Code No: **20SH4T01**

R20

II B. TECH II SEMESTER REGULAR EXAMINATIONS, JUNE - 2022
PROBABILITY AND STATISTICS
(Common to CSE, INF, AID, CSO, CSM & CIC)

Time: 3 hours   Max. Marks: 70

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Note: Answer **ONE** question from each unit **(5 × 14 = 70 Marks)**
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UNIT-I

1. a) Define statistics and explain the importance of statistics in Data Science. [7M]

    b) A study of 100 engineering companies gives the following data.

Profit (in crores)	0-10	10-20	20-30	30-40	40-50	50-60
No.of companies	8	12	20	30	20	10

    [7M]

    Calculate the mean and standard deviation of the profit earned by companies.

(OR)

2. a) Discuss any two measures of dispersion of statistical data. [7M]

    b) Determine the coefficient of skewness based on quartiles from the following data of marks of 100 student's.

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	14	25	36	11	14

    [7M]

UNIT-II

3. a) Determine line of regression Y on X from the following data. Also estimate the likely demand when the price is Rs. 20 from the following data. [7M]

Price (x)	10	12	13	12	16	15
Demand (y)	40	38	43	45	37	43

    b) Fit a second degree polynomial to the following data by the method of least squares

X	2	4	6	8	10
Y	3.07	12.85	31.47	57.38	91.29

    [7M]

(OR)

4. a) Determine the rank correlation coefficient form the following data about 10 students, ranked according to their achievements in both the laboratory and lecture proportions of an engineering course.

Laboratory	7	3	6	9	10	8	4	2	5	1
Lecture	6	8	4	7	9	10	5	3	2	1

    [7M]

    b) Fit a curve of the type $y = ae^{bx}$ to the following data by the method of least squares

X	1	5	7	9	12
Y	10	15	12	15	21

    [7M]

UNIT-III

5. a) State and prove Baye's theorem of probability. [7M]

    b) The random variable X, representing the number of errors per 100 lines of software code, has the following probability distribution, Determine the mean and variance of X.

X	2	3	4	5	6
P(x)	0.01	0.25	0.4	0.3	0.04

    [7M]

(OR)

6. a) Assume that the probability that a bomb dropped from an aero plane will strike a certain target is 1/4, if 5 bombs are dropped, Calculate the probability that (i) Exactly 2 will strike the target (ii) At least two will strike the target. [7M]

b) Suppose the weights of 800 male students are normally distributed with mean 140 pounds and standard deviation 10 pounds. Find the number of students whose weights are (i) between 138 and 148 pounds (ii) more than 152 pounds. (iii) Less than 150 pounds. [7M]

UNIT-IV

7. a) Define (i) Population and sample (ii) Parameter and Statistic (iii) Sampling distribution (iv) Standard Error. [7M]

b) Calculate the probability that a random sample of 16 computers will have an average life of less than 775 hours assuming that length of life of computers is approximately normally distributed with mean 800 hours and standard deviation 40 hours. [7M]

(OR)

8. a) A population consists of four numbers 3,7,11,15. Consider all possible samples of a size two which can be drawn without replacement from the population. Calculate (i) the mean of sampling distribution of mean (ii) the standard deviation of the sampling distribution of means. [7M]

b) If the mean age at death of 64 men engaged in an occupation is 56·4 years with standard deviation of 10·2 years, then estimate 95% and 99% confidence limits for the mean age at death of all men in that population? [7M]

UNIT-V

9. a) Define (i) Null and Alternative Hypothesis (ii) Type-I and Type-II errors (iii) One and Two tailed tests. [7M]

b) An oceanographer wants to check whether the depth of the ocean in a certain region is 57.4 fathoms, as had previously been recorded. What can he conclude at 0.05 level of significance, if reading taken at 40 random locations in the given region yielded a mean of 59.1 fathoms with a standard deviation of 5.2 fathoms? [7M]

(OR)

10. a) The daily wages in rupees of skilled workers in two cities are as follows

City	Size of sample	S.D of wages in sample
CITY-A	16	25
CITY-B	13	32

[7M]

Test at 5% level of significance the equality of variances of the wage distribution in the two cities.

b) In an experiment to study the dependence of hypertension on smoking habits, the following data were taken on 180 individuals:

	Non-Smokers	Moderate Smokers	Heavy Smokers
Hypertension	21	36	30
No Hypertension	48	26	19

[7M]

Test the hypothesis that the presence or absence of hypertension is independent of smoking habits. Use 0.05 level of significance.

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