Sr. No. of Question Paper : 1477

Unique Paper Code : 2362201202

Name of the Paper : DSC – Statistics

Name of the Course : NEP-UGCF-2022 – B.A. (Program) OR

Semester : II

Duration : 3 Hours   Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. Attempt any **five** questions.

3. All questions carry equal marks.

1. (a) Define Conditional probability. Let A and B be events of an experiment such that $P(A) = 3/10$, $P(B) = 1/2$ and $P(B \mid A) = 2/5$. Find the value of

   (i) $P(A \cap B)$

(ii) $P(A \mid B)$

(iii) $P(A \cup B)$

(10)

(b) What are the Independent events? Give example.

(8)

2. (a) In a bolt factory, machines A, B and C manufacture 25%, 35% and 40% of the total outputs respectively. Of their total outputs, 5%, 4% and 2% are defective bolts. A bolt is chosen at random from factory's production and is found to be defective. What is the probability that it was manufactured by machine B? (10)

(b) Define probability function. Suppose A and B are two events such that $B \subset A$, then show that $P(B) \leq P(A)$. (8)

3. (a) Suppose X is a Random Variable with probability mass function as –

X	0	1	2	3	4
P(x)	0.08	0.15	0.45	0.27	0.05

Compute the expectation E[X] and the variance V[X] of the random variable X. (10)

(b) Suppose X has the pdf defined as

$$f(x) = \begin{cases} cx^2 & 0 < x < 7 \\ 0 & , \quad \text{elsewhere} \end{cases}$$

(i) Find c.

(ii) Find $P(1/4 < X < 1)$ (8)

4. (a) For the following bivariate probability distribution of X and Y, find

   (i) $P(X \leq 0)$

  (ii) $P(X \leq 0, Y = 2)$

 (iii) $P(X < 0, Y < 1)$

X \ Y	0	1	2
-1	1/15	3/15	2/15
0	2/15	2/15	1/15
1	1/15	1/15	2/15

(10)

(b) Let two Random Variables X and Y have joint pdf given by :

$$f(x,y) = cxy \quad 0 < x < 1, \ 0 < y < 2.$$

Find the value of c.   (8)

5. (a) Ten coins are thrown simultaneously. Using Binomial Distribution, find the probability of getting at least eight heads. (10)

(b) Define Continuous Uniform Distribution. If a Random Variable X is uniformly distributed with mean 1 and variance 4/3, Find $P(X < 0)$. (8)

6. (a) X is a Poisson variate such that

$$P(X=2) = 9P(X=4) + 90\ P(X=6)$$

Find the mean of X. (10)

(b) A coin is tossed 200 times. Using Central Limit Theorem, find the approximate probability that the number of heads between 80 and 120. (8)

7. (a) Calculate the correlation coefficient for a dataset with the following values of X and Y :

X	1	3	4	5	7	8	10
Y	2	6	8	10	14	16	20

(10)

(b) Define line of regression. Let the lines of regression be $8x - 2y = 0$ and $3Y - 2X = 9$, then find the coefficient of correlation between X and Y. (8)