**B.Sc. DEGREE EXAMINATION, NOVEMBER 2015.**

**II YEAR – III SEMESTER**

**(MATHEMATICS)**

**Mathematical Statistics — I**

**Time : 3 hours Max. marks : 60**

**SECTION A — (10 × 1 = 10 marks)**

**Answer Any *TEN* questions.**

1. Define Sample Space and give an example for it.
2. Distinguish between outcome and event.
3. Explain Random Variable with an example.
4. Define Distribution Function of a random variable.
5. Define rth moment about origin of a probability distribution.
6. Is Variance independent of change of origin?
7. Differentiate between positive and negative correlation.
8. What is meant by Regression Analysis?
9. Write the m.g.f. of Binomial distribution 
10. State Additive Property of independent Poisson variates.
11. Define Probability Function using axioms.
12. When do we say an event A is independent of another event B?

**SECTION B — (5 × 4 = 20 marks)**

**Answer any *FIVE* questions.**

1. State and Prove Addition Law of Probability for two events.
2. A continuous random variable X has a p.d.f. f(x) = 3*x*2, 0 ≤ x ≤ 1. Find a and b such that (a) P(X ≤ a) = P(X > a), and (b) P(X > b) = 0.05.
3. State and Prove Multiplication Theorem of Expectation.
4. Prove that correlation coefficient is the geometric mean between the regression coefficients.
5. Derive the m.g.f. of Normal Distribution.
6. The joint probability distribution of two random variables X and Y is given by:

P(X = 0, Y = 1) = P(X = 1, Y = -1) = P(X = 1, Y = 1) =$\frac{1}{3}$. Find the marginal distributions of X and Y.

1. Suppose that two-dimensional continuous random variable (X, Y) has joint p.d.f. given by

$\left\{\begin{array}{c}6x^{2}y, 0<x<1, 0<y<1 \\0, elsewhere \end{array}\right.$ f(x, y) = $\left\{\begin{array}{c}6x^{2}y, 0<x<1, 0<y<1 \\0, elsewhere \end{array}\right.$

Find P(X < 1 │Y < 2).

[P.T.O.]

**SECTION C — (3 × 10 = 30 marks)**

**Answer any *THREE* questions.**

1. State and Prove Bayes’ Theorem.
2. Joint distribution of X and Y is given by f(x, y) = 4xy exp( - (*x*2 + *y*2)) ; x ≥ 0, y ≥ 0.

Test whether X and Y are independent.Find the conditional density of X given

Y = y.

1. State and Prove Chebychev’s inequality.
2. Prove that correlation coefficient is independent of change of origin and scale.
3. Stating the conditions, prove that Poisson distribution is a limiting case of Binomial

distribution.

**——————**