K. J. Somaiya Institute of Engineering and Information Technology
Sion, Mumbai - 400022
NAAC Accredited Institute with 'A' Grade
NBA Accredited 3 Programs (Computer Engineering, Electronics & Telecommunication Engineering and Electronics Engineering) Permanently Affiliated to University of Mumbai

EXAMINATION TIME TABLE (JUNE 2021)

PROGRAMME - S.E. (Electronics & Telecommunication) (REV. -2016) (Choice Based)

SEMESTER - IV

Days and Dates	Time	Paper Code	Paper
Tuesday, June 1, 2021	11:30 a.m. to 1:30 p.m.	ECC401	APPLIED MATHEMATICS - IV
Thursday, June 3, 2021	11:30 a.m. to 1:30 p.m.	ECC402	ELECTRONIC DEVICES & CIRCUITS II
Saturday, June 5, 2021	11:30 a.m. to 1:30 p.m.	ECC403	LINEAR INTEGRATED CIRCUITS
Tuesday, June 8, 2021	11:30 a.m. to 1:30 p.m.	ECC404	SIGNALS & SYSTEMS
Thursday, June 10, 2021	11:30 a.m. to 1:30 p.m.	ECC405	PRINCIPLES OF COMMUNICATION ENGINEERRING

Important Note: ● Change if any, in the time table shall be communicated on the college web site.

Mumbai -
12th May, 2021

Principal

University of Mumbai

Examination 2021 under cluster __ (Lead College: _____)

Examinations Commencing from 1st June 2021 to 10th June 2021

Program: **BE (Electronics and Telecommunication Engineering)**

Curriculum Scheme: Rev2016

Examination: SE Semester IV

Course Code: ECC401 and Course Name: Applied Mathematics IV

Time: 2 hours 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**
1.	If y(x) is the extremal of the functional I=$\int_{x1}^{x2} F(x,y,y')dx$ it satisfies--
Option A:	$\frac{\partial F}{\partial y'}-\frac{d}{dx}\left(\frac{\partial F}{\partial y}\right)=0$
Option B:	$\frac{\partial F}{\partial y}-\frac{d}{dx}\left(\frac{\partial F}{\partial y'}\right)=0$
Option C:	$\frac{\partial F}{\partial y}-\frac{d}{dx}\left(\frac{\partial F}{\partial y}\right)=0$
Option D:	$\frac{d}{dx}\left(\frac{\partial F}{\partial y}\right)-\frac{\partial F}{\partial y'}=0$
2.	If a particle in the absence of friction will slide from one point to another in the shortest time under the action of gravity, then the path is
Option A:	a right circular cone
Option B:	a cone
Option C:	a cylinder
Option D:	a Cycliod
3.	What is the Extremal of the function I[y(x)]=$\int_{x1}^{x2} \frac{y'^2}{x^3}dx$
Option A:	$y = Ax^3+B$
Option B:	$y = Ax^4+B$
Option C:	$y = Ax^2+B$
Option D:	$y = Ax^3+Bx^4+C$
4.	Which of the following is true ?
Option A:	Q is a vector space over Z
Option B:	Q is a vector space over Q
Option C:	Q is a vector space over R
Option D:	Q is a vector space over C
5.	Which of the following set of vector in R^3 is Linearly Independent ? 1. {(1,0,0),(0,1,0),(1,1,0)} 2. {(1,0,0),(0,1,0),(0,0,1)}

	3. {(0,1,0),(1,0,1),(1,1,0)} 4. {(0,0,1),(0,1,0),(0,1,1)} Select the correct answer using the codes given below:
Option A:	1 and 2
Option B:	2 and 3
Option C:	3 and 4
Option D:	1 and 4
6.	R^n is …… Space over
Option A:	Not a vector
Option B:	Not subspace
Option C:	Not metric
Option D:	A vector
7.	The Characteristic Equation of $A=\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$
Option A:	$\lambda^2+5\lambda+7$
Option B:	$\lambda^2-2\lambda+7$
Option C:	$\lambda^2-3\lambda+7$
Option D:	$\lambda^2+\lambda+7$
8.	The Sum of the Eigen Value of $A=\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$
Option A:	5
Option B:	7
Option C:	9
Option D:	18
9.	Eigen Value of the Matrix $S=\begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$ are 5 and 1 . What are the eigen value of S^3 ?
Option A:	1,5
Option B:	1,25
Option C:	1,125
Option D:	-1,-125
10.	Probability can take the values from -
Option A:	$-\infty$ to $+\infty$
Option B:	$-\infty$ to 1
Option C:	0 to 1
Option D:	-1 to +1
11.	Two events are said to be independent if -
Option A:	Each out come has equal chance of occurrence.
Option B:	There is the common point in between them.
Option C:	One does not affect the occurrence of other.
Option D:	Both events have only one point.

