DISCIPLINE SPECIFIC ELECTIVE FOR B. SC. (P)

DISCIPLINE SPECIFIC ELECTIVE COURSE – 1:   TIME SERIES ANALYSIS AND INDEX NUMBERS

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Time Series Analysis and Index Numbers	4	3	0	1	Passed Class XII with Mathematics	Descriptive Statistics and Probability Theory

Learning Objectives
The Learning Objectives of this course are as follows:
- Introduce the concept of time series, its components, and their estimation.
- Introduce the application of time series.
- Introduce the concept, formulation, and application of index numbers.

Learning outcomes
After completion of this course, the students will be able to:
- Understand the concepts of time series and index numbers.
- Formulate, solve, and analyse the use of time series and index numbers for real-world problems.

SYLLABUS OF DSE 1
Theory
Unit - 1   (12 hours)
Components of Time Series
Introduction to Time Series, Components of time series, Decomposition of time series- Additive and multiplicative model with their merits and demerits, Illustrations of time series, Measurement of trend by method of free-hand curve, method of semi-averages and method of least squares (linear, quadratic and exponential).

Unit - 2   (15 hours)
Trend and Seasonality
Fitting of modified exponential, Gompertz and logistic curve, Moving average method, Measurement of seasonal variations by method of simple averages, ratio to trend method, and ratio to moving average method.

Unit - III   (18 hours)
Index Numbers
Introduction to Index numbers, Problems in the construction of index numbers, Construction of price and quantity index numbers: simple aggregate, weighted aggregate (Laspeyres, Paasche's, Drobish-Bowley, Marshall-Edgeworth's, Walsch and Fisher's Formula), simple and weighted

average of price relatives, and chain base method, Criteria for a good index number, Errors in the measurement of price and quantity index numbers, Consumer price index number, its construction and uses, Uses and limitations of index numbers.

Practical - 30 Hours
List of Practicals:
1. Fitting of linear trend
2. Fitting of quadratic trend
3. Fitