R20 Regulation *Subject code: 3B4AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, September 2023

PROBABILITY & STATISTICS
(Common to CE, CSE & IT)

Maximum Marks: 70 Date:13.09.2023 Duration: 3 hours

Note: Statistical tables are allowed.

Part-A

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

1 A continuous random variable X that can assume any value between $X = 2$ and $X = 5$ has a density function given by $f(x) = C(1 + x)$. Find the value of 'C'.

2 Define discrete random variable with suitable example.

3 What is unbiased estimator?

4 Define consistent estimator.

5 What are Type I and Type II errors?

6 Write the various steps involved in the testing of hypothesis.

7 Define One - tailed and Two - tailed test.

8 What is Standard Error?

9 The following table shows the sales and advertisement expenditure of a form

	Sales	Advertisement expenditure(Rs Crores)
Mean	40	6
SD	10	1.5

Coefficient of correlation $r = 0.9$. Estimate the likely sales for a proposed advertisement expenditure of Rs. 10 crores.

10 Define simple correlation.

Part-B

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

11 A random variable X has the following probability distribution. [10]

X= 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) Evaluate $P(X < 4)$, $P(0 < X < 4)$

(iii) Find the distribution function of X. (iv) Find mean and variance of X.

OR

12 Find mean and variance of binomial distribution. [10]

13 A population consists of five numbers 2,3,6,8, and 11. Consider all possible samples of size two Which can be drawn with replacement from this population. Find i) The population mean. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) standard deviation of the sampling distribution of means. [10]

OR

14 Show that $\frac{ns^2}{n-1}$ is a consistent estimator of σ^2. [10]

15 In a random of 1000 people from city A, 400 are found to be consumers of rice. In a sample of 800 from city B, 400 are found to be consumers of rice. Does this data give a significant difference between the two cities as far as the proportion of rice consumers is concerned? [10]

OR

16 The sales manager of a large company conducted a sample survey in states A and B taking 400 samples in each case. The results were:

	State A	State B
Average Sales	Rs. 2,500	Rs. 2,200
S.D.	Rs. 400	Rs. 550

Test whether the average sales is the same in the 2 states at 1% level of significance. [10]

17 A group of 10 rats fed on diet A and another group of 8 rats fed on diet B and the following data refers the increase in weight

Diet A	5	6	8	1	12	4	3	9	6	10
Diet B	2	3	6	8	10	1	2	8		

Test whether the estimates of the population variance is significantly different or not. [10]

OR

18 The demand for a particular spare part in a factory was found to vary from day –to- day. In a sample study, the following information was obtained.

Days	Mon	Tue	Wed	Thu	Fri	Sat
No. of spare parts demanded	1124	1125	1110	1120	1126	1115

Test the hypothesis that the number of spare parts demanded does not depend on the day of the week. [10]

19 Find a least squares straight line for the following data:

X	1	2	3	4	5	6
Y	6	4	3	5	4	2

and estimate (predict) Y at X=4 and X at Y=4. [10]

OR

20 Fit an exponential curve of the type $Y = ae^{bX}$ from the following data. [10]

x	1	2	4
y	5	10	30