



## **UNIT V: Elements of Probability**

Probability: Introduction, random experiments, sample space, events and algebra of events. Mathematical (classical) definition of Probability and its limitations and applications. Statements and simple applications of addition and multiplication theorems.

### **SUGGESTED READINGS:**

1. Goon, A.M., Gupta, M.K., & Dasgupta, B. (2003). An outline of Statistical Theory (Vol. I) (4th ed.). World Press, Kolkata.
2. Gupta, S.C., & Kapoor, V.K. (2007). Fundamentals of Mathematical Statistics (11th ed.). Sultan Chand and Sons.
3. Hogg, R.V., Craig, A.T., & McKean, J.W. (2005). Introduction to Mathematical Statistics (6th ed.). Pearson Education.
4. Bhattacharjee, D., & Bhattacharjee, D. (2008): B.Sc Statistics Vol-I. Kalyani Publication.

### **INTER DISCIPLINARY COURSE IN STATISTICS: IDC-151 (Index Number and Time Series Analysis) (Credits: 03)**

**Contact Hours: 45 Hours**

**Full Marks=100 [End Semester Exam (70) +Internal (30)]**

**Pass Marks =40 [End Semester Exam (28) + Internal(12)]**

### **Learning objectives**

- To understand and construct index numbers, both weighted and unweighted.
- To evaluate the limitations and applications of index numbers.
- To perform factor reversal and time reversal tests for index numbers.
- To understand chain index numbers for handling changing base periods and calculating consumer price index numbers.
- To introduce the basics of time series data, its components, and decomposition methods.

### **Learning outcomes**

- Interpret index numbers using various methods.
- Represent the limitations and practical applications of index numbers.
- Apply factor reversal and time reversal tests to assess index number reliability.
- Use consumer price index numbers using chain index methods accurately.

- Analyze time series data, identify its components, and apply appropriate decomposition methods.

**UNIT I: Index Number-I**

Definition, Problems in the construction of index numbers, weighted and unweighted index numbers including Laspeyre's, Paasche's, Marshall- Edgeworth and Fisher's. Limitations and applications of index number.

**UNIT II: Index Number-II**

Factor reversal and time reversal tests. Chain index numbers, Consumer price index numbers: applications and limitations.

**UNIT III: Time Series-I**

Introduction to time series data, application of time series on various fields. Components of a time series, Decomposition of time series.

**UNIT IV: Time Series-II**

Trend: Estimation of trend by free hand curve method, method of semi averages, fitting of various mathematical curves. Method of moving averages.

**UNIT V: Time Series-III**

Seasonal Component: Estimation of seasonal component by Method of simple averages, Ratio to Trend, Ratio to Moving Averages and Link Relative method.

**SUGGESTED READINGS:**

1. Goon A.M., Gupta M.K., & Dasgupta, B.(2002). Fundamentals of Statistics, Vol.I&II (8th ed.).The World Press, Kolkata.
2. Gupta,S.C., & Kapoor,V.K.(2008). Fundamentals of Applied Statistics (4th ed., reprint). Sultan Chand and Sons.
3. Mukhopadhyay, P. (2011). Applied Statistics, (2nd ed., Revised reprint). Books and Allied.
4. Bhattacharjee, D., & Bhattacharjee, D. (2008): B. Sc Statistics Vol-II. Kalyani Publication.