12.	In Normal Distribution :
Option A:	Mean= Median = Mode
Option B:	Mean< Median < Mode
Option C:	Mean> Median > Mode
Option D:	Mean> Median <Mode
13.	The mean and variance of binomial distribution are 8 and 4 respectively. Then P[X=1] is equal to
Option A:	$1/2^{12}$
Option B:	$1/2^{4}$
Option C:	$1/2^{6}$
Option D:	$1/2^{8}$
14.	The mean of Poisson Variate is……. Variance.
Option A:	Greater than
Option B:	Less than
Option C:	Equal to
Option D:	Twice its variance.
15.	The correlation is the ……. Of two regression coefficients :
Option A:	Geometric Mean
Option B:	Arithmetic mean
Option C:	Harmonic Mean
Option D:	Median.
16.	If both variables X and Y increase or decrease simultaneously, then the coefficient of correlation will be :
Option A:	Positive
Option B:	Negative
Option C:	Zero
Option D:	One
17.	Which of the following would not allow you to calculate a correlation ?
Option A:	A negative relationship between X and Y
Option B:	A Positive relationship between X and Y
Option C:	A curvilinear relationship between X and Y.
Option D:	A Linear relationship between X and Y
18.	If C is closed contour $\|z\|=r$ and $n\neq -1$, then $\int z^n = ?$ over C.
Option A:	$2\pi i$
Option B:	0
Option C:	2i
Option D:	i
19.	If $f(z) = \frac{z^2+5z+6}{z-2}$, and the path of integration is a circle C of radius 1and center at origin then $\int_c f(z)dz = ?$
Option A:	0

Option B:	Not equal to 0
Option C:	2i
Option D:	2
20.	Find the value of the integral $\int_0^{1+i}(x-y+ix^2)dz$ along a straight line z=0 to z=1+i.
Option A:	(i-1)/3
Option B:	i-1
Option C:	$(i-1)^2$
Option D:	0

Subjective/Descriptive questions

Q2 . **(20 Marks Each)**	**Solve any Four** **5 marks each**
1	Find the Extremal of the curve I[y(x)] = $\int_0^1\{(y')^2+12xy\}dx$,y(0)=0 and y(1)=1.
2	Let R^4 have Euclidean inner product. Find the cosine of the angle between vectors u=(4,3,1,-2) and v=(-2,1,2,3)
3.	Evaluate $\int_c \frac{Sin\,\pi z^2+\cos\pi z^2}{(z-2)(z-3)}dz$, Where C is the Circle |z|=4.
4	Daily income of worker follows normal distribution with Rs. 1000. And Standard deviation Rs. 100. Find probability of income i) less than 1100 Rs. ii) More than 1100Rs. [given P(z=1)=0.3413)]
5	Verify that the matrix $A=\begin{bmatrix}1 & 2 & 0\\ 2 & -1 & 0\\ 0 & 0 & -1\end{bmatrix}$ satisfies the characteristic equation, Hence find A^{-2}
6	Obtain two distinct Laurent's series for $\frac{2z-3}{z^2-4z+3}$ in powers of (z – 4) indicating the regions of convergence.

Q3. **(20 Marks Each)**	**Solve any Four** **5 marks each**
i.	Find the Unit Vector orthogonal to the both (1,1,0) and (0,1,1)
ii.	Find the Probability that at most 4 defective bulbs will be found in a box of 200 bulbs if it is known that 2 percent of the bulbs are defective. ***(Given $e^{-4} = 0.0183$)***
iii.	Find the Extremal of the curve I[y(x)] = $\int_0^{\frac{\pi}{2}}\{((y')^2 - y^2 + 2xy)\}dx$,y(0)=0 and y($\frac{\pi}{2}$)=0.
iv.	Find $A^7 - 4A^6 - 20A^5 - 34A^4 - 4A^3 - 20A^2 - 33A + 2I$ where $A = \begin{bmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{bmatrix}$
v.	Evaluate $\int_0^{1+i} z^2 dz$ along (i) line $y = x$ (ii) parabola$x = y^2$.
vi.	From the following data calculate the coefficient of rank correlation coefficient between X and Y. ***X: 32,55,49,60,43,37,43,49,10,20*** ***Y:40,30,70,20,30,50,72,60,45,25***

