Statistics

K22U 3654

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, November 2022
(2019 Admission Onwards)
CORE COURSE IN STATISTICS
3B03STA : Probability Distribution and Limit Theorems

Time : 3 Hours Max. Marks : 48

Instruction : *Use of calculators and statistical tables are* ***permitted.***

PART – A

Answer **all** questions. **Each** question carries **1** mark. **(6×1=6)**

1. When looking at a person's eye colour, it turns out that 1% of people in the world has green eyes. Considering a group of 20 people, let X denote the number of people in the group with green eyes. Identify the probability distribution of X and its parameters.
2. Suppose that X and Y are independent Poisson distributed random variables having means m and n respectively. Write down the probability mass function of Z = X + Y.
3. Give the expression for variance of uniform random variable defined on (a, b).
4. If $X_{i,\ i=1,2,\dots,n}$ are independent and identically distributed random variables following N(μ, 1), what is the distribution of mean of X_i's.
5. What do you mean by convergence in probability ?
6. State Chebychev's inequality.

P.T.O.

PART – B

Answer **any 7** questions. **Each** question carries **2** marks. **(7×2=14)**

7. Derive moment generating fucntion(m.g.f.) of uniform distribution on {0, 1, 2, ..., n – 1}.
8. Find measure of skewness β1 of binomial distribution.
9. Define geometric distribution and state how it is related to negative binomial distribution.
10. If X is a Poisson variate with parameter m such that P(X = 1) = P(X = 2), find P(X=4).
11. State area property of normal distribution.
12. A standardized test is given to 10,000 students. Suppose their scores are normally distributed with mean 665 and standard deviation 85. If anyone who scored above 835 was given Rs. 1,000 for college, how many got Rs. 1,000 for college ?
13. Derive m.g.f. of exponential distribution.
14. State Weak Law of Large Numbers.
15. State Lindberg Levy form of Central Limit Theorem.

PART – C

Answer **any 4** questions. **Each** question carries **4** marks. **(4×4=16)**

16. Derive recurrence relation between central moments of Poisson distribution. Hence find μ_2.
17. Find the mode of normal distribution.

18. For one parameter gamma distribution, find m.g.f., mean and variance.
19. If X is beta variate of first kind, find the distribution of Y = 1–X.
20. If X is a random variable such that E(x) = 3, Var(X) = 4, Use Chebychev's inequality to determine lower bound for Prob (– 2 < X < 8).
21. State and prove Bernoulli's law of large numbers.

PART – D

Answer **any 2** questions. **Each** question carries **6** marks. **(2×6=12)**

22. Show that binomial distribution tends to Poisson distribution, stating the conditions.
23. Derive the mean, variance and mean deviation of standard normal distribution.
24. State and prove lack of memory property of exponential distribution.
25. State and prove De Movire Laplace Central Limit theorem.

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