



'সমানো মন্ত্র: সমিতি: সমানী'

UNIVERSITY OF NORTH BENGAL

B.Sc. Programme 2nd Semester Examination, 2022

DSC1/2/3-P2-STATISTICS

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
All symbols are of usual significance.*

GROUP-A

1. Answer any **five** questions: 1×5 = 5
- (a) For binomial distribution with mean 5 and S.D. 2, find the mode.
 - (b) State two properties of normal distribution.
 - (c) Show that the chance of throwing an odd number with a die is $\frac{1}{2}$.
 - (d) What is the chance that a leap year selected at random will contain 53 Sundays?
 - (e) Distinguish between p.m.f. and p.d.f.
 - (f) The mean and variance of X are 10 and 4 respectively. Find the mean and variance of $5 - 2X$.
 - (g) A speak truth in 75% and B in 80% of the cases. In what percentage of cases, are they likely to contradict each other stating the same fact?
 - (h) If $P(A \cup B) = \frac{5}{6}$, $P(A \cap B) = \frac{1}{3}$ and $P(A^c) = \frac{1}{2}$, then show that A and B are independent.

GROUP-B

2. Answer any **three** questions: 5×3 = 15
- (a) Find the variance of Poisson distribution.
 - (b) State and prove Bayes' Theorem.
 - (c) If X follows binomial distribution with parameter n and p then prove that
$$P[X \text{ is even}] = \frac{1}{2}[1 + (q - p)^n] \text{ where } p + q = 1$$
 - (d) Derive Poisson distribution as the limit of binomial distribution.
 - (e) Let X be a binomially distributed random variable with parameter n and p . For what value of p is $\text{var}(X)$ a maximum, if you assume that n is fixed?

GROUP-C

3. Answer any *two* questions: 10×2 = 20
- (a) (i) Show that the expectation of the sum of two jointly distributed random variable X and Y is the sum of their expectations. 5
- (ii) Let the variable X have the distribution $P(X = 0) = P(X = 2) = p$; $P(X = 1) = 1 - 2p$, for $0 \leq p \leq \frac{1}{2}$. 5
- For what value of p is the $\text{var}(X)$ maximum?
- (b) (i) Show that odd order central moments of the normal distribution are equal to zero. 5
- (ii) A coin is tossed until a head appears. What is the expectation of the number of tosses? 5
- (c) (i) Find the probability that at most 5 defective fuses will be found in a box of 200 fuses if experience show that 2% of such fuses are defective. 5
- (ii) Find the expected value of the number of points that will be obtained in a single throw with an ordinary die. 5
- (d) (i) Find the points of inflexion of the normal curve. 5
- (ii) Assume the mean heights of soldiers to be 68.22 inches with a variance of $10.8(\text{in})^2$. How many soldiers in a regiment of 1000 would you expect to be over 6 feet tall? 5
- (Given that the area under the standard normal curve between $x = 0$ and $x = 0.35$ is 0.1368 and between $x = 0$ and $x = 1.15$ is 0.3746).

—x—