QP CODE: 18103429

Reg No : ....

Name : ....

B.Sc. DEGREE (CBCS) EXAMINATION, NOVEMBER 2018

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

12921CDC

Maximum Marks: 80 **Time: 3 Hours**

Part A

Answer any **ten** questions.

Each question carries **2** marks.

1. Mention one example each for discrete and continuous variable where expectation does not exist.
2. Write the expressions for third and fourth central moments using raw moments.
3. Mention two examples of random variables following discrete uniform distribution.
4. Define continuous uniform distribution.
5. Show that for a Poisson distribution, coefficient of variation is the reciprocal of the standard deviation.
6. Define hyper geometric distribution.
7. Find the second raw moment of two parameter gamma distribution.
8. Find the expression for r^{th} raw moment of type - 1 beta distribution.
9. Define type - 2 beta distribution.
10. If X is a random variable with mean 3 and variance 2, find h such that $P(|X - 3| < h) \geq 0.99$
11. Define chi- square distribution.
12. Define Snedecor's F distribution.

(10×2=20)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. Find a and b if Y = aX+ b has mean 6 and variance unity where X is a random variable with mean 8 and variance 16.

14. Explain any two properties of moment generating function.

15. Derive the mgf of Bernoulli distribution and hence find the mean and variance.

16. Obtain the first three raw moments of binomial distribution.

17. Derive the mgf of exponential distribution and hence find the mean and variance.

18. Derive the additive property of one parameter gamma distribution.

19. A sample of size n is taken from a population with mean μ and SD σ . Find the limits within which the sample mean $\overline{x}$ will lie with probability 0.9 by using Tchebycheff's inequality and central limit theorem. Evaluate the limits if $n = 64$, $\mu = 10$ and $\sigma = 2$.

20. If s^2 is the sample variance of sample of size n taken from a normal population with mean μ and SD σ , find the distribution of $Y = ns^2/\sigma^2$

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 of random variables X and Y is given by $f(x, y) = 2 ; 0 < x < y < 1$. Obtain the correlation between X and Y.

23. (a) Obtain the mean and variance of geometric distribution.
(b) Establish the lack of memory property of geometric distribution.

24. Show that $\beta_1 = 0$ and $\beta_2 = 3$ for a normal distribution.

25. (1) State and prove weak law of large numbers.
(2) Show by an example of a case where weak law of large numbers cannot be applied.

(2×15=30)