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Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, March 2021

First Degree Programme Under CBCSS

Statistics

Complementary Course for Physics

ST 1331.2 : PROBABILITY DISTRIBUTIONS AND STOCHASTIC PROCESS

(2017 & 2018 Admission)

Time : 3 Hours Max. Marks : 80

Instructions: Use of calculator and statistical Table is permitted.

PART – A

Answer **all** questions. Each carries **1** mark.

1. Define Geometric Distribution.

2. Write down the pdf of normal distribution.

3. Name the continuous distribution which possesses lack of memory property.

4. Define sampling distribution.

5. Can a binomial distribution have mean 4 and variance 6?

P.T.O.

6. If X_1 and X_2 are two i.i.d. normal random variables with mean μ and variance σ^2, what is the distribution of $Y = \frac{X_1 + X_2}{2}$?

7. What is the relationship between chi square and normal variates?

8. State central limit theorem.

9. Define multiplets.

10. Define Brownian motion process.

(10 × 1 = 10 Marks)

PART – B

Answer **any eight** questions. Each question carries **2** marks.

11. A discrete random variable X has mean 6 and variance 2. If it is assumed that the underlying distribution of X is binomial, what is the probability that $x = 1$?

12. Define F statistic. State its applications.

13. A discrete random variable X has mean = variance = 6. Find the probability that $X \leq 1$.

14. Define lack of memory property.

15. Write any four properties of Normal Distribution.

16. Define Stochastic process. Give an example.

17. Describe Bose-Einstein statistic.

18. Explain transition probability matrix.

19. A sample of size 16 is taken from a normal population with mean 1 and standard deviation 1.5. Find the probability that the sample mean is positive.

20. Define additive property. Check whether Poisson distribution possesses it.

21. Define Gamma distribution with two parameters.

22. What are the classifications of a stochastic process with respect to state space and time?

(8 × 2 = 16 Marks)

PART – C

Answer **any six** questions. Each question carries **4** marks.

23. Derive Poisson Distribution as the limiting form of Binomial Distribution.

24. Obtain the moment generating function of normal distribution.

25. If $X \sim U(3,12)$, find $P(2 < X \leq 10)$.

26. Obtain mean and variance of binomial distribution with parameters n and p.

27. Obtain the distribution function of exponential distribution.

28. Define beta distribution and show that uniform distribution is a particular case of beta distribution.

29. Define 't' statistic. Give its applications.

30. Write the interrelationship between normal, chi square, t and F statistic.

31. Explain Poisson process.

(6 × 4 = 24 Marks)

PART – D

Answer **any two** questions. Each question carries **15** marks.

32. Explain the importance of normal distribution in statistical theory. In a normal distribution, 30% of the items are under 40 and 12% are above 60. Find $P[30 < X < 50]$.

33. Fit a binomial distribution to the following data and obtain expected frequencies.

X	0	1	2	3	4
F	3	10	20	13	4

34. (a) Derive the distribution of sample variance of a sample of size n taken from a normal population.

    (b) A random sample of size 25 is taken from a normal population with mean 50 and standard deviation 4, find the probability that the sample mean

    (i) Is greater than 50.

    (ii) Lies between 20 and 60.

35. (a) Explain Markov chain with an example.

    (b) Describe the classification of Markov chain and its states. with example.

(2 × 15 = 30 Marks)