SARDAR PATEL UNIVERSITY

THIRD SEMESTER

(EFFECTIVE FROM JUNE, 2011)

SUBJECT: STATISTICS

COURSE CODE: US03CSTA02

(ELEMENTS OF PROBABILITY THEORY)

Course credit: 3

No. of lectures per week: 3

All units carry equal Weightage

Weightage: Internal – 30%, External – 70%

Objectives:

The main objective of this course is to introduce to the students the basic concepts of probability, axiomatic theory of probability, concept of random variable, probability distribution (univariate and bivariate) discrete random variables, expectation and moments of probability distribution. By the end of the course students are expected to be able

1. To distinguish between random and non-random experiments,

2. To find the probabilities of events,

3. To obtain a probability distribution of random variable (one or two dimensional) in the given situation,

4. To apply standard discrete probability distribution to different situations.

Unit-I Probability

- **Concept of Set theory, Permutation & combination**
- **Random experiment**
- **Sample space**
- **Events**
- **Types of sample space**
- **Meaning and definition of probability (classical & axiomatic)**
- **Laws of probability**
- **Conditional probability and independent events**
- **Baye's theorem**

Unit-II Random variables and probability distribution

- **Random variable**
- **Discrete and Continuous**
- **Probability mass function(p.m.f)**
- **Probability density function(p.d.f)**
- **Distribution function(c.d.f)**
- **Median, mode and partition values**

Unit-III Mathematical Expectation

- **Definition**
- **Properties (with proof)**
- **Moments, factorial moments, measures of central tendency, dispersion, skewness and kurtosis**
- **Moments and Generating functions (non-standard distributions)**
- **Probability generating function (p.g.f), moment generating function (m.g.f.) and its properties.**

- **Cumulant generating function(c.g.f.)**

Unit-IV Bivariate distribution

- **Joint, marginal and conditional p.m.f of two random variables**
- **Joint, marginal and conditional p.d.f of two random variables**
- **Independence of two random variables (examples-nonstandard distribution)**
- **Product moments**
- **Correlation**

References:

1. **Fundamentals of Mathematical statistics by S.C. Gupta & V.K. Kapoor**
2. **Fundamentals of statistics by S.C. Gupta**
3. **Mood A.M. and Graybill F.A. and Boes D.C.E.: Introduction to theory of statistics**
4. **Hogg and Craig: Introduction to Mathematical Statistics**
5. **Probability & Statistics by Purna Chandra Biswas (PHI Edition)**