University of Mumbai

Examination 2021 under cluster __ (Lead College: _____)

Examinations Commencing from 1st June 2021 to 10th June 2021

Program: **BE (Electronics and Telecommunication Engineering)**

Curriculum Scheme: Rev2016

Examination: SE Semester IV

Course Code: ECC401 and Course Name: Applied Mathematics IV

Time: 2 hours Max. Marks: 80

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

University of Mumbai

Examination 2020 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 1st June 2021

Program: **Electronics & Telecommunication**

Curriculum Scheme: Rev 2016

Examination: SE Semester IV

Course Code: ECC402 and Course Name: Electronic Devices & Circuits-II

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 parameters, the calculation of Q point in designing of CS-CS multistage amplifiers is dependent?
Option A:	I_{DQ}, V_{GSQ}
Option B:	V_{DSQ}, I_{DQ}
Option C:	V_{DSQ}, V_{GSQ}
Option D:	V_{GSQ}, I_{GQ}
2.	In designing of CS-CE multistage amplifier if the lower cut-off frequency is 30 Hz, X_{CE2} = 500 Ω, then the value of the emitter bypass capacitor will be
Option A:	10.6 µF
Option B:	1.06 µF
Option C:	10.6 mF
Option D:	10.6 F
3.	An amplifier has an open loop gain of 100, an input impedance of 1 kΩ. A feedback network with a feedback factor of 0.99 is connected to the amplifier in a voltage series feedback mode. The new input impedance with feedback is
Option A:	10 Ω
Option B:	100 Ω
Option C:	100 kΩ
Option D:	1 kΩ
4.	For a voltage shunt negative feedback amplifier
Option A:	Input impedance decreases but output impedance increases
Option B:	Both input impedance and output impedance increases
Option C:	Both input impedance and output impedance increases
Option D:	Cannot be predicted
5.	In an RC coupled amplifier, the voltage gain over mid-frequency range …….
Option A:	Changes abruptly with frequency
Option B:	Is constant
Option C:	Changes uniformly with frequency
Option D:	Cannot be predicted
6.	As per Barkhausean's condition, One condition for oscillation is …….
Option A:	A phase shift around the feedback loop of 180°

Option B:	A gain around the feedback loop of one-third
Option C:	A phase shift around the feedback loop of 0^o
Option D:	A gain around the feedback loop of less than 1
7.	When a negative voltage feedback is applied to an amplifier, its bandwidth…….
Option A:	Is increased
Option B:	Is decreased
Option C:	Remains the same
Option D:	Cannot be predicted
8.	A 2-transistor class B power amplifier is commonly called …….. amplifier
Option A:	Dual
Option B:	Push pull
Option C:	Symmetrical
Option D:	Differential
9.	In designing of cascade amplifier if the overall voltage gain is 200 and the relation between the voltage gains of individual stages is $A_{V1} = 0.7\ A_{V2}$ then calculate the gains of the first stage and second stage respectively are
Option A:	13.8, 14.5
Option B:	16.9,11.83
Option C:	14.5,13.8
Option D:	11.83,16.9
10.	Class …….. operation gives the maximum distortion
Option A:	A
Option B:	B
Option C:	C
Option D:	AB
11.	Which of these are incorrect about the Darlington amplifier?
Option A:	It has a high input resistance
Option B:	The output resistance is low
Option C:	It has a unity voltage gain
Option D:	It is a current buffer
12.	In designing two stage RC coupled cascaded amplifiers, if the requirement of input impedance is greater than 1 MΩ and voltage gain requirement is more than 600 then which amplifier should be selected as the first stage amplifier?
Option A:	Common source JFET amplifier
Option B:	Common emitter BJT amplifier
Option C:	Common Base BJT amplifier
Option D:	Common gate JFET amplifier
13.	An n-channel MOSFET has I_{DSS} = 2mA, and V_P = - 4V. Its transconductance gm = (in mA/V) for an applied gate to source voltage V_{GS} = -2 V is
Option A:	0.25
Option B:	0.5
Option C:	0.75
Option D:	1

