Course Code: 2030005   Roll No: | MLRS- R20 |

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INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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MLRS

II B.Tech I Sem Regular End Examination, February-2022
Probability Distributions and Complex Variables
(MECHANICAL ENGINEERING)

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
   Each question carries 10 marks and may have a, b as sub questions.

PART- A
(10*2 Marks = 20 Marks)

1.	a)	Find the probability of getting a sum of 10. If we throw two dices.	2M	CO1	R
	b)	If A,B are events with P(A)=1/3 ,P(B)=1/4 and P(AUB)=1/2 then find i)$P(A \cap B)$ ii)$P(A^c \cap B)$.	2M	CO1	R
	c)	A fair coin is tossed six times find the probability of getting four coins.	2M	CO2	R
	d)	Write four characteristics of Normal distribution.	2M	CO2	R
	e)	Write the formula for t-distribution.	2M	CO3	R
	f)	Write the Type-I error and Type -II error.	2M	CO3	R
	g)	State C-R equations.	2M	CO4	R
	h)	Define harmonic function.	2M	CO4	R
	i)	Evaluate $\oint (x - y + ix^2)dz$ along y=3x between (0 , i+1)	2M	CO5	R
	j)	Evaluate $\int_c \frac{e^z}{z-2} dz$ where C is $|z| = 1$	2M	CO5	R

PART- B
(10*5 Marks = 50 Marks)

2	a)	The probabilities that students A, B, C, D solve a problem are 1/3, 2/5, 1/5 and1/4 respectively. If all of them try to solve the problem, that is the probability that the problem is solved.	5M	CO1	U
	b)	The probability density of a variate X as follows	5M	CO1	Ap

X	0	1	2	3	4	5	6
P(X)	K	3K	5K	7K	9K	11K	13K

Find i) K ii) Mean iii) Variance.

OR

3	In a blot factory machines A,B, C manufacture 20% 30% and 50% of the total of their output and 6%, 3% and 2% are defective .A bolt is drawn at random and found to be defective .find the probabilities this is manufactured from i)Machine A ii) Machine B iii)Machine C.	10M	CO1	AP

4 a)	Out of 800 families with 5 children each how many would you expect to have a) 3 boys b) 5 girls c) either 2 or 3 boys.	5M	CO2	U
b)	In a poission distribution with mean is 1.8 then find i) $P(x \geq 1)$ ii)$p(2 \leq x \leq 5)$.	5M	CO2	Ap

OR

5	If X is a normal variate with mean 30 and standard deviation 5 find the probabilities that i)$P(26 \leq x \leq 40)$ ii)$P(x \geq 45)$ iii) $P(x \leq 35)$.	10M	CO2	Ap

6 a)	Write short note on Null hypothesis and alternative hypothesis.	5M	CO3	U
b)	A coin was tossed 960 times and returned heads 183 times. Test the hypothesis that the coin is unbiased. Use a 0.05 level of significance.	5M	CO3	Ap

OR

7	Two horses A and B were tested according to the time to run a particular track with the following results. Test whether the two horses have the same running capacity.	10M	CO3	Ap

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	

8	Find most general analytic function whose real part is $u = x^2 - y^2 - x$.	10M	CO4	U

OR

9	If $f(z) = u + iv$ is analytic , prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4[f^1(z)]^2$.	10M	CO4	Ap

10 a)	Expand $f(z) = \frac{1}{(1-z)(z-2)}$ in the region $|z| > 2 , 1 < |z| < 2$.	5M	CO5	U
b)	Using Cauchy's residue theorem evaluate $\oint \frac{e^z}{(z-1)(z-2)} dz$ where c is the circle $|z| = 3$.	5M	CO5	Ap

OR

11	Using Cauchy's integral formula to evaluate $\oint \frac{z}{(z-1)(z-2)^2} dz$ where c is the circle $|z - 2| = \frac{1}{2}$.	10M	CO5	Ap

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