K22U 3655

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/
Improvement) Examination, November 2022
(2019 Admission Onwards)
COMPLEMENTARY ELECTIVE COURSE IN STATISTICS FOR
MATHEMATICS/COMPUTER SCIENCE
3C03STA : Probability Distributions

Time : 3 Hours

Max. Marks : 40

PART – A
(Short Answers)

Answer **all** questions :

$(6×1=6)$

1. Define mathematical expectation.

2. Give the expression for 2nd central moment in terms of raw moments.

3. What are the conditions under which we can approximate binomial distribution of Poisson distribution ?

4. Which is the discrete distribution having lack of memory property ? Give its p.m.f.

5. Give the moment generating function of a normal random variable.

6. Give the mean of a rectangular distribution on (2, 5).

PART – B
(Short Essay)

Answer **any 6** questions :

$(6×2=12)$

7. What are the properties of characteristic function ?

8. Let X be a random variables. Show that $V(X) \geq 0$.

P.T.O.

9. Derive the mean of a Poisson variate with parameter λ.

10. Mean and variance of a binomial distribution are 3 and 2 respectively. Obtain the binomial probability distribution.

11. Write any four properties of a normal distribution.

12. Define beta distribution of first kind and second kind.

13. Define χ^2 distribution with n degree of freedom. Give an example for a statistic following χ^2 distribution.

14. If $X \sim F(m, n)$, show that $\frac{1}{F} \sim F(n, m)$.

PART – C
(Essay)

Answer **any 4** questions : $(4 \times 3 = 12)$

15. Prove that two independent random variables are uncorrelated, but the converse need not be true.

16. A and B plays a game in which their chances of winning are in the ratio 5:4. Find B's chance of winning at least 4 games out of 9 games played.

17. Prove that sum of n independent Poisson random variables is again Poisson.

18. Obtain the mean and variance of an exponential random variable.

19. Average IQ of a group of 1000 children is 99 with a standard deviation of 4. Assuming normality, find the expected number of children having IQ between 100 and 120.

20. Let X_1 and X_2 be two independent standard normal random variables. Obtain the distribution of $\frac{X_1}{X_2}$.

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PART – D
(Long Essay)

Answer **any 2** questions :   (2×5=10)

21. Given the joint p.d.f. of two random variables X and Y $f(x, y) = 3(x + y)$, $1 < x, y < 1, 0 < x + y < 1$. Find $E(Y \mid X)$.

22. Four coins are tossed 80 times. The distribution of number of heads is given below.

No. of heads	0	1	2	3	4
Frequency	4	18	32	20	6

Estimate the probability of getting a head and obtain the expected frequencies.

23. For a normal random variable 15% of the observations are below 30 and 10% are above 65. Find the mean and variance.

24. Define t statistic with an example. Give the p.d.f. of t(n) random variable. What are its properties ?