

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0321]

MARCH 2021

Sub. Code: 2861

(OCTOBER 2020 EXAM SESSION)

M.Sc. BIOSTATISTICS

FIRST YEAR (From 2011-2012 onwards)

PAPER I – PROBABILITY AND DISTRIBUTION THEORY

Q.P. Code : 282861

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. a) If $\{X_n\}$ be a sequence of binomial variables with parameters (n, p) , then prove binomial variables converge to standard normal variable.
b) List out properties of characteristic function.
2. a) Write a lack of memory property of geometric distribution and how can use this property in Medicine.
b) If X_1, X_2, \dots, X_n be mutually independent $N(\mu, \sigma^2)$ variables. Prove that \bar{X} is statistically

independent of $Q = \sum_{i=1}^n \frac{(X_i - \bar{X})^2}{\sigma^2}$ and $Q \sim \chi_{(n-1)}^2$

II. Write Short Notes on:

(10x6 = 60)

1. If X be a continuous r.v. with p.d.f given by

$$f(x) = \begin{cases} ax, & 0 \leq x \leq 1 \\ a, & 1 \leq x \leq 2 \\ -ax + 3a, & 2 \leq x \leq 3 \\ 0, & 3 < x \end{cases}$$

Determine a and $F(x)$.

2. If $X \sim U(a, b)$ then find $E(X), V(X)$.
3. Find mean and variance from moments for Poisson distribution.
4. Write a Lindeberg-Levy central limit theorem and its importance.
5. Write a Cauchy criterion for almost sure convergence.
6. Why Exponential distribution is preferable to estimate population growth?
7. How can perform Binomial probability distribution in medicine give examples.
8. Write characteristic function of Wishart Distribution.
9. Give properties of conditional expectations.
10. Show that $\rho_{1,23} \geq \rho_{12}$.
