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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II B.Tech I Sem Supplementary Examination, July-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) State Baye's theorem .   2M   CO1   R
   b) If $P(A^c) = \frac{3}{8}, P(B^c) = \frac{1}{2}, P(A \cap B) = 1/4$ Then find i)P(A/B)   2M   CO1   R
      ii)P(B/A)
   c) The mean and variance of a binomial variable X with parameter in **n**   2M   CO2   R
      and **P** are 16 and 8.find the value of "n"
   d) For the following probability distribution find i)E(X)   ii) $E(X^2)$ 2M   CO2   R

X	-3	6	9
P(X)	1/6	½	1/3

   e) Define one tailed test and two tailed test.   2M   CO3   R
   f) Write the formula for difference of two means in t-distribution.   2M   CO3   R
   g) Write real and imaginary values of $f(z) = z^2$.   2M   CO4   R
   h) Write Cauchy Riemann equations in polar form.   2M   CO4   R
   i) State Cauchy Integral formula.   2M   CO5   R
   j) Write a short note on types of singularity.   2M   CO5   R

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

2 a) A business man goes to hotels X,Y,Z 20%, 50% ,30% of the time   5M   CO1   U
     respectively. It is known that 5%, 4% and 8% of the rooms in X,Y,Z,
     Hotels have faulty plumbing's .what is the probability that business
     man's room having faulty plumbing is assigned to hotels X.Y,Z ?
  b) A random variable X has the following probability function   5M   CO1   Ap

X	0	1	2	3	4	5	6	7
P(x)	0	K	2k	2K	3K	K^2	$2K^2$	$7K^2 + K$

   Find i)k   ii) P(X<6)   iii)Mean.

OR

3   The probability density f(x) of a continuous random variable is   10M   CO1   Ap
     given by $f(x) = k(1 - x^2)$ $for\ 0 < x < 1$
         =0 other wise
     Find the value of i) K   ii)P(0.1<X<0.2)   iii) P(X>0.5)   iv) mean

4 a) Fit a Binomial distribution for the following data and compare the theoretical frequencies with actual ones. 5M CO2 U

x	0	1	2	3	4	5
f	2	14	20	34	22	8

   b) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction. 5M CO2 Ap

OR

5 In a normal distribution 31% of the items are under 45 and 8% of the items are over 64 find the mean and standard deviation of the normal distribution. 10M CO2 Ap

6 a) In a sample of 1000 students 500 use ball pens and in another sample of 3500 students 1400 use ball pens. Test the significance between the difference of two proportions at 5% level. 5M CO3 U

   b) A sample of 26 bulbs gives a mean life of 990 hours with a S.D of 20 hours. The manufacturer claims that mean life of bulbs is 1000 hours. Is the sample not up to the standard? 5M CO3 Ap

OR

7 The nicotine contents in milligrams in two samples of tobacco were found to be as follows 10M CO3 Ap

Sample A	24	27	26	26	21	
Sample B	27	30	28	31	22	36

8 a) If $f(z) = u + iv$ is analytic, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|Ref(z)|^2 = 2[f^1(z)]^2$ 5M CO4 U

   b) Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin even though Cauchy Riemann equations are satisfied. 5M CO4 Ap

OR

9 Find an analytic function $f(z) = u + iv$, if $u - v = (x - y)(x^2 + 4xy + y^2)$. 10M CO4 Ap

10 a) Using Cauchy's integral formula evaluate $\oint_c \frac{z\,dz}{(z-1)(z-3)}$ where C is the circle (i) $|z| = 4$ (ii) $|z| = 1.5$ 5M CO5 U

    b) Find the Laurent's series expansion of the function $\frac{z+2}{(z+1)(z+4)}$ in the region (i) $|z| < 1$ (ii) $1 < |z| < 4$ 5M CO5 Ap

OR

11 Using residue theorem evaluate $\oint_c \frac{z\,dz}{(z-1)(z-2)^2}$ where C is the circle $|z - 2| = 3$ 10M CO5 Ap

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