[Time:3 hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B: 1. Q.1 is compulsory
2. Attempt any three from remaining five questions.
3. Answers to sub questions should be written together.
4. Use of scientific calculator is permitted.

1. a. In 4 tosses of a coin, let X denote number of heads. Find the possible outcomes and find the expectation of X. 5

b. The number of hardware failure system in a week of operation has the following pmf. 5

No. of failure	0	1	2	3	4	5	6
Probability	0.18	0.28	0.25	0.18	0.06	0.04	0.01

i) Find the expected number of failure in a week.
ii) Find the variance of the number of failure in a week.

c. The mean and standard deviation of 200 items are found to be 60 and 20. At the time of calculations two items are wrongly taken as 3 and 67 instead of 13 and 17. Find the correct mean and standard deviation. 5

d. Calculate the modal marks for the following 5

Marks	10-30	30-50	50-70	70-90	90-110	110-130
No. of Students	4	10	14	12	8	6

2. a. The ranks of the some 15 students in two subjects A and B are given below. Use spearman formula to find the rank correlation coefficient. 10

Rank in A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Rank in B	10	7	2	6	4	8	3	1	11	15	9	5	14	12	13

b. Test the consistency of the following data with the symbol having their usual meaning: 5
N = 60 (AB) = 25 (A)= 51 (B)= 32

3. a. The Joint probability density function of the two dimensional random variable (X,Y) is given by 10
f (x,y)=8/9xy, $1 \le x \le y \le 2$
=0, otherwise
a)Find the marginal densities of X and Y.
b)Find the conditional density function of Y given X=x and conditional density function of X given Y=y.

b. The mean weekly sales of chocolate bar in candy stores were 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful? 5

4. a. The following distribution gives marks of 100 students. 10

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	5	8	7	12	28	20	10	10

Find all quartiles and the coefficient of quartile deviation. Use it to determine Bowley's Coefficient of skewness.

b. From a city population, the probability of selecting (i) a male or a smoker is 7/10, (ii) a male smoker is 2/5, and (iii) a male, if a smoker is already selected is 2/3. Find the probability of selecting (a) a non-smoker, (b) a male, and (c) a smoker, if male is first selected. 5

5. a. From the data given below find: 10

i) Regression Coefficient bxy and byx
ii) Two regression equations x on y and y on x
iii) The coefficient of correlation between the marks in Economics and Statistics

Marks in Economics	25	28	35	32	31	36	29
Marks in Statistics	43	46	49	41	36	32	31

b. The number of scooter accidents per month in a certain town were as follows: 5
12,8,20,2,14,10,15,6,9,4
Are these frequencies in agreement with the belief that accident conditions were the same during this 10 months period? [Given : chi-square value at 5% level of significance at 9 degree of freedom is 16.916]

6. a. What is the probability that 4 A's come consecutively in arrangements of the letters in the word 'MAHARASHTRA' ? 5

b. Find if A and B are independent, positively associated or negatively associated: 5
N=1000, (A)=470, (B)=620 and (AB)=320

c. Suppose A and B are events with P(A) = 0.6, P(B) = 0.3 and P(A ∩ B) = 0.2 Find the probability that 5

i) A does not occur
ii) B does not occur
iii) A or B occurs
iv) Neither A nor B occurs

d. If X is a random variable and a, b are constants, then prove that V (a X + b) = a2 V(x) 5