14.	The three amplifiers are connected in a multistage arrangement each with a voltage gain of 30dB. Compute for the overall voltage gain.
Option A:	90
Option B:	27000
Option C:	10
Option D:	30
15.	In an LC oscillator, the frequency of the oscillator is ……. L or C.
Option A:	Proportional to square of
Option B:	Directly proportional to
Option C:	Independent of the values of
Option D:	Inversely proportional to square root of
16.	When no signal is applied, the approximate collector efficiency of class A power amplifier is …….
Option A:	10%
Option B:	0%
Option C:	25%
Option D:	50%
17.	The output characteristics of a MOSFET, is a plot of
Option A:	Id as a function of Vgs with Vds as a parameter
Option B:	Id as a function of Vds with Vgs as a parameter
Option C:	Ig as a function of Vgs with Vds as a parameter
Option D:	Ig as a function of Vds with Vgs as a parameter
18.	What is the frequency of oscillation for an RC phase shift oscillator with R of 5 kΩ and C of 0.01 µF in each of its RC sections?
Option A:	3.18 kHz
Option B:	1.3 kHz
Option C:	3.18 Hz
Option D:	1.3 Hz
19.	For the operation of enhancement only n channel MOSFET, value of gate voltage has to be
Option A:	high positive
Option B:	high negative
Option C:	low positive
Option D:	zero
20.	When current feedback is applied to an amplifier its input impedance _____
Option A:	Is decreased
Option B:	Is increased
Option C:	Remains the same
Option D:	Cannot be predicted

Q2	**Solve any Two Questions out of Three**	

A	With the help of circuit diagram and ac equivalent model, derive the expression for input impedance, output impedance, voltage gain for a two stage CE-CE cascaded amplifier with bypassed emitter resistance.	10
B	Draw Wein Bridge using BJT and derive the frequency of oscillation for the same.	10
C	State and explain different types of biasing techniques for Depletion type MOSFET.	10
Q3	**Solve any Two questions out of three**	
A	Design the resistors of a 2 stage RC coupled CS-CS amplifier for the following parameters $A_V \geq 100$, I_{DQ}= 1.2 mA f_L = 20 Hz, V_O = 4 V. Assume gmo = 5 m℧, I_{DSS}= 7 mA, r_d= 50 kΩ, V_P= -4 V. Assume suitable V_{DD}	10
B	With the help of a neat block diagram, derive the expression for R_{IF}, R_{OF}, G_{mF} for voltage series negative feedback amplifier.	10
C	Draw circuit diagram of Class B Push Pull amplifier and explain its working. Find its maximum efficiency.	10

University of Mumbai

Examination 2020 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 1st June 2021

Program: **Electronics & Telecommunication**

Curriculum Scheme: Rev 2016

Examination: SE Semester IV

Course Code: ECC402 and Course Name: Electronic Devices & Circuits-II

Time: 2 hour Max. Marks: 80

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

University of Mumbai

Examination June 2021

Examinations Commencing from 1st June 2021

Program: Electronics & Telecommunication

Curriculum Scheme: Rev2016

Examination: SE Semester IV

Course Code: ECC403 and Course Name: Linear Integrated 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.	An ideal op-amp requires infinite bandwidth because
Option A:	Signals can be amplified without attenuation
Option B:	Output common-mode noise voltage is zero
Option C:	Output voltage occurs simultaneously with input voltage changes
Option D:	Output can drive infinite number of devices
2.	With zero volts on both inputs, an op-amp ideally should have an output voltage
Option A:	equal to the positive supply voltage
Option B:	equal to the negative supply voltage
Option C:	equal to zero
Option D:	equal to CMRR
3.	The common-mode voltage gain for a practical op-amp is
Option A:	Smaller than differential-mode voltage gain
Option B:	Equal to differential-mode voltage gain
Option C:	Greater than differential-mode voltage gain
Option D:	Exactly twice the differential-mode voltage gain
4.	In a differential amplifier when inputs are applied to the base of both the transistors and the output is taken across the collectors of both the transistors the configuration is called as
Option A:	Single Input Balanced Output differential amplifier
Option B:	Single Input Unbalanced Output differential amplifier
Option C:	Dual Input Balanced Output differential amplifier
Option D:	Dual Input Unbalanced Output differential amplifier
5.	In the Phase shift oscillator, the frequency of oscillation and gain of the amplifier block are
Option A:	$f_o = 1 / (2\pi RC)$ and $\lvert A_V \rvert = 29$
Option B:	$f_o = 1 / (2\pi RC \sqrt{6})$ and $\lvert A_V \rvert = 29$
Option C:	$f_o = 1 / (2\pi RC \sqrt{6})$ and $\lvert A_V \rvert = 3$
Option D:	$f_o = 1 / (2\pi RC)$ and $\lvert A_V \rvert = 3$
6.	The input impedance of differentiator
Option A:	decreases when frequency increases
Option B:	decreases when frequency decreases
Option C:	is independent of frequency

