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

# BSCSTCN 201

## II Semester B.Sc. Examination, September 2022
## (NEP 2020) (2021 – 2022 Batch Onwards)
## STATISTICS
## Probability and Probability Distributions – I (DSCC)

Time : 2 Hours Max. Marks : 60

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

PART – A

1. Answer **any three** of the following. **(3×2=6)**
   a) Write down the sample space when a coin is tossed thrice.
   b) Define continuous random variable and its probability density function.
   c) State Markov's inequality.
   d) Define negative binomial distribution.
   e) Describe the use of colon operator.
   f) Mention any two limitations of R.

PART – B

Answer **any four** of the following. **(4×6=24)**

2. State and prove the addition theorem of probability for two events.

3. If A and B are two events with $P(A) = p_1 > 0$ and $P(B) = p_2$, show that $P(B|A) \geq 1 - \frac{(1-p_2)}{p_1}$.

4. If $p(x) = \frac{x}{15}$; x = 1, 2, 3, 4, 5, verify whether p(x) is p.m.f. If so find the distribution function.

P.T.O.

5. Define m.g.f. and c.g.f. of a random variable. For two independent random variables X and Y, show that $M_{X+Y}(t) = M_X(t). M_Y(t)$.

6. Prove that the recurrence relation between the central moments of Poisson distribution is $\mu_{r+1} = \lambda\left[r\,\mu_{r-1} + \frac{d\mu_r}{d\lambda}\right]$. Where $\mu_r$ is the $r^{th}$ moment about mean.

7. Derive the median of normal distribution.

8. Write a note on input and output in R.

PART – C

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

9. a) If A and B are independent events, show that
   i) A′ and B′ are independent.
   ii) A and B′ are independent. **5**

   b) State and prove Baye's theorem of probability. **5**

10. a) State and prove the multiplication theorem of expectation for two continuous random variables. **5**

    b) Show that $V(aX + bY) = a^2 V(X) + b^2 V(Y) + 2ab \text{ Cov}(X, Y)$. **5**

11. a) State and prove the memoryless property of geometric distribution. **5**

    b) Derive the variance of U(a, b) distribution. **5**

12. a) Define Beta distribution of first kind and obtain mean of Beta distribution of first kind. **5**

    b) Explain statistical functions performed by R. **5**