R20 Regulation *Subject code: 3B4AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular Examinations, July 2022

PROBABILITY & STATISTICS

(Common to CE,CSE & IT)

Maximum Marks: 70 Date:20.07.2022 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 which carries 10M.
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 A random variable has a probability density function $f(x) = \frac{k}{1+x^2}, -\infty < x < \infty$. Find the value of 'k'.

2 The mean and variance of binomial distribution are 8 and 6. Find $P(X \geq 2)$.

3 Define point estimation.

4 What is interval estimation?

5 What is null hypothesis?

6 Define Type I and Type II errors.

7 Write two applications of ψ^2 test.

8 10 oil tins are taken at random from an automatic filling machine. The mean weight of sample is 15.8 kg and standard deviation is 0.5 kg. Does the sample mean differ significantly from the intended weight of 16 kg?

9 Define rank correlation.

10 What is correlation?

Part-B

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

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

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) the value of k (ii) $P(x < 5)$ and $P(1 < x < 6)$ (iii) the distribution function of X. (iv) mean and variance of X.

OR

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

13 Let $X_1, X_2, X_3, \ldots\ldots Xn$ are independent random variables having Poisson distribution with parameter λ. Show that sample mean is an unbiased estimator of λ. [10]

OR

14 A sample of size 9 from a normal population gave $\bar{x} = 15.8$ *and* $s = 10.3$. Find a 99% confidence interval for population mean. [10]

15 The average hourly wage of a sample of 150 workers is plant A was Rs. 2.56 with a S.D of Rs.1.08. The average wage of a sample of 200 workers in plant B was Rs. 2.87 with a S.D of Rs. 1.28. Can an applicant safety assume that the hourly wages paid by plant B are greater than those paid by plant A? [10]

OR

16 A manufacturer claims that his synthetic fishing line has a mean breaking strength of 8kg and S.D 0.5kg. Can we accept his claim if a random sample of 50 lines yield a mean breaking of 7.8kg. Use 1% level of significance. [10]

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]

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]

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

Can you say that the die is biased?

19 By the method of least squares, find a straight line that best fits the following data points. [10]

x	0	1	2	3	4
y	1.0	2.9	4.8	6.7	8.6

OR

20 Fit a parabola for the following data: [10]

x	10	12	15	23	20
y	14	17	23	25	21