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H – 1534

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, October 2019

First Degree Programme Under CBCSS

Complementary Course for Physics

ST 1331.2 : PROBABILITY DISTRIBUTIONS AND STOCHASTIC PROCESS

(2017 Admission onwards)

Time : 3 Hours

Max. Marks : 80

Use of Calculator and Statistical table is permitted.

SECTION – A

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

1. Define uniform distribution in continuous case.
2. Write down the mean and variance of a binomial distribution with parameters n and p.
3. Name the discrete distribution which possesses lack of memory property.
4. Define statistic.
5. Name the distribution of square of a standard normal variate.
6. Define 't' distribution.
7. Write the relationship between chi square and F variates.
8. State Central Limit Theorem.

P.T.O.

9. Define transition probability matrix.

10. Define ordered samples.

(10 × 1 = 10 Marks)

SECTION – B

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

11. Explain the term parameter with an example.

12. Find the distribution function of an exponential distribution.

13. Find the pdf of $Y = -2 \log_e X$ if $X \sim \cup (0, 1)$.

14. Define Gamma distribution.

15. Write any four properties of Normal Distribution.

16. Find $P(|X - 26| \geq 2)$ if X is a Normal variate with mean 26 and standard deviation 3.

17. Define stochastic process.

18. Explain multiplets.

19. Define F statistic and its uses.

20. Explain Maxwell – Boltzmann statistic.

21. Define sampling distribution with examples.

22. Define Brownian Motion process.

(8 × 2 = 16 Marks)

SECTION – C

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

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

24. State and prove the additive property of chi square distribution.

25. Obtain moment generating function of a binomial distribution.

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

27. Write down the interrelationships between normal, chi square, *t* and *F* statistics.

28. If (X_1, X_2, X_3, X_4) is a random sample from $N(0,1)$, find the value of C such that $P\left[\frac{3X_3^2}{X_1^2 + X_2^2 + X_4^2} > C\right] = 0.01$.

29. If X_1 and X_2 are two i.i.d. normal variates with mean μ and variance σ^2, find the m.g.f. of $Y = 2X_1 + 3X_2$ and identify the distribution.

30. State the postulates of Poisson process.

31. Define a process with independent increments. Give an example.

(6 × 4 = 24 Marks)

SECTION – D

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

32. For a normally distributed population, 7% of the items have their values less than 35 and 89% have their values less than 63. Find the mean and standard deviation of the distribution.

33. The following table gives the number of accidents occurred in a certain part of a city for a period of 100 days. Fit an appropriate distribution to the data and find the expected frequencies.

X	0	1	2	3	4	5	6	7
f	25	18	13	9	4	3	2	1

34. (a) Obtain the sampling distribution of mean of a random sample from a normal distribution.

(b) 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.

35. (a) Define persistent and transient states.

(b) Show that in an irreducible Markov Chain, all states are either persistent or transient.

(2 × 15 = 30 Marks)
