R20 Regulation *Subject code: 3B4AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, March/April 2023

PROBABILITY & STATISTICS

(Common to CE,CSE & IT)

Maximum Marks: 70 Date: 28.03.2023 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 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 If a random variable has a Poisson distribution such that P(1)=P(2), Find the Mean of the distribution.
2 Define probability density function.
3 A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence?
4 Write (i) Point Estimation (ii) Interval Estimation
5 Define the Null Hypothesis and alternative hypothesis.
6 Define Type I error and Type II error.
7 Write the Applications of the t- distribution.
8 Write the properties of the chi-square distribution
9 Write the Rank correlation formula.
10 Write any two Properties of regression coefficients.

Part-B

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

11 A Discrete Random Variable X has the following Probability Distribution

X	1	2	3	4	5	6	7	8
P(x)	2K	4K	6K	8K	10K	12K	14K	4K

Find (i) K value (ii) Mean (iii) variance (iv) $P(X<3)$ (v) $P(X \geq 5)$ (10M)

OR

12 A) Out of 800 families with 5 children each, how many would be expected to have (a) 3 boys (b) 5 girls (c) either 2 or 3 boys? assume equal probabilities for boys and girls. (5M)

B) A sample of 100 dry battery cells tested to find the length of life produced the following results: $\bar{x}$=12 hours, σ=2 hours. Assuming the data to be normally distributed. What percentage of battery cells are expected to have a life? i)More than 15 hours ii) Less than 6 hours. (5M)

13 If the population is 3, 6, 9, 15, 27 (10M)

i) List all the possible samples of size 3 that can be taken without replacement from the finite population

ii) Calculate the mean of each of the sampling distributions of means.

iii) Find the standard deviation of the sampling distribution of means.

OR

14 A population consists of 3, 7, 11, and 15 elements. Consider all possible samples of size two drawn with replacement from this population. Find i) Population Mean ii) Population Variance iii) mean of the Sampling distribution of the sample mean iv) Standard error of sample mean. (10M)

15 A sample of 100 bulbs produced by company A showed a mean lifetime of 1190 hours and an SD of 90 hours. A sample of 75 bulbs produced by company B showed a mean lifetime of 1230 hours with an S.D. of 120 hours. Is there a difference between the mean lifetimes of the two brands at a significance level of 0.05? (10M)

OR

16 In a Sample of 1000 people in Karnataka, 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance? (10M)

17 Two horses A & B were tested according to the time to run a particular track with the following results:

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

Test whether the two horses have the same running capacity. (10M)

OR

18 Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins show the sample standard deviations of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test the hypothesis that the true variances are equal, against them that they are not, at the 10% level. (10M)

19 Find Karl Pearson's coefficient of correlation from the following data. (10M)

Wages	100	101	102	102	100	99	97	98	96	95
Cost of living	98	99	99	97	95	92	95	94	90	91

OR

20 Fit a parabola of the form $y = a+bx+cx^2$ to the following data. (10M)

X	1	2	3	4	5	6	7
Y	23	5.2	9.7	16.5	29.4	35.5	54.4