WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 2nd Semester Examination, 2022

STSACOR03T-STATISTICS (CC3)

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. In a single throw of three dice, find the probability of getting a sum of at least 5. 5

2. An event A is known to be independent of events B, $B \cup C$ and $B \cap C$. Show that it is also independent of C. 5

3. Write a note on pairwise and mutually independence of events. 5

4. A continuous random variable X has the p.d.f. $f(x) = A + Bx$, $0 \le x \le 1$. If mean of the distribution is $\frac{1}{2}$, find A and B. 5

5. An urn contains n cards marked from 1 to n, two cards are drawn at a time. Find the mathematical expectation of the product of the numbers on the cards. 5

6. If $X \sim B(n, p)$, show that $P(X \le 2) = P(X \ge (n-2))$, if and only if $p = \frac{1}{2}$. 5

GROUP-B

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

7. (a) State and prove Bayes theorem. 5

   (b) The chances of X, Y, Z becoming managers of a certain company are 4:2:3. The probabilities that bonus scheme will be introduced of X, Y, Z become managers are 0.3, 0.5 and 0.8 respectively. If the bonus scheme has been introduced, what is the probability that X is appointed as the manager? 5

8. (a) Find the mean deviation about mean of binomial distribution. 5

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

9. (a) If X and Y are independent Poisson variables, show that the conditional distribution of X given $X+Y$ is binomial. 5

   (b) A couple decides to have children until they have a female child. What is the probability distribution of the number of children they would have? If the probability of a male child in their community is $\frac{2}{3}$, how many children are they expected to have before the first female child is born? 5

10. (a) Find the mean and variance of Hypergeometric distribution. 5

    (b) The number of aeroplanes arriving at an airport in a 30 minutes interval obeys the Poisson law with mean 25. Use Chebyshev's inequality to find the least chance, that the number of planes to arrive within a given 30-minute interval will be between 15 and 35. 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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