University of Mumbai Examination 2021 under cluster Examinations Commencing from 1st June to 15 June 2021 Program: SE(EXTC/ETRX) Curriculum Scheme: Rev2019 Examination: SE-IV

Course Code: _ECC401 and Course Name: Engineering mathematics-IV

Time: 2 hour

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The sum of Residue of $f(z) = \frac{z}{(z-1)(z^2-1)}$ is
Option A:	0
Option B:	1
Option C:	2
Option D:	3
2.	$\oint \frac{1-2z}{z(z-1)(z-2)} dz$ where c is $ z = 1.5$
Option A:	2π <i>i</i>
Option B:	3πί
Option C:	πί
Option D:	4π <i>i</i>
3.	The Extremal of $(\int_{x_1}^{x_2} y^2 - y'^2 - 2y \cosh \cosh x) dx$ is
Option A:	$y = c_1 \cos \cos x + c_2 \sin \sin x + \frac{1}{2} \cosh \cosh x$
Option B:	$y = c_1 \cos \cos x - c_2 \sin \sin x + \frac{1}{2} \cosh \cosh x$
Option C:	$y = c_1 \cos \cos x + c_2 \sin \sin x - \frac{1}{2} \cosh \cosh x$
Option D:	$y = c_1 \cos \cos x - c_2 \sin \sin x - \frac{1}{2} \cosh \cosh x$
4.	The Extremal of $\int_{x_1}^{x_2} (x + y')y' dx$ is
Option A:	$c_1 + c_2 x - \frac{x^2}{4}$
Option B:	$c_1 - c_2 x - \frac{x^2}{4}$
Option C:	$c_1 - c_2 x - \frac{x^2}{4}$
Option D:	$c_1 + c_2 x + \frac{x^2}{4}$

5.	Consider a dice with the property that that probability of a face with n dots
	showing up is proportional to n. The probability of face showing 4 dots is?
Option A:	1/7
Option B:	5/42
Option C:	1/21
Option D:	4/21
6.	What would be the probability of an event 'G' if H denotes its complement,
	according to the axioms of probability?
Option A:	P(G) = 1 / P(H)
Option B:	P(G) = 1 - P(H)
Option C:	P(G) = 1 + P(H)
Option D:	P(G) = P(H)
7.	If $E(x) = 2$ and $E(z) = 4$, then $E(z - x) = ?$
Option A:	
Option B:	6
Option C:	0
Option D:	-2
8.	For a Poisson Distribution, if mean $(m) = 1$, then P (1) is?
Option A:	e
Option B:	1/e
Option C:	e/2
Option D:	0
9.	For a standard normal variate, the value of Standard Deviation is
Option A:	0
Option B:	1
Option C:	∞
Option D:	1.5
10.	The shortest distance between two points in a plane is
Option A:	straight line
Option B:	a curve
Option C:	parabola
Option D:	circle
11.	Find the population proportion p for an IPL team having total 30 players with 10
	overseas players.
Option A:	1/2
Option B:	1/3
Option C:	2/3
Option D:	1/4
12.	If 40% of boys opted for maths and 60% of girls opted for maths, then what is the
	probability that maths is chosen if half of the class's population is girls?
Option A:	0.5
Option B:	0.6

Option C:	0.7
Option D:	0.4
13.	If $F(z)$ is single valued and analytic everywhere within and on a closed contour
	then the value of is
Option A:	-2πi
Option B:	0
Option C:	1
Option D:	-1
14.	Find the residue at $z=0$ of the function
	$z^2 - sin(z)$
	$f(z) = \frac{1}{-2}$.
	27
Option A:	7/9
Option B:	
Option C:	
Option D:	-1
1.5	
15.	The expected value of a discrete random variable 'x' is given by
Option A:	P(x)
Option B:	$\sum P(x)$
Option C:	$\sum x P(x)$
Option D:	1
16.	If a particle in 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 cycloid
17.	A bag contains 80 chocolates. This bag has 4 different colors of chocolates in it.
	If all four colors of chocolates were equally likely to be put in the bag, what
	would be the expected number of chocolates of each color?
Option A:	
Option B:	
Option C:	
Option D:	9
10	Defent de diment entetille distingues de la contra de la contra de
18.	Keier to the discrete probability distribution provided in the table below. X=x 0 1 2 3 4
	X-x 0 1 2 3 4 P(X=x) 0.040 0.110 0.450 0.230 ?
	Find the probability that x is equal to 0 or 4. Round to 3 decimal places.
Option A:	0.040
Option A: Option B:	0.040 0.210
Option A: Option B: Option C:	0.040 0.210 0.007
Option A: Option B: Option C: Option D:	0.040 0.210 0.007 1.000

19.	The subset { (1,-2), (2,9), (-4,3 } of R^2 is
Option A:	Linearly independent
Option B:	Basis
Option C:	Linearly dependent
Option D:	Conditional Basis
20.	The dimension of subspace W = { (x,y,z) / $x+y+z=0$ } of R^3 is
Option A:	1
Option B:	3
Option C:	2
Option D:	0

Q2	Solve any Four out of Six	5 marks each
А	Evaluate $\oint \frac{z^2 - 2z + 4}{z^2 - 1} dz$ where $ z - 1 = l$	
В	Find Extremal of the functional $\int_{0}^{\frac{\pi}{2}} (y' - y^2 + 2xy) dx$ with	$y(0) = 0 \ y(\frac{\pi}{2}) = 0$
С	Use Gram-Schmidt Process to transfer the basis {u orthonormal bases where $u_1 = \{1, 1, 1\}$, $u_2 = \{0, 1, 1\}$, $u_3 = \{1, 1, $	$\{u_1, u_2, u_3\}$ in to = $\{0, 0, 1\}$
D	Find the lines of regression for the following data x 656667676869 y 676865667272	70 72 69 71
Е	A skilled typist on routine work , kept a record of mista during 300 working days. Fit aPoisson distribution to theMistake01234per day1234No. of1439042129	akes made per day below data.5631
F	Reduce the following Quadratic form to canconical form and signatures. $21x^2+11y^2+2z^3-30xy+12xz-8yz$	and find its rank

03.	Solve any Four out of Six	5 marks each
А	Using Rayleigh-Ritz method, solve $I = \int_{0}^{1} (xy + \frac{1}{2}y') dx$ 0, $v(1)=0$.	Given that $y(0) =$
В	Defined by [a 0 0 b]. with usual addition and scalar moves of the space.	nultiplication is a

G	
C	Evaluate $\int \frac{1}{3} dz$ where c is $ z = 1$
	$\left(2-\frac{\pi}{6}\right)^{3}$

D	Find an orthonormal basis for the subspace of R^3 by appling Gram-Schmidt process where $S = \{(1,2,0) \ (0,3,1)\}$
E	Obtain Laurent and Taylors series for $\frac{z-1}{z^2-2z-3}$
F	Using Residue Theorem evaluate $\int_{0}^{\frac{\pi}{2}} \frac{d\theta}{(2+\cos\cos\theta)^2}$