

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

Time : 2 Hours

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.
 - 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

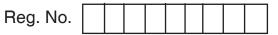
Answer **any four** of the following.

- 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 $P(B|A) \ge 1 \frac{(1-p_2)}{p_1}$.
- 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.

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Max. Marks : 60

(3×2=6)



(4×6=24)

- 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 μ_r is the rth moment about mean.
- 7. Derive the median of normal distribution.
- 8. Write a note on input and output in R.

Answer any three of the following.

- 9. a) If A and B are independent events, show that
 - i) A' and B' are independent.
 - ii) A and B' are independent.
- b) State and prove Baye's theorem of probability.
 10. a) State and prove the multiplication theorem of expectation for two continuous random variables.
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 - b) Show that $V(aX + bY) = a^2 V(X) + b^2 V(Y) + 2ab Cov(X, Y)$. 5
- 11. a) State and prove the memoryless property of geometric distribution.
 - b) Derive the variance of U(a, b) distribution.
- 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.

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(10×3=30)

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