2024

2nd Semester Examination (CCFUP : NEP)

STATISTICS

Paper : MI 2-T (Minor)

(Introductory Probability)

Full Marks : 40 Time : Two Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Group - A

Answer any ***five*** of the following questions : 2×5=10

1. Define sample space.
2. Give the classical definition of probability.
3. When are two events said to be independent?
4. Suppose two unbiased coins are tossed. Find the probability that there will be at most one head.

P.T.O.

5. If a random variable X denotes the number of successes before the first failure, then state the probability distribution of X and write its p.m.f.

6. For two events A and B, show that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

7. Define conditional probability.

8. Define probability mass function and mention its properties.

Group - B

Answer any ***four*** of the following questions : 5×4=20

9. (i) Give the axiomatic definition of probability. 2

   (ii) In an area, 15% days are rainy and 3% days are both rainy and stormy. If a random day is fixed up, then what is the probability that the day will be stormy if it is given that the day is already rainy? 3

10. Define random variable and explain it by using an example.

11. If A and B are two independent events, then prove that

    (i) $\overline{A}$ and $\overline{B}$ are also independent.

    (ii) A and $\overline{B}$ are also independent.

    (iii) $\overline{A}$ and B are also independent.

12. Obtain the MGF of a binomial distribution.

13. Determine the mode of a Poisson distribution.

14. Box 1 contains 4 defective and 16 nondefective light bulbs. Box 2 contains 1 defective and 1 nondefective light bulb. We roll a fair die 1 time. If we get a 1 or a 2, then we select a bulb at random from Box 1. Otherwise, we select a bulb from Box 2. What is the probability that the selected bulb will be defective?

Group - C

Answer any ***one*** of the following questions : 10×1=10

15. (a) Derive the mean and variance of an exponential distribution with rate parameter λ. 6

    (b) Two cards are drawn randomly from a standard deck of cards. Find the probability that both are of same suit and same denomination. 4

16. (a) Define distribution function of a random variable and mention its properties.

    (b) Show that the mean and variance of a Poisson distribution are equal. 3+7