Sylhet Cadet College

Test Examination - 2022

Class: HSC

Subject: Statistics 2nd Paper (Creative)

Time: 1 hours & 40 minutes **Subject Code: 130** **Full Marks: 30**

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

Group A

1. **It is observed that in a college, there are 100 students, of whom 30 play football, 40 play cricket, and 20 play both.**

   (a) What is a sample space? 1

   (b) What is the relationship between independence and mutual excluvity? 2

   (c) Are the probabilities of playing cricket and that of football independent? Prove. 3

   (d) If a student is selected randomly,a nd if he plays cricket, what is the probability that he does not play football? 4

2. **The probability density function of a continuous random variable is**

$$f(x) = \begin{cases} kx^2 + kx + \frac{1}{8}, & 0 \leq x \leq 2 \\ 0, & otherwise \end{cases}$$

   (a) What is a random variable? 1

   (b) Find the value of k 2

   (c) Find the probability that the values of x would lie between 0 and 1. 3

   (d) Is $f(x)$ a probability density function? Justify. 4

Group B

3. **In winter, the probability that it rains on a particular day is 0.015. An analyst observes 100 winter days.**

   (a) What is an experiment? 1

   (b) When can the Poisson distribution be approximated by the Binomial distribution? 2

   (c) Find, using Binomial distribution, the probability that it would not rain at all on the observed days. 3

   (d) Find the probability in 3(c) using Poisson distribution. 4

4. **For projection of population in a future time period, demographers use simple, geometric or exponential growth technique. Each method has its advantages and disadvantages.**

   (a) For projection of population in a future time period, demographers use simple, geometric or exponential growth technique. Each method has its advantages and disadvantages. 1

   (b) In geometric growth method, obtain the formula for time required for the population to get doubled [denote rate as r]. 2

   (c) In exponential method, how much unit of time is required for the population to get tripled? 3

   (d) For projecting (predicting future values), is geometric growth method better than the exponential method? Justify. 4