Option D:	increases when frequency increases
7.	In an inverting ideal integrator, which component exhibits the feedback path connection?
Option A:	R
Option B:	C
Option C:	L
Option D:	Diode
8.	A Non inverting Comparator employs
Option A:	Only Negative feedback
Option B:	Only Positive feedback
Option C:	Both Negative and Positive feedback
Option D:	No feedback
9.	An integrator circuit
Option A:	uses a resistor in its feedback circuit.
Option B:	uses an inductor in its feedback circuit.
Option C:	uses a capacitor in its feedback circuit.
Option D:	uses a diode in its feedback circuit.
10.	The major function of the instrumentation amplifier is
Option A:	to convert analog signal to digital signal
Option B:	to amplify the low-level output signals of the transducers
Option C:	to attenuate the low-level output signals of the transducers
Option D:	to compare the input signals
11.	At what range the PLL can maintain the lock in the circuit?
Option A:	Lock in range
Option B:	Input range
Option C:	Feedback loop range
Option D:	Output Range
12.	The internal circuitry of the 555 timer consists of_____, an R-S flip-flop, a transistor switch.an output buffer amplifier, and a voltage divider.
Option A:	A comparator
Option B:	A Voltage Amplifier
Option C:	Two Comparators
Option D:	A peak detector
13.	An astable 555 timer has the_____ number of stable states.
Option A:	0
Option B:	1
Option C:	2
Option D:	3
14.	IC AD534 is a
Option A:	Voltage Controlled Oscillator
Option B:	Waveform generator
Option C:	Analog Multiplier

Option D:	Timer
15.	What is IC 723?
Option A:	Voltage regulator
Option B:	clipper
Option C:	clamper
Option D:	Precision rectifier
16.	In IC7805 the output voltage is
Option A:	5 V
Option B:	0 V
Option C:	8 V
Option D:	7 V
17.	If output voltage is 5V & output current is 50 mA it is
Option A:	Low Voltage Low Current Regulator
Option B:	Low Voltage High Current Regulator
Option C:	High Voltage Low Current Regulator
Option D:	High Voltage High Current Regulator
18.	In a dual slope ADC
Option A:	The input signal and the reference are integrated by two different integrators for a fixed interval of time
Option B:	The input signal is integrated for a fixed time and then the reference is integrated by the same integrator for a variable interval of time
Option C:	The input signal is integrated for a fixed time and then the reference is integrated by the same integrator for the same interval of time
Option D:	The input signal and the reference are integrated by two different integrators for variable intervals of time
19.	The output of a 4 bit DAC is exactly half of its full scale voltage when its input is
Option A:	1111
Option B:	0011
Option C:	1000
Option D:	1100
20.	If K is the scaling factor, Vfs is the full scale output voltage and b_0 (MSB) to b_2 (LSB) is the digital input to a Binary Weighted DAC. The output voltage equation for a 3-bit DAC converter is given by
Option A:	$V_o = K\ Vfs\ [(b_2/8) + (b_1/4) + (b_0/2)]$
Option B:	$V_o = K\ Vfs\ [(b_2) + (b_1/2) + (b_0/3)]$
Option C:	$V_o = K\ Vfs\ [(b_2) + (b_1) + (b_0)]$
Option D:	$V_o = K\ Vfs\ [(b_2/3) + (b_1/2) + (b_0)]$

Q2	**Solve any Two Questions out of Three (10 marks each)**
A	Design a second order Butterworth low pass filter for cut off frequency of 5 kHz.
B	Explain the working of R-2R type DAC with circuit diagram & Derive the output of equation of output voltage.
C	Design an astable multivibrator using IC 555 for frequency 5 kHz & duty cycle 66%. Assume C = 0.1μF.
Q3	**Solve any Two Questions out of Three (10 marks each)**
A	Design a voltage regulator using 723 to deliver an output voltage of 4 V and load current upto 40 mA.
B	With help of a neat circuit diagram and voltage transfer characteristics explain the working of an inverting Schmitt trigger.
C	Design a circuit to perform $Vo = 2V_2 - 3V_1$. Explain the working of the circuit.

