K20U 1851

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree CBCSS (OBE) – Regular Examination, November 2020
(2019 Admission Only)
CORE COURSE IN STATISTICS
3B03STA : Probability Distributions and Limit Theorems

Time : 3 Hours Max. Marks : 48

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

PART – A
(Short Answer)

Answer **all** questions : **(6×1=6)**

1. Give the p.g.f. of a geometric distribution.
2. When do you say that a random variable X is degenerate at k ?
3. Obtain the mean of a continuous uniform distribution over the interval (a, b).
4. Give the points of inflexion of a normal curve.
5. Define Standard Cauchy distribution.
6. Give the characteristic function of an exponential distribution with mean θ .

PART – B
(Short Essay)

Answer **any 7** questions : **(7×2=14)**

7. If X ~ b(n, p) then find the distribution of n – X.
8. Find the moment generating function of a Poisson distribution.

P.T.O.

9. If a random variable $X \sim U(-3, 3)$ then compute $P(|X| \leq 2)$.

10. Find the mode of a normal distribution.

11. Describe the additive property of an exponential distribution.

12. Obtain the mean and variance of a gamma distribution.

13. Define convergence in probability.

14. Examine whether the WLLN holds for the sequence $\{X_k\}$ of independent random variables given by

    $P(X_k = \pm 2^k) = 2^{-(2k+1)}, P(X_k = 0) = 1 - 2^{-2k}$.

15. Define Lindeberg-Levy form of Central Limit Theorem.

PART – C

(Essay)

Answer **any 4** questions : **(4×4=16)**

16. Show that geometric distribution possesses the lack of memory property.

17. Derive the m.g.f. of a negative binomial distribution and hence find its mean and variance.

18. Find the mean deviation about mean of $N(\mu, \sigma^2)$.

19. Let X be distributed as beta distribution of first kind with parameters p and q. Derive the distribution of $Y = \frac{X}{1-X}$. Identify the density function of Y.

20. State and prove Bernoulli's Law of Large numbers.

21. A random variable X has E(X) = 3 and E(X^2) = 13. Obtain the lower bound of P(– 2 < X< 8).

PART – D

(Long Essay)

Answer **any 2** questions : **(2×6=12)**

22. Show that Poisson distribution is the limiting form of Binomial distribution.

23. Show that for a normal distribution with variance σ^2, the odd order central moments are zero and even order central moments are given by

    $\mu_{2r} = 1.3.5....(2r-1)\sigma^{2r}$.

24. Find the mean and variance of a Beta distribution of second kind.

25. State and prove Chebyshev's inequality.

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