Reg. No. | | | | | | | | | |

BSCSTC 152

Credit Based II Semester B.Sc. Degree Examination, September 2022
(2018–19 and Earlier Batches)
STATISTICS
Regression Analysis and Discrete Distribution

Time : 3 Hours Max. Marks : 80

Instructions : *1) A single booklet containing **40** pages will be **issued**.*
*2) **No** additional sheets will be **issued**.*

PART – A

1. Answer **any ten** of the following. **(10×2=20)**

a) Define discrete and continuous sample space with examples.

b) Define pairwise and mutual independence of events.

c) Give the classical definition of probability.

d) Define random variable and its probability function.

e) Show that E(aX+b) = aE(X)+b.

f) What are the properties of p.m.f. ?

g) State the properties of the distribution function of a random variable.

h) Examine whether the following is a p.d.f.

$$f(x) = \frac{1}{\theta} e^{-x/\theta}, \quad x \geq 0, \theta > 0 \cdot$$

i) Obtain the variance of Bernoulli distribution.

j) Define hyper geometric distribution.

k) What is the relation between negative binomial distribution and geometric distribution ?

l) State the conditions under which a binomial distribution tends to Poisson distribution.

P.T.O.

PART – B

Answer **any five** of the following. **(5×6=30)**

2. State and prove multiplication theorem of expectation for any two events.

3. State and prove addition theorem of probability for any two events.

4. If A and B are independent counts show that
   i) A and B′ are independent.
   ii) A′ and B′ are independent.
   iii) A′ and B are independent.

5. State and prove Bayes theorem of probability.

6. State and prove addition theorem of expectation of two continuous random variables.

7. Find the mean and variance of binomial distribution.

8. Find the mean and variance of negative binomial distribution.

9. Derive recurrence relation for central moments of Poisson distribution.

PART – C

Answer **any three** of the following. **(3×10=30)**

10. a) Define conditional probability and show that it satisfies the axioms of probability. **5**

    b) With usual notations prove that $0 \leq P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$. **5**

11. a) State and prove multiplication theorem of probability of two events. **5**

    b) If X and Y are two random variables, ‘a’ and ‘b’ are constants. Find V (aX + bY). **5**

12. a) State and prove memoryless property of geometric distribution. **6**

    b) Derive the variance of discrete uniform distribution. **4**

13. a) Assuming mean find the variance of hyper geometric distribution. **6**

    b) Find the variance of geometric distribution. **4**
