

## BSc (NEP) Semester-2 Examination

DSC-C-121 T

Statistics

April-2024

Time : 2-00 Hours]

[Max. Marks : 50

- Q.1 (A) Explain the following term: 5  
 (1) Sample Space  
 (2) Mutually Exhaustive event  
 (3) Mutually Exclusive event
- (B) State and prove Boole's inequality. 5  
 OR
- (A) Define conditional probability, state and prove Baye's theorem. 5  
 (B) State and prove Bonferroni's inequality. 5
- Q.2 (A) Explain joint probability mass function and joint probability density function. 5  
 (B) Define the mathematical expectation and prove any two properties. 5  
 OR
- (A) Explain Probability mass function and Probability density function. 5  
 (B) Write a note on marginal and conditional distributions. 5
- Q.3 (A) Write a note on product raw moments and product central moments. 5  
 (B) Explain moment generating function and probability generating function. 5  
 OR
- (A) Explain factorial moment generating function with their properties. 5  
 (B) Write a note on Skewness and Kurtosis. 5
- Q.4 (A) Define Jacobian. State the properties of Jacobian. 5  
 (B) Write a short note on Transformation of one-dimensional random variable. 5  
 OR
- (A) Write a short note on Transformation of two-dimensional random variable. 5  
 (B) Prove that if X and Y are independent continuous random variables then pdf of  $U = X - Y$  is given by  $h(u) = \int_{-\infty}^{\infty} f_X(x)f_Y(x+u)dx$  5
- Q.5 **Attempt any Five** 10
- 1 A coin is tossed three times. What is the probability that at least two heads are obtained?
  - 2 Two cards are drawn from the pack of 52 cards. Find the probability that both are diamonds or both are kings.
  - 3 What is the result of  $V(2x+5y)$ , if x and y are independent events?
  - 4 Solve  $E(6x+4y)$ , if x and y are independent events?
  - 5 Write the formula for conditional probability function of Y given  $X=x$
  - 6 What is the Jacobian of p, q, r w.r.t x, y, z given  $p = x+y+z$ ,  $q = y+z$ ,  $r = z$ ?
  - 7 Define discrete random variable.
  - 8 Define Cumulant generating function.