

December 2022
BCA- III SEMESTER
Probability and Statistics (BCA-DS-202)

Time: 3 Hours**Max. Marks:75**

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.
 4. Use of calculator is allowed

PART -A

- Q1 (a) A continuous random variable X has density function (1.5)

$$f(x) = \begin{cases} K(x+1) & , \quad 0 < x < 3 \\ 0 & , \quad \text{otherwise} \end{cases}$$

Find the value of K and hence calculate mean.

- (b) Differentiate between Uniform Probability Distribution and Exponential Probability Distribution. (1.5)

- (c) A continuous random variable X has (1.5)

$$f(x) = \begin{cases} \frac{1}{2}(x+1) & , \quad -1 < x < 1 \\ 0 & , \quad \text{elsewhere} \end{cases}$$

Represents the density, find the expected value.

- (d) Find K so that, (1.5)

$$f(x,y) = kxy, \quad 1 \leq x \leq y \leq 2$$

Will be a joint probability density function.

- (e) Differentiate between Mesokurtic, Leptokurtic and Platykurtic. (1.5)

- (f) Compute the coefficient of skewness from the following data: (1.5)

2, 4, 6, 8, 10, 12

- (g) Calculate the median of the following data: (1.5)

110, 115, 108, 112, 120, 116, 140, 135, 128, 132, 112, 145, 132, 100

- (h) Differentiate between Regression Analysis and Correlation Analysis. (1.5)

- (i) Define the following terms with the help of an example: (1.5)

1. Positive correlation
2. Linear correlation
3. Multiple correlation

- (j) By the method of least square, find the straight line that best fits the following data: (1.5)

X	1	2	3	4
Y	4	3	2	1

PART -B

Q2 (a) Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the mean and variance of the number of kings. (8)

(b) In a normal probability distribution 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. (7)

Q3 (a) The joint probability density function of (X, Y) is given by: (8)

$$f(x, y) = \begin{cases} 2 & , \quad 0 < x < 1 \text{ and } 0 < y < x \\ 0 & , \quad \text{otherwise} \end{cases}$$

(1). Find the marginal density functions of X and Y.

(2). Find the conditional density function of Y given X = x and that of X given Y = y

(3). Are X and Y independent?

(b) Calculate the expected value and variance of the absolute difference of upturned faces in the experiment of tossing of two dies. (7)

Q4 (a) Define the term statistics. Explain the following points in details: (8)

1. Classification of data
2. Representation of data
3. Central tendency

(b) Calculate Karl Pearson's coefficient of Skewness. (7)

Income (Rs)	No. of Employees
400-500	8
500-600	16
600-700	20
700-800	17
800-900	3

$a = 1.142$
 $b = 2.679$

Q5 (a) From the given data obtain the two regression equations using the method of least square: (8)

X	1	2	3	4	5	6	7
Y	3	7	10	12	14	17	20

(b) Calculate Karl Pearson's coefficient of correlation using following data: (7)

X	35	34	40	43	56	20	38
Y	32	30	31	32	53	20	33

Q6 (a) Fit a poisson distribution on the following : (8)

X	0	1	2	3	4
F	192	100	24	3	1

(b) Find the moment generating function of the random variable X having the probability density function (7)

$$f(x) = \begin{cases} x & ; \quad 0 \leq x < 1 \\ 2 - x & ; \quad 1 \leq x < 2 \\ 0 & ; \quad \text{otherwise} \end{cases}$$

Also find the mean and variance of X using m.g.f.

- Q7 (a) Ten Competitors in a beauty contest are ranked by three judges in the following orders: (8)

Judge A	1	6	5	10	3	2	4	9	7	8
Judge B	3	5	8	4	7	10	2	1	6	9
Judge C	6	4	9	8	1	2	3	10	5	7

Use the correlation coefficient to determine which pair of judges has the nearest approach to common taste in beauty.

- (b) Calculate Mean, Median and Mode using following data: (7)

Marks	No. of Students
0-10	3
10-20	5
20-30	7
30-40	10
40-50	12
50-60	15
60-70	12
70-80	6
80-90	2
90-100	8

3
8
15
25
432
52
