A	**Solve any Two** **5 marks each**
i.	Define the following terms – resolution, sensitivity and linearity.
ii.	Investigate stability of the given characteristic equation s^3+2s^2+3s+10=0
iii.	Draw polar plot for a unity feedback system with open-loop transfer function $G(s) = \frac{1}{s(1+s)}$.
B	**Solve any One** **10 marks each**
i.	Explain the working of Schering bridge with a neat sketch.
ii.	Draw root locus diagram for a system with open-loop transfer function $G(s)H(s) = \frac{K}{s(s+4)(s+10)}$

Q3.	**Answer the following :**
A	**Solve any Two** **5 marks each**
i.	Explain with block diagram components of a generalized measurement system.
ii.	Explain the terms gain margin and phase margin. How to improve them?
iii.	Find frequency domain specifications for the given system $G(s) = \frac{84}{s^2 + 7s + 81}$
B	**Solve any One** **10 marks each**
i.	A unity feedback system has $G(s) = \frac{80}{s(s+2)(s+20)}$. Draw bode plot of this system and comment on its stability.
ii.	Explain how stability of a system can be analyzed using Nyquist stability criteria.

University of Mumbai

Examination June 2021

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

Program: S.E. (Electronics & Telecommunication) (REV. -2019 'C' Scheme) (Choice Based)
Curriculum Scheme: Rev2019 Examination: SE Semester: III
Course Code: ECC305 and Course Name: ELECTRONIC INSTRUMENTATION & CONTROL SYSTEMS

Time: 2 Hour Max. Marks: 80

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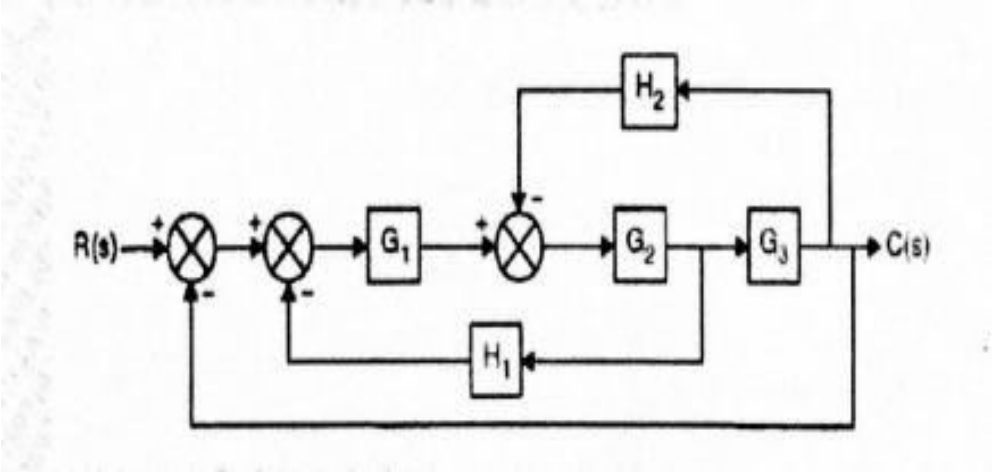
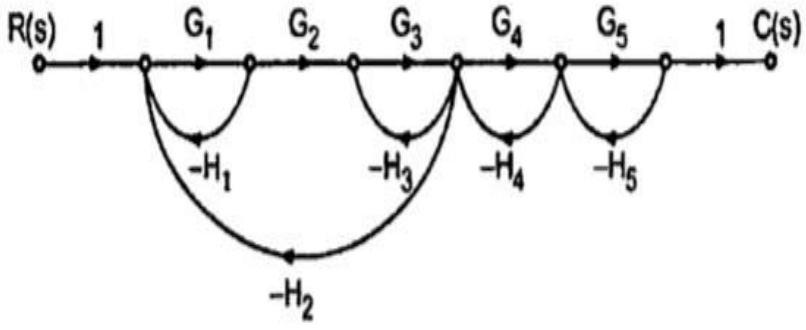
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The open loop transfer function is given below. Find the value of K which will cause sustained oscillations in the system and also find frequency of oscillation. $$G(s) = \frac{K}{s(s+3)(s^2+s+1)}$$
Option A:	K=2.437 and frequency of oscillation=0.866 rad/sec
Option B:	K=0.866 and frequency of oscillation= 2.437rad/sec
Option C:	K=2.437 and frequency of oscillation=2.437 rad/sec
Option D:	K=1.437 and frequency of oscillation=2.437 rad/sec
2.	When the number of poles is equal to the number of zeroes, how many branches of root locus tends towards infinity?
Option A:	1
Option B:	2
Option C:	0
Option D:	Equal to number of zeroes
3.	The system with the open loop transfer function $G(s) = \frac{K}{s(s+1)}$.is:
Option A:	Type 2 and order 1
Option B:	Type 1 and order 1
Option C:	Type 0 and order 0
Option D:	Type 1 and order 2
4.	A unity feedback system has $G(s) = \frac{K}{s(s+1)}$. The input to the system is described by r(t)= 4 + 6t + 2 $t^{2.}$ Find the steady-state error.
Option A:	zero
Option B:	infinity
Option C:	six
Option D:	Minus infinity
5.	Given a unity feedback system with $G(s) = \frac{K}{s(s+4)}$. What is the value of K for a damping ratio of 0.5?
Option A:	1
Option B:	16
Option C:	4
Option D:	2

