

SYLHET CADET COLLEGE

TEST EXAMINATION - 2024

CLASS: XII

STATISTICS (CREATIVE)

SECOND PAPER

TIME – 2 hours & 35 minutes

FULL MARKS – 50

Set	A
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Subject Code:	1	3	0
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[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