WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 2nd Semester Examination, 2021

STSACOR03T-STATISTICS (CC3)

PROBABILITY AND PROBABILITY DISTRIBUTIONS-I

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. State and prove Boole's inequality.   5

2. Let A, B and C denote events. If $P(A|C) \geq P(B|C)$ and $P(A|C^c) \geq P(B|C^c)$, show that $P(A) \geq P(B)$.   5

3. For the probability density function, $f(x) = cx^2(1-x)$, $0 < x < 1$. Find (i) the constant c, and (ii) mean.   5

4. If the letters of the word 'RANDOM' be arranged at random, what is the chance that there are exactly two letters between A and O?   5

5. State and prove the memoryless property of geometric distribution.   5

6. Two fair dice are thrown simultaneously. Let A be the event that the first number thrown is not larger than 3, and let B be the event that the sum of the two numbers thrown equals 6. Find the $P(A)$ and $P(B)$ and $P(A|B)$ and $P(B|A)$.   5

GROUP-B

Answer any *two* questions from the following   10×2 = 20

7. (a) Let the probability that the weather on any day is of the same type (rain or no rain) as the previous day be p. Let P_1 be the probability of rain on the first day of the year. What is the probability P_n of rain on the n-th day?   5

(b) Define independence of events. What is the difference between pairwise and mutual independence? 5

8. (a) Stating underlying assumptions, show that Hypergeometric distribution can be approximated by binomial distribution. 5

(b) Show that for a Poisson distribution, the coefficient of variation is the reciprocal of the standard deviation. 5

9. (a) Find the recursive relation for central moments of Poisson distribution. 5

(b) If the probability that a target is destroyed on any one shot is 0.4, what is the probability that it would be destroyed on 6th attempt? 5

10. (a) Stating underlying assumptions, show that Negative binomial distribution can be approximated by Poisson distribution. 5

(b) Find the mode of binomial distribution with parameters *n* and *p*. 5

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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