6.	The Laplace transform of a parabolic signal is _____
Option A:	1
Option B:	A/s
Option C:	A/s^2
Option D:	A/s^3
7.	Which of the following transfer function will have the greatest maximum overshoot?
Option A:	$\frac{9}{s^2+2s+9}$
Option B:	$\frac{16}{s^2+2s+16}$
Option C:	$\frac{25}{s^2+2s+25}$
Option D:	$\frac{36}{s^2+2s+36}$
8.	Hey's bridge can be used for _____
Option A:	measurement of inductance
Option B:	measurement of capacitance and inductance
Option C:	measurement of resistance
Option D:	measurement of voltage and current
9.	The output of a transducer must _____
Option A:	be different at different environment conditions
Option B:	be same at all environment conditions
Option C:	be same at some environment conditions
Option D:	be zero always
10.	The principle of operation of LVDT is based on the variation of _____
Option A:	Mutual inductance
Option B:	Self-inductance
Option C:	Reluctance
Option D:	Permanence
11.	Thermistor is a transducer with _____ temperature coefficient
Option A:	Negative
Option B:	Positive
Option C:	Zero
Option D:	One
12.	_____ is the example of photo emissive cell
Option A:	LDR
Option B:	Photodiode
Option C:	Photomultiplier tube
Option D:	Photo transistor
13.	Examine the stability of the system having characteristic equation: $2s^4+s^3+3s^2+5s+10=0$ using Routh's criterion.

Option A:	Unstable with two poles RHS of s-plane
Option B:	Unstable with one poles RHS of s-plane
Option C:	Marginally stable with complex conjugate pole on imaginary axis
Option D:	stable with all poles on LHS of s-plane
14.	The characteristic equation of a system is given as $s^3+25s^2+10s+50=0$. How many roots are in the right half s-plane and the imaginary axis respectively?
Option A:	1,1
Option B:	0,0
Option C:	2,1
Option D:	1,2
15.	The second order system is defined by $T(s) = \frac{25}{s^2+5s+25}$. Find the settling time
Option A:	1.3
Option B:	1.6
Option C:	1.4
Option D:	1.2
16.	Schering bridge is used for
Option A:	low voltages only
Option B:	low and high voltages
Option C:	high voltages only
Option D:	intermediate voltages only
17.	Step signal is the signal whose values is:
Option A:	It is varying for all the time values greater than zero
Option B:	Determinate at zero
Option C:	It is varying for all the time values less than zero
Option D:	Indeterminate at zero
18.	The output of a transducer should be _____
Option A:	exponential
Option B:	Unit step
Option C:	Non-linear
Option D:	linear
19.	The position and velocity errors of a type-2 system are
Option A:	constant, constant
Option B:	constant, infinity
Option C:	zero, constant
Option D:	zero, zero
20.	A control system in which the control action is dependent on the output is known as
Option A:	Closed loop system
Option B:	Semi closed loop system
Option C:	Open system
Option D:	Dummy system

Q2.	**Solve any Two Questions out of Three** **10 marks each**
A	Find C(s)/R(s) for the given system using block diagram reduction technique. 
B	A unity feedback system has G(s)=$\frac{100}{s(s+1)(s+2)}$ .Draw the bode plot and hence find the gain margin and phase margin.
C	Explain in detail the working principle of LVDT and explain its application.

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Find the transfer function using Mason's gain formula 
B	For the given unity feedback system, Sketch the Root Locus and comment on the system stability. $G(s)H(s) = \frac{k}{s(s+1)(s+5)}$
C	Explain measurement of inductance using Maxwell bridge. Also list the application of it.
