University of Mumbai
Examination 2020 under cluster ___ (Lead College Shortname)

Program: COMPUTER Engineering
Curriculum Scheme: Rev 2016
Examination: Second Year SemesterIV
Course Code: 401 and Course Name: Applied Mathematics IV
Time: 1 hour Max. Marks: 50

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For the students:- All the Questions are compulsory and carry equal marks .

Q1.	Find eigen values of $A^2 - 6A^{-1} + 3I$, $A = \begin{bmatrix} 6 & 0 & 0 \\ -6 & 3 & 0 \\ 2 & -4 & 1 \end{bmatrix}$
Option A:	36,10,-2
Option B:	38,10,-2
Option C:	-38,11,-2
Option D:	38,10,2
Q2.	If f(z) is analytic f ' (z) is continuous at all points inside and on a simple closed curve C then
Option A:	$\int_c f(z)dz = 0$
Option B:	$\int_c f(z)dz \neq 0$
Option C:	$\int_c f(z)dz \neq 1$
Option D:	None
Q3.	The singularity of $f(z) = \frac{z+3}{(z-1)(z-2)}$ are
Option A:	1, 3
Option B:	1, 0
Option C:	1, 2
Option D:	2, 3
Q4.	Find mean and variance of Binomial distribution $(0.2+0.8)^{10}, q = 0.2$
Option A:	2,1.6
Option B:	8,1.6
Option C:	7,16
Option D:	2,8
Q5.	Given $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$, then

Option A:	A is derogatory and degree of minimal polynomial is 2
Option B:	A is non derogatory and degree of minimal polynomial is 3
Option C:	A is non derogatory and degree of minimal polynomial is 2
Option D:	A is derogatory and degree of minimal polynomial is 3
Q6.	The residue of f(z)= cotz at each pole is
Option A:	0
Option B:	1
Option C:	½
Option D:	None
Q7.	Dual of following LPP Maximize $z = 2x_1 + 3x_2 + x_3$ Subject to $x_1 + 2x_2 + x_3 \leq 12$ $2\,x_1 + x_3 \leq 5$ $-x_1 + 2x_2 \leq -6$ $x_1, \quad x_2, x_3 \geq 0$
Option A:	Minimize $w = 12y_1 - 5y_2 - 6y_3$ Subject to $y_1 + 2y_2 - y_3 \geq 2$ $2\,y_1 + 2y_2 \geq 3$ $y_1 + y_2 \geq 1$ $y_1, \quad y_2, y_3 \geq 0$
Option B:	Minimize $w = 12y_1 + 5y_2 + 6y_3$ Subject to $y_1 + 2y_2 - y_3 \geq 2$ $2\,y_1 + 2y_3 \geq 3$ $y_1 + y_2 \geq 1$ $y_1, \quad y_2, y_3 \geq 0$
Option C:	Minimize $w = 12y_1 + 5y_2 - 6y_3$ Subject to $y_1 + 2y_2 - y_3 \geq 2$ $2\,y_1 + 2y_3 \geq 3$ $y_1 + y_2 \geq 1$ $y_1, \quad y_2, y_3 \geq 0$
Option D:	Minimize $w = 12y_1 - 5y_2 - 6y_3$ Subject to

