R22

Code No: 183BY

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, February - 2024
PROBABILITY AND STATISTICS
(Civil Engineering)

Time: 3 Hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.
- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

1.a) Define Exhaustive events. [1]
b) Find the probability of throwing 7 with two dice. [1]
c) If the Probability of a bolt to be defective bolt is 0.2. Find the mean and variance for the distribution of bolts in a total of 400. [1]
d) If X and Y are independent, then find the Cov(X,Y). [1]
e) Write the mean and standard deviation of Binomial distribution. [1]
f) What does the central limit theorem state? [1]
g) Explain Null and Alternative Hypothesis. [1]
h) What is meant by level of significance? [1]
i) Explain the method of least squares. [1]
j) Write formula for finding the Spearman's rank correlation coefficient. [1]

PART - B

(50 Marks)

2. Four cards are drawn at random from a pack of 52 cards. Find the probability that they are
(a) A king, a queen, a jack and an ace.
(b) Two kings and two queens.
(c) Two black and two red.
(d) Two clubs cards and two diamond cards. [10]

OR

3.

X =x	0	1	2	3	4	5	6	7
P(X=x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Find (a) k (b) $P(x<6)$ (c) $P(0<x\leq 4)$ (d) $P(x\geq 5)$ (e) Distribution Function (f) Find the minimum value of k such that $P(x\leq k)>\frac{1}{2}$. [10]

4.a) If a random variable x has the m.g.f, $M_x(t) = \frac{2}{2-t}$, find the variance of x.

b) Two random variables x and y have the following joint probability density function $f(x,y) = \begin{cases} 2-x-y, 0 \le x \le 1,\ 0 \le y \le 1 \\ 0,\ otherwise \end{cases}$. Find Variance x, Variance y and also the covariance between x and y. [5+5]

OR

5.a) Ten coins are thrown simultaneously. Find the probability of getting at least (i) seven heads (ii) six heads (iii) one head.

b) Fit a Poisson distribution for the following data and calculate the expected frequencies

x	0	1	2	3	4
f(x)	109	65	22	3	1

[5+5]

6. The marks obtained in statistics in a certain examination found to be normally distributed. If 15% of the students got greater than and equal to 60 marks, 40% of the students got less than 30 marks. Find the mean and standard deviation. [10]

OR

7. The nicotine contents in milligrams in two samples of tobacco were found to be as follows:

Sample A	24	27	26	21	25	----
Sample B	27	30	28	31	22	36

To test (a) the equality of means by using students't' test (b) the equality of variances by using F-test. [10]

8.a) An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the claim at 0.05 level of significance?

b) The time taken by workers in performing a job by method I and method II is given below:

Method I	20	16	26	27	23	22	---
Method II	27	33	42	35	32	34	38

Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly? [4+6]

OR

9. Ten soldiers participated in a shooting competition in the first week. After intensive training they participated in the competition in the second week. Their scores before and after training are given below:

Scores before	67	24	57	55	63	54	56	68	33	43
Scores after	70	38	58	58	56	67	68	75	42	38

Do the data indicate that the soldiers have been benefited by the training? [10]

10. Fit the curve $y = ae^{bx}$ for the following data by using least square method.

x	1	2	3	4
y	21	35	59	92

[10]

OR

11. From the following data, Find

(a) The two regression equations

(b) The coefficient of correlation between the marks in Economics and Statistics

(c) The most likely marks in Statistics when marks in Economic are 30.

Marks in Economics	25	28	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

[3+3+4]

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