

Sylhet Cadet College
Model Test Examination - 2022
Class: HSC

Subject: Statistics 2nd Paper (Creative)

Time: 1 hour & 40 minutes

Subject Code: 129

Full Marks: 30

Answer three questions taking at least 1 (one) from each group. Figures in the right indicate full marks.

Group A

1. **A red and a blue dice are thrown once. The dice are absolutely neutral and independent.**

- (a) What is a simple event? 1
- (b) Give an example of a certain event using set theory. 2
- (c) Find the probability that the difference of two digits from two dices is less than 3. 3
- (d) Are the probabilities of getting greater digit from the blue die and that from the red die equal? Justify. 4

2. **A coin is tossed five times. The number of heads appearing from the tosses is considered a discrete random variable.**

- (a) What is a discrete random variable? 1
- (b) Are probability distributions and frequency distributions similar? Show with an example. 2
- (c) Find the probability distribution from the stem and show in a table. 3
- (d) Find the probability that a head will appear in more than 3 tosses. 4

3. **A professor showed a probability distribution in a class:**

x	1	2	3	4	5
p(x)	0.1	a	0.3	b	0.2

The value of the arithmetic mean of the distribution is 3.

- (a) What is the formula of expectation? 1
- (b) What is the variance of a constant? Explain logically. 2
- (c) What are the values of a & b? 3
- (d) Find and explain the variance of the distribution. 4

4. **X is a random variable having the below functional form:**

$$P(X) = \frac{6-|7-x|}{k}; x = 1, 2, \dots, 10$$

Y is another variable having the relationship $y = 3x+5$

- (a) What is joint probability? 1
- (b) What is the minimum possible value of variance? Why? 2
- (c) Find the value of k. 3
- (d) Find $E(X)$ and $E(Y)$. Why are they different? 4

Group B

5. **A survey of Television (TV) users at Gulshan in Dhaka was conducted to find how many sets each family use. The following data were obtained:**

No of TV set	0	1	2	3
No of family	10	75	10	5

- (a) What is Expectation equivalent to? 1
- (b) Can Variance be negative? Why or why not? 2

- (c) Find the variance of the number of TV sets. 3
- (d) Find and compare between arithmetic mean and expectation. 4

6. A farmer plans to store rice seeds for future use. It was found that 8 out of 20 seeds are rotten. He then collected a sample of 15 seeds.

- (a) What is Bernoulli trial? 1
- (b) How are Bernoulli and Binomial distributions related? 2
- (c) What is the probability that at least one seed is rotten out of 15? 3
- (d) What is the probability that the number of rotten seeds is greater than the arithmetic mean? 4

7. BTCL receives 2.5 telephone calls on average from 4 pm to 6 pm. The number of calls received is a random variable.

- (a) When is Poisson variate applicable? 1
 - (b) Show conversion criteria and method from Binomial to Poisson distribution. 2
 - (c) Find the probability of receiving no more than 3 calls. 3
 - (d) Find the pattern of calls and show on graph paper. 4
- Hint: Find probabilities: $P(0)$, $P(1)$, ...

8. Population of Dhaka and Sylhet by different age groups and areas are given below:

Division	Age			Area (km^2)
	0-14	15-64	65+	
Dhaka	10,000,00	5,00,000	5,80,000	1,880
Sylhet	7,00,000	2,70,000	4,70,000	2,319

- (a) Write down the formula of dependency ratio. 1
- (b) What is meant by $NRR = 0.983$? 2
- (c) Find and compare between the dependency ratios of the cities. 3
- (d) Based on data, which city is more comfortable for living? 4