University of Mumbai

Examinations Commencing from 16 MAY 2022 to 30 MAY 2022

Program: __BE COMPUTER ENGINEERING _

Curriculum Scheme: Rev2019 (C scheme) Examination: SE Semester : IV

Course Code: _CSC 401____ and Course Name: ___Engineering Mathematics_IV

Time: 2 hour 30 minutes DATE:17/5/2022 QP CODE:92377 Max. Marks: 80

S.E.(Information Technology)(Choice Based)(R-2020-21)('C' Scheme) Semester - IV / 41021 - Engineering Mathematics-IV

$x(n)$ then what is the z-transform of $x(n-k)$? Option A: $z^k X(z)$ Option B: $z^k X(z)$ Option C: $X(z+k)$ Option D: $X(z-k)$ 6. The value of $Z^{-1}\left[\frac{z^2}{(z-a)(z-b)}\right]$ is Option A: $a^{n+1} - b^{n+1}$	Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
Option A: 1 Option B: 5 Option C: 8 Option D: 6 2. If $A = \begin{bmatrix} 2 & 0 & -1 \\ 0 & 2 & 0 \\ -1 & 0 & 2 \end{bmatrix}$ Eigen value of Adj. A are Option A: 5.6,2 Option B: 2.3,6 Option D: 1,3,6 Option D: 1,3,6 3. If $f(z) = \frac{3z^2+z}{z^2-1}$, then residue of $f(z)$ at $z=-1$ is Option A: 1 Option B: -1 Option B: -1 Option C: 2 Option D: -2 4. The value of $\int_C \frac{\cos \pi z}{z^2-1} dz$ where C is the circle $ z = 1/2$ Option A: πi Option B: -1 Option C: 0 Option D: $-\pi i$ 5. According to Time shifting property of z-transform, if $X(z)$ is the z-transform of $x(n)$ then what is the z-transform of $x(n-k)$? Option A: $x(n)$ then what is the z-transform of $x(n-k)$? Option B: $x^2 \times X(z)$ Option C: $x(z+k)$ Option C: $x(z+k)$ Option D: $x(z+k)$ Option C: $x(z+k)$ Option D: $x(z+k)$ Option D: $x(z+k)$	1.	If X is a Poisson variate and $P(X=1)=P(X=2)$, then $E(X^2)$ is
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	Option A:	$a^{n+1} - b^{n+1}$
U = U	132 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	$\frac{a+b}{a+b}$

Option B:	$a^{n+1} + b^{n+1}$
Option B.	$\frac{a+b}{a-b}$
Option C:	
Option C.	$a^{n+1} - b^{n+1}$
Option D:	$\frac{a-b}{a^{n+1}+b^{n+1}}$
option B.	$\frac{a+b}{a+b}$
7.	If a random variable X follows Poisson distribution such that P(X=0)=6P(X=3), find
	the mean and variance of the distribution.
Option A:	mean = 1, variance = 1
Option B:	mean = 1, variance = -1
Option C:	mean = 1, variance = 2
Option D:	mean = 1, variance = -2
•	
8.	In normal distribution
Option A:	Mean = Median = Mode
Option B:	Mean < Median < Mode
Option C:	Mean> Median > Mode
Option D:	Mean ≠ Median ≠ Mode
9.	If the primal LPP has an unbounded solution then the dual has
Option A:	Unbounded solution
Option B:	Bounded solution
Option C:	Feasible solution
Option D:	Infeasible solution
10	
10.	The value of Lagrange's multiplier λ for the following NLPP is
	Optimize $z = 6x_1^2 + 5x_2^2$
-	Subject to $x_1 + 5x_2 = 7$
- 29° 53°	$x_1, x_2 \ge 0$
Option A:	$\lambda = 31/84$
Option B:	$\lambda = 84/31$
Option C:	$\lambda = 13/74$
Option D:	$\lambda = 31/64$
10000 C	

Q2	Solve any Four out of Six 5 marks ex							
A	Given A =	$\begin{bmatrix} -2 & 2 & -2 \\ 2 & 1 & -1 \\ -1 & -2 \\ es & of & 4A^{-1} \end{bmatrix}$	$\begin{bmatrix} -3 \\ -6 \\ 0 \end{bmatrix}$, find and ei	d the e	igenva	alues o	of A. Al	so find
B	Evaluate \int_0^1	$+i(x^2-iy)dz$	z along tl	ne path	(i) $x^2 =$	= y (ii)	y = x	
	Find $Z\{2^k $	$\cos(3k+2)\}$	$k \geq 0$.					
	The following	ng table gives	the num	ber of a	ccident	s in a c	ity duri	ng a
	week. Find	whether the ac	cidents	are unif	ormly d	listribu	ted over	a week
	Day	Sun Mon	Tue	Wed	Thu	Fri	Sat	Total

	No. of accidents	13	15	9	11	12	10	14	84
E	Solve by Si Maximise Subject to	$z = -x_1 \\ 4x_1$	$= 7x_1 +$	$5x_2 \ge -6 \le 12$					
F	Solve the formaximise Subject	,		$2x_1^2 -$		0x ₁ +	4x ₂		

Q3	Solve any Four out of Six	5 marks each
A	Find the Eigen values and Eigen Vectors of the followi $A = \begin{bmatrix} 3 & -1 & 1 \\ -1 & 3 & -1 \\ 1 & -1 & 3 \end{bmatrix}$	ng matrix.
В	Evaluate $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$ where C is the circle $ z $	= 3
C	Obtain inverse z-transform $\frac{z+2}{z^2-2z-3}$, $1 < z < 3$	
D	The height of six randomly chosen sailors are in inches 63,65,68,69,71,72. The height of 10 randomly chosen s 61,62,65,66,69,69,70,71,72 and 73.	
	Solve by the dual Simplex Method Minimise $z = 6x_1 + 3x_2 + 4x_3$ Subject to $x_1 + 6x_2 + x_3 = 10$ $2x_1 + 3x_2 + x_3 = 15$ $x_1, x_2 \ge 0$	
F	Find the relative maximum or minimum of the function $z = x_1^2 + x_2^2 + x_3^2 - 8x_1 - 10x_2 - 12x_3$	

Q4	Solve any Four out of Six	5 marks each
A	Show that the following matrix is diagonalizative the diagonal form and a diagonalizing matrix	$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$
B	Evaluate $\int_C \frac{4z^2+1}{(2z-3)(z+1)^2} dz$, $C: z = 4$ using Cauchy theorem.	's residue
	Find the inverse z-transforms of $F(z) = \frac{z}{(z-1)(z-2)}$;	z > 2

D	If the heights of 500 students is normally distributed with mean 68 inches and standard deviation 4 inches, estimate the number of students having heights (i) greater than 72 inches (ii) less than 62 inches (iii) between 65 and 71 inches.
Е	Using Simplex method Maximize $z = 10x_1 + 6x_2 + 5x_3$ Subject to $2x_1 + 2x_2 + 6x_3 \le 300$ $10x_1 + 4x_2 + 5x_3 \le 600$ $x_1 + x_2 + x_3 \le 100$ $x_1, x_2, x_3 \ge 0$
F	Using Lagrange's multiplier optimize $z = 4 x_1 + 6x_2 - 2 x_1^2 - 2 x_1 x_2 - 2x_2^2$ subject to $x_1 + 2x_2 = 2$ $x_1, x_2 \ge 0$