SYLHET CADET COLLEGE

FIRST TERM-END EXAMINATION - 2024 | Set | A |
CLASS: XII
STATISTICS (CREATIVE) **Subject Code:** | 1 | 3 | 0 |
FIRST PAPER
TIME – 2 hours & 35 minutes
FULL MARKS – 50

[**N.B.** – The figures of the right margin indicate full marks. Read the stems carefully and answer the associated questions. Answer any **FIVE** questions taking at least two questions from each group]

Group–A

1. **As part of an experiment, a neutral coin is tossed 5 times.**

   (a) What is a neutral coin? 1

   (b) If a coin is flung n times, show the no. of outcomes generated. 2

   (c) What is the probability of getting a) at least 3 heads, b) at most 3 heads? 3

   (d) Are these probabilities equal? a) Getting at least 2 heads & b) Getting at least 2 tails. Also justify logically. 4

2. **A sorcerer draws 3 cards from a pack (i) with replacement and then (ii) without replacement. The cards were well-shuffled before drawing.**

   (a) What is an uncertain event? 1

   (b) Differentiate between classical and empirical approach of probability. 2

   (c) As per (i), what is the probability that the cards have different color? 3

   (d) As per (ii), what is the probability that the cards are aces of same color? 4

3. **A continuos random variable X follows the following probability density function (pdf).**

$$f(x) = 6x(x-1); 0 \leq x \leq 1$$

   (a) Give an example of a continous random variable. 1

   (b) Examine whether the given function is a pdf. 2

   (c) If $P(X > a) = P(X < a)$, find the value of a. 3

   (d) Should $P(0.5 \leq X \leq 1)$ be equal to 0.5? 4

4. **A random variable is distributed as below:**

$$P(X) = \frac{3-|4-x|}{k}; x = 2, 3, 4, 5, 6$$

   (a) What is the Expectation equivalent to? 1

   (b) Find the value of k. 2

   (c) Determine the value of the expectation. 3

   (d) Find $V(2X-1)$ 4

Group–B

5. **A random variable is distributed as follows:**

Value	0	1	2	3	4	5
Frequency	70	73	27	15	4	1

   (a) What is the mean of Poisson distribution? 1

   (b) What is the relationship between mean and standard deviation of Poisson distribution? 2

   (c) Find the mean and variance of the given distribution. 3

   (d) Compare the observed and expected frequencies, assuming a Possion distribution. 4

6. **The number of defective pen produced by a company follows a binomial distribution with expectation 1.5 and variance 1.125.**.

   (a) What is the mean of binomial distribution 1

   (b) Can variance be greater than mean in binomial distribution? 2

   (c) Determine the probability function of the number of defective items produced by the company. 3

   (d) What is the probability that the number of defective items is no less than 3? 4

7. **The number of customers coming at a shop per minute follows a Poisson distribution, whose mean is 3.**

   (a) What is a Poisson variate? 1

   (b) Can the mean of Poisson distribution be negative? 2

   (c) Find the probability that the number of customers coming is between 1 and 2. 3

   (d) Analyze the statement: P(X=2) = P(X=3). 4

8. **As part of an analysis, a researcher collected data on women and live births.**

Age	15-19	20-24	25-29	30-34	35-39	40-44	45-49
No. of Women	540	760	530	495	450	505	430
No. of live births	109	198	86	90	65	76	60

   (a) What is the formula of death rate? 1

   (b) Write down the uses of vital statistics. 2

   (c) Find teh Age Specific Birth Rates (ASFR). 3

   (d) Find the GFR and compare its concept and value with ASFRs. 4