



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 3rd Semester Examination, 2021-22

STSACOR05T-STATISTICS (CC5)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

GROUP-A

Answer any four questions from the following

5×4 = 20

1. (a) The random pair (X, Y) has the distribution 3

Y	X		
	1	2	3
2	1/12	1/6	1/12
3	1/6	0	1/6
4	0	1/3	0

Find probability distributions of random variables U and V that have same marginals as X and Y but are independent.

- (b) Let X_1 be the number of trials needed to get the first head and X_2 be the number of trials needed to get two heads in repeated tosses of a fair coin. Are X_1 and X_2 independent? 2

2. (a) When two random variables are said to be mutually exclusive? 2

- (b) Let X and Y be jointly continuous random variables with joint PDF 1+2

$$f_{X,Y}(x, y) = 6e^{-(2x+3y)}, \quad x, y \geq 0$$

(i) Are X and Y independent?

(ii) Find $E(Y | X > 2)$.

3. What is 'points of inflexion'? Find those points for normal density. 2+3

4. Define trinomial distribution. Find covariance between the variables that have trinomial distribution. 2+3

5. (a) Find harmonic mean of the Pareto distribution. 2

- (b) Find median of Laplace distribution. 3

6. Define characteristic function of a random variable. Show that it always exists. $1+1\frac{1}{2}+2\frac{1}{2}$
Also, show that it is real if and only if the underlying distribution is symmetric about zero.

GROUP-B

Answer any *two* questions from the following

10×2 = 20

7. Find the mode, MGF and skewness of the following distribution 3+3+4

$$f(x) = \frac{\left(\frac{x}{b}\right)^{c-1} e^{-\frac{x}{b}}}{b[(c-1)!]}, \quad 0 \leq x < \infty, \quad b > 0, \quad c = 1, 2, 3, \dots$$

8. (a) Derive mean deviation about median for a Normal (μ, σ^2) distribution. 4
(b) If $(X, Y) \sim$ bivariate normal $(\mu_x, \mu_y, \sigma_x^2, \sigma_y^2, \rho)$, then find 3+3
(i) conditional distribution of Y given X
(ii) marginal distribution of Y .

9. Suppose X and Y have joint density function given by 10

$$f_{X,Y}(x, y) = k \cdot xy^2, \quad 0 < x < y < 1,$$

and 0, otherwise. Compute k , marginal densities of X and Y , $E(X)$, $E(Y)$ and the regression functions Y on X and X on Y .

N.B. : Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.

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