TEST:- (DATE → 22nd April)

Probability & Statistics

TIME: 1 hr MAX MARKS: 20

CLASS → B.Sc (H) MATHS, VI^th Sem

Instructions:- Attempt any 4 Questions. Each Question Carry EQUAL marks

Q1:- State Weak Law of large numbers. Let X_i assume the value i^α and $-i^\alpha$ with Equal probabilities. Prove that the Sequence $\langle X_n \rangle$ of independent Random Variables Satisfies Weak Law of Large Numbers if $\alpha < \frac{1}{2}$

Q2:- For the Geometric Distribution $f_X(x) = 2^{-x}$; $x = 1, 2, 3, \ldots$. Prove that Chebyshev's Inequality gives $P(|X-2| \geq 2) \geq \frac{1}{2}$, while the actual probability is $\frac{15}{16}$

Q3:- If $(X,Y) = BN(\mu_1, \mu_2, \sigma_1, \sigma_2, \rho)$, when $\mu_1 = 5$, $\mu_2 = 10$, $\sigma_1^2 = 1$, $\sigma_2^2 = 25$ find ρ, if $P\left(\frac{4 < Y < 16}{X = 5}\right) = 0.954$

Q4:- If (X,Y) has bivariate Normal Distribution, find the marginal of X? Under what conditions X & Y are Independent?

Q5:- State & prove Strong Law of Large numbers?