R20 Regulation *Subject code:3B3CA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech III Semester Regular/Supplementary Examinations, March/April 2023

PROBABILITY & STATISTICS AND COMPLEX VARIABLE
(MECHANICAL ENGINEERING)

Maximum Marks: 70 Date:27.03.2023 **Duration: 3 hours**

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 Find the mean and variance of the following distribution.

X	-1	0	1	3	5
P(x)	0.1	0.3	0	0.2	0.4

2 If mean and SD of a binomial distribution are 20 and 4, find the parameters of the distribution.

3 Let X be a random variable with pdf given by $f(x) = \begin{cases} k(4x - 2x^2), 0 < x < 2 \\ 0, \ otherwise \end{cases}$. Find the value of k.

4 If $f(x) = \begin{cases} Kxe^{-x}, x > 0 \\ 0 \ , \ elsewhere \end{cases}$ is the probability density function of a random variable X, then find 'K'

5 Define point estimation.

6 What you mean by standard error?

7 Write two applications of *chisquare* test.

8 Define one - tailed and two - tailed test.

9 Prove that the function $u = 3x^2y - y^3$ is a harmonic function.

10 Show that an analytic function with constant real part is constant.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 Find the mean and variance of Poison distribution. (10 marks)

OR

12 A discrete random variable X has the following probability distribution. (10 marks)

x	0	1	2	3	4	5	6	7	8
P(x)	a	3a	5a	7a	9a	11a	13a	15a	17a

i) Find the value of 'a'.

ii) Find $P(X < 3), P(0 < X < 3)$.

iii) Find the distribution function of X.

13 The cumulative distribution function of a random variable X is $F(x) = (1 + x)e^{-x}, x > 0$. Find the probability density function of X. Also find the mean and variance of X. (10 marks)

OR

14 Find the probability that in tossing a fair coin 5 times, there will appear i)3 heads ii) 3 tails and 2 heads iii) atleast 1 head iv) not more than 1 tail. (10 marks)

15 Define sampling and discuss about types of sampling. (10 marks)

OR

16 Show that the sample variance is a consistent estimator of the population variance σ^2. (10 marks)

17 Two independent samples are chosen from two schools A and B and a common test is given in a subject. The scores of the students are given. Can we conclude that students of school A performed better than students of School B? (10 marks)

School A	76	68	70	43	94	68	33	
School B	40	48	92	85	70	76	68	22

OR

18 In 120 throws of a single die, the following distribution of faces was observed. (10 marks)

Face:	1	2	3	4	5	6
Frequency:	30	25	18	10	22	15

Test for goodness of fit using Binominal distribution and conclude whether the coin is biased or not.

19 Using Cauchy's integral formula, evaluate $\int_C \frac{z+4}{(z-1)(z-2)} dz$ where C is the circle $|z| = 1$. (10 marks)

OR

20 Show that the function $u = \frac{1}{2}(log\ (x^2 + y^2))$ is harmonic and determine its conjugate and the analytic function. (10 marks)