	$y_1 + 2y_2 - y_3 \geq -2$ $2\,y_1 + 2y_3 \geq 3$ $y_1 + y_2 \geq 1$ $y_1, \quad y_2, y_3 \geq 0$
Q8.	Find characteristic equation of , $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 2 & 2 \end{bmatrix}$
Option A:	$\lambda^3 + 5\lambda^2 + 7\lambda - 3 = 0$
Option B:	$\lambda^3 - 5\lambda^2 + 7\lambda - 3 = 0$
Option C:	$\lambda^3 - 5\lambda^2 + 7\lambda + 3 = 0$
Option D:	$\lambda^3 - 5\lambda^2 - 7\lambda - 3 = 0$
Q9.	X is a Poisson Variate such that $P[X = 2] = P[X = 3]$ then variance of X is
Option A:	0
Option B:	3
Option C:	1
Option D:	5
Q10.	The poles of f(z)= $\frac{z^2+1}{1-z^2}$ is
Option A:	1
Option B:	-1
Option C:	1, -1
Option D:	0
Q11.	A random variable X has a probability density function $f(x) = x^2 e^{-x}\,; x \geq 0.$ Then Mean of X is
Option A:	12
Option B:	6
Option C:	3
Option D:	4
Q12.	Using Cayley Hamilton Theorem Find A^{-1}in terms of$A$, $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 1 & -5 \\ 0 & 0 & 1 \end{bmatrix}$
Option A:	$\frac{1}{5}(A^2 + 3A + 3I)$
Option B:	$\frac{1}{5}(-A^2 - 3A + 3I)$
Option C:	$\frac{1}{5}(-A^2 + 3A - 3I)$
Option D:	$\frac{1}{5}(-A^2 + 3A + 3I)$
Q13.	Mean and standard deviation of marks obtained by 50 students of college A are

	79 and 9 respectively. Those of 60 students of college B are 75 and 7 respectively. The test Statistic Z to test the significant difference between the means of the two samples $H_0: \mu_1 = \mu_2$ is
Option A:	2.562
Option B:	1.65
Option C:	13.33
Option D:	7.345
Q14.	Find eigen values of $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$
Option A:	1,2
Option B:	0,5
Option C:	5,1
Option D:	0,1
Q15.	The residue of $f(z) = \frac{1+e^z}{\sin z + \cos z}$ at the pole z=0 is
Option A:	0
Option B:	1
Option C:	1,-1
Option D:	undefined
Q16.	A random variable X has a probability mass function $p(x) = kx^3 \; ; x = 1,2,3,4$. Then k is
Option A:	1/10
Option B:	1/30
Option C:	1/100
Option D:	1
Q17.	The line integral of the function F= yzi in the counter clockwise direction along the circle $x^2 + y^2 = 1$ at z=1 is
Option A:	-2π
Option B:	-π
Option C:	π
Option D:	2π
Q18.	The number of car accidents in a city was found to be 8,5,20,16,14,17,12, 6,7,15 per month respectively. Using χ^2 test it was found that accidents do not occur equally during 10 months period. Find χ^2 value.
Option A:	20.33
Option B:	21.33
Option C:	19.33
Option D:	23.33

Q19.	Find k if probability distribution function is given as $f(x) = \begin{cases} k.x^2 for\ 0 \le x \le 2. \\ 0 \qquad\quad otherwise \end{cases}$
Option A:	8/3
Option B:	8
Option C:	3/8
Option D:	¾
Q20.	Find $5^A,\ A = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$
Option A:	$\begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$
Option B:	$\begin{bmatrix} 5 & 0 \\ 0 & 25 \end{bmatrix}$
Option C:	$\begin{bmatrix} 5 & 1 \\ 0 & 25 \end{bmatrix}$
Option D:	$\begin{bmatrix} 25 & 0 \\ 0 & 5 \end{bmatrix}$
Q21.	A and B throw a fair die for a stake of Rs.44 which is won by a player who throws 6 first. If A starts the probability of A winning the game is
Option A:	6/11
Option B:	24
Option C:	5/11
Option D:	20
Q22.	A sample of size 20 from a normal population has a mean 44 and standard deviation 6. Assuming the population mean as 42.the corresponding t-statistic is
Option A:	1.453
Option B:	6.67
Option C:	1.491
Option D:	6.33
Q23.	X is normally distributed variable with mean 30 and standard deviation 4, find P(X<40). (Given: Area between Z=0 to Z=2.5 is 0.4938.)
Option A:	0.9878
Option B:	0.4878
Option C:	0.9938
Option D:	0.0062
Q24.	If $f(x) = \frac{3}{4}x(2-x),\ \ 0 < x < 2\ and\ k > 0$ then E(x) is
Option A:	1/6
Option B:	3/4
Option C:	4/3
Option D:	1

Q25.	The mean of the Binomial distribution with the parameters n=4 and p=0.6 is
Option A:	0.3
Option B:	0.6
Option C:	0.2
Option D:	2.4