University of Mumbai
Examination June 2021
Examinations Commencing from 1st June 2021

Program: Electronics & Telecommunication

Curriculum Scheme: Rev2016

Examination: SE Semester: IV

Course Code: ECC 403 and Course Name: Linear Integrated Circuits

Time: 2 hour Max. Marks: 80

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

University of Mumbai

Examination 2021 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 1st June 2021 to 11th June 2021.

Program: EXTC

Curriculum Scheme: CBCS Rev2016

Examination: SE Semester IV

Course Code: ECC 404 and Course Name: Signals and Systems

Time: 2 hour Max. Marks: 80

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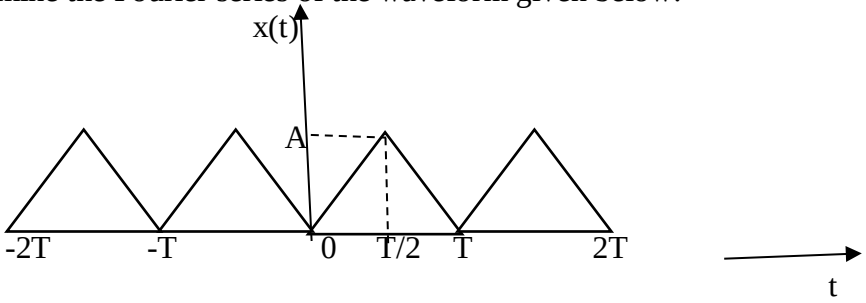
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The area under the curve $\int_{-\infty}^{\infty} \delta(t)dt$ is
Option A:	∞
Option B:	unity
Option C:	0
Option D:	undefined
2.	The discrete -time signal x(n) = $(-1)^n$ is periodic with fundamental period
Option A:	6
Option B:	4
Option C:	2
Option D:	0
3.	Given x(n) = $a^{\lvert n \rvert}$, $\lvert a \rvert < 1$ is
Option A:	An energy signal
Option B:	A power signal
Option C:	Neither an energy nor a power signal
Option D:	An energy as well as a power signal
4.	Which of the following is a causal system?
Option A:	y(t) = $x(t^2)$
Option B:	y(t) = $x^2(t)$
Option C:	y(t) = x(-t)
Option D:	y(t) = x(2t)
5.	The system described by y(n)=n x(n) is
Option A:	Linear, time-varying and stable
Option B:	Nonlinear, time-invariant and unstable
Option C:	Nonlinear, time-varying and stable
Option D:	Linear, time-varying and unstable
6.	Convolution is used to find
Option A:	The impulse response of an LTI system
Option B:	Frequency response of a system
Option C:	The time response of an LTI system
Option D:	The phase response of an LTI system

7.	The convolution of a rectangular pulse with itself results in a
Option A:	Rectangular pulse
Option B:	Square pulse
Option C:	Triangular pulse
Option D:	Sinc pulse
8.	The DTFS coefficients of a real and odd periodic signal are
Option A:	Real and odd
Option B:	Imaginary and even
Option C:	Real and even
Option D:	Imaginary and odd
9.	The Fourier transform of a signal $x(t) = e^{2t} u(-t)$ is given by
Option A:	$1 / (2-j\omega)$
Option B:	$2 / (1-j\omega)$
Option C:	$1 / (j2-\omega)$
Option D:	$2 / (j2-\omega)$
10.	The Fourier transform of a rectangular pulse is
Option A:	Another rectangular pulse
Option B:	Sinc function
Option C:	Triangular pulse
Option D:	Impulse function
11.	What is the Nyquist rate of the following signal? $x(t) = 3 \cos (50\pi t) + 10 \sin (300\pi t) – \cos (100\pi t)$
Option A:	50 Hz
Option B:	100 Hz
Option C:	200 Hz
Option D:	300 Hz
12.	Region of convergence of X(s) is bounded by
Option A:	Zeros
Option B:	Poles
Option C:	Poles and zeros
Option D:	No pole
13.	The Laplace transform of u(t) is
Option A:	1/s
Option B:	s
Option C:	$1/s^2$
Option D:	1
14.	_____ should lie on the left half of the s-plane for stability of a causal system.
Option A:	ROC
Option B:	Imaginary axis
Option C:	Zeros
Option D:	Poles
15.	Inverse Laplace transform of $(sI-A)^{-1}$ is called

Option A:	State equation in matrix form
Option B:	State transition matrix
Option C:	Transfer function
Option D:	Response of continuous time system.
16.	Find the Z-transform of $\delta(n)$.
Option A:	1
Option B:	z
Option C:	z^2
Option D:	z^3
17.	In state space modelling the number of state variables will decide____ of the system.
Option A:	Stability
Option B:	State
Option C:	Order
Option D:	Number
18.	The ROC of sequence x[n] = u[-n] is,
Option A:	$\|z\| > 1$
Option B:	$\|z\| < 1$
Option C:	No ROC
Option D:	$-1 < \|z\| < 1$
19.	The ROC of the signal $x[n]= a^n$ for $-5<n<5$
Option A:	Entire z-plane
Option B:	Entire z-plane except z=0 and z=∞
Option C:	Entire z-plane except z=0
Option D:	Entire z-plane except z=∞
20.	The Z-transform of $x[n]=[\sin \frac{\pi}{2}n] u[n]$
Option A:	$z/(z+1)$
Option B:	$z^2(z^2+1)$
Option C:	$1/(z+1)$
Option D:	$z/(z^2+1)$

Q2	**Solve any Four out of Six** **5 marks each**
A	Show that the response of an LTI system can be obtained by convolution of input and impulse response?
B	Determine whether the following signals are energy or power signals: (i) $x(t)=1.2 \sin(7\omega t)$ (ii) $x(t)=t\, u(t)$ (iii) $x[n]=(3/8)^n u[n]$ (iv) $x[n]=u[2n]$
C	What is the inverse Laplace transform of $X(s)=2/(s^2+2s+5)$?
D	What is BIBO stability? What is the condition to be satisfied for stability?

E	Find the time domain initial value x [0] and final value x [∞] of the z-domain function: $X(z)=z^2/((z-1)(z-0.2))$
F	The input x[n] and impulse response h[n] of an LTI system are given by x[n]= {-1,1,-2,-1,1,2} ↑ h[n]= {-0.5,0.5,-1,0.25,-1,-2} ↑ Find the response of the system using Linear Convolution.

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Determine the Fourier series of the waveform given below: 
B	Determine the response of discrete time LTI system governed by the difference equation ***y(n)=-0.5y(n-1) + x(n),*** when the input is unit step and initial condition, a**)** ***y (-1) =0*** and b) ***y(-1)=1/3***
C	Find the inverse Laplace transform of X(s)=4/((s+2) (s+4)) if the ROC is, (i) -2> Re{s} >-4 (ii) Re{s} <-4 (iii) Re {s} > -2

University of Mumbai

Examination 2021 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 1st June 2021 to 11th June 2021.

Program: EXTC

Curriculum Scheme: CBCS Rev2016

Examination: SE Semester IV

Course Code: ECC 404 and Course Name: Signals and Systems

Time: 2 hour Max. Marks: 80

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

University of Mumbai

Examination June 2021

Examinations Commencing from 1st June 2021

Program: **Electronics and Telecommunication**

Curriculum Scheme: Rev2016

Examination: SE Semester IV

Course Code: ECC405 and Course Name: Principles of Communication Engineering

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.	What is the noise figure of an ideal receiver who introduces no noise on its own?
Option A:	0
Option B:	1
Option C:	Infinite
Option D:	10
2.	For a three stage cascade amplifier, calculate the overall noise figure when each stage has a gain of 12 dB and noise figure of 8dB.
Option A:	12
Option B:	24
Option C:	13.55
Option D:	8
3.	Which of the following processes is not done in the transmitter?
Option A:	Encoding
Option B:	Modulation
Option C:	decoding
Option D:	Mixing
4.	In DSB-SC amplitude modulation, bandwidth is ……. the audio signal frequency
Option A:	Twice
Option B:	Thrice
Option C:	Same as
Option D:	Four times
5.	An AM broadcast station transmits modulating frequencies up to 6 kHz. If the AM station is transmitting on a frequency of 594 kHz, the values of upper and lower sidebands and the total bandwidth occupied by the AM station are:
Option A:	300 KHz, 588 KHz, 12 KHz
Option B:	600 KHz, 400 KHz, 12 KHz
Option C:	400 KHz, 388 KHz, 12 KHz
Option D:	600 KHz, 588 KHz, 12 KHz
6.	In radio receivers, varactor diodes are used for ____ .
Option A:	Tuning

Option B:	Demodulation
Option C:	Mixing
Option D:	Amplification
7.	If the carrier power of an AM transmitter is 1000 W and it is modulated 100 percent, the AM power in each sideband is _____ W.
Option A:	1500
Option B:	1000
Option C:	500
Option D:	250
8.	What is the required bandwidth according to the Carson's rule, when a 100 MHz carrier is modulated with a sinusoidal signal at 2.5KHz, the maximum frequency deviation being 10 KHz.
Option A:	50 KHz
Option B:	25 MHz
Option C:	25 KHz
Option D:	5 MHz
9.	Armstrong method is used for the generation of
Option A:	Direct FM
Option B:	Indirect FM
Option C:	DSB-SC AM
Option D:	SSB
10.	What is the value of carrier frequency in the following equation for the FM signal? v(t)= 5 cos(6600t+ 12sin2500t)
Option A:	1050 Hz
Option B:	1150 Hz
Option C:	2000 Hz
Option D:	2110 Hz
11.	The ratio of actual frequency deviation to the maximum allowable frequency deviation is called
Option A:	Multi tone modulation
Option B:	Percentage modulation
Option C:	Phase deviation
Option D:	Modulation index
12.	Which component of the AM wave does not contain any information?
Option A:	Upper Sideband
Option B:	Lower Sideband
Option C:	Carrier
Option D:	Both sidebands
13.	"IF" stands for:
Option A:	indeterminate frequency
Option B:	image frequency
Option C:	intermodulation frequency
Option D:	intermediate frequency

14.	Which of the following is not a superheterodyne receiver stage?
Option A:	RF Stage
Option B:	IF Stage
Option C:	Modulator stage
Option D:	Mixer
15.	The ability of a receiver to reject unwanted signals is called as ____ .
Option A:	Sensitivity
Option B:	Gain
Option C:	Selectivity
Option D:	Ripple factor
16.	For what value of Sampling Frequency does the sampling of the following signal $x(t) = 5 \cos 100\pi t$ will not generate aliasing error?
Option A:	40 Hz
Option B:	120 Hz
Option C:	30 Hz
Option D:	45 Hz
17.	The PPM can be obtained from
Option A:	PAM
Option B:	PWM
Option C:	DM
Option D:	PCM
18.	In pulse width modulation,
Option A:	Amplitude of the carrier pulse is varied
Option B:	Synchronization is not required between transmitter and receiver
Option C:	Instantaneous power at the transmitter is constant
Option D:	Frequency of the carrier pulse is varied
19.	In multiplexing, channels are separated by unused strips of bandwidth guard bands - to prevent
Option A:	Overlapping
Option B:	Synchronization
Option C:	modulation
Option D:	bandwidth
20.	To combine the multiple signals in FDM the circuit required to be used is
Option A:	Oscillator
Option B:	Linear Mixer
Option C:	Non Linear Mixer
Option D:	Filter

Q2 **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each**
A	Draw the transmitter and receiver of TDM signal. Explain the working in detail.
B	For an AM DSBFC modulator with a carrier frequency 100 KHz and a maximum modulating signal frequency 5 kHz determine i) Frequency limits for the upper and lower sidebands ii) Bandwidth ii) USF and LSF when modulating signal frequency is a single frequency 5KHz tone iv) Sketch the output spectrum.
C	State and prove sampling theorem in detail for low pass bandlimited signal

Q3 **(20 Marks Each)**	**Solve any Two Questions out of Three** **10 marks each**
A	Explain the low level and high level modulation.
B	Compare all the types of AM. Explain the application of VSB
C	What are the disadvantages of TRF receivers? Explain the working of superheterodyne receivers.

University of Mumbai
Examination June 2021

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Q1.	B
Q2.	C
Q3.	C
Q4	A
Q5	D
Q6	A
Q7	D
Q8.	C
Q9.	B
Q10.	A
Q11.	B
Q12.	C
Q13.	D
Q14.	C
Q15.	C
Q16.	B
Q17.	B
Q18.	B
Q19.	A
Q20.	B