QP CODE: 21100567

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Reg No : ....

Name : ....

B.Sc DEGREE (CBCS)EXAMINATION, MARCH 2021

Third Semester

COMPLEMENTARY COURSE - ST3CMT03 - STATISTICS - PROBABILITY DISTRIBUTIONS

(Common to B.Sc Computer Applications Model III Triple Main, B.Sc Mathematics Model I, B.Sc Physics Model I)

2017 Admission Onwards

4CEC2A9B

Time: 3 Hours Max. Marks : 80

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Define mathematical expectation of a continuous random variable with an example.
2. Define harmonic mean and mean deviation about mean using expectation.
3. Define discrete uniform distribution.
4. Obtain the distribution function of continuous uniform distribution.
5. Obtain the mean of Bernoulli distribution.
6. Obtain the mean of hyper geometric distribution.
7. Define one parameter gamma distribution.
8. Define two parameter gamma distribution.
9. Define standard normal distribution.
10. State Weak law of large numbers.
11. Mention any two uses of standard error.
12. Define Snedecor's F distribution.

(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Find the first four raw moments and central moments for the following

x	0	1	2	3
f(x)	1/2	1/8	1/8	1/4

14. Show by an example that even when a random variable has no moments, it may have a moment generating function.

15. The average percentage of failures in a certain examination is 40. What is the probability that out of a group of 6 candidates (1) at least 4 passes in the examination (2) the number of passes is between 2 and 4.

16. Let X and Y be independent random variables such that $P(X = r) = P(Y = r) = q^r p$; r = 0, 1, 2, … where p + q =1. Find the conditional distribution of X given X + Y.

17. Obtain the mean and variance of type - 1 beta distribution.

18. Show that type – 1 beta distribution can be obtained from type – 2 beta distribution using transformation of variables.

19. For a binomial distribution with parameters n= 10 and p = 0.4, obtain $P (| X - \mu | > 2\sigma)$ and compare it with the probability given by Tchebycheff's inequality and estimate the error.

20. Establish the additive property of chi - square distribution.

21. Explain an example of a statistic following student's t distribution.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. The joint pdf is given by f(x, y) = 2 – x – y ; 0 < x < 1, 0 < y < 1 and 0 elsewhere. Find (1) V(X) (2) V(Y) (3) COV(X, Y).

23. Fit a Poisson distribution to the following data and find the expected frequencies.

variable	0	1	2	3	4
frequency	123	59	14	3	1

24. (a) Establish the lack of memory property of exponential distribution.
(b) If X_1 , X_2 , …, X_n are n independent exponential random variables, each with parameter λ , find the distribution of $Y = X_1 + X_2 + \ldots + X_n$.

25. State and prove Lindberg - Levy form of central limit theorem.

(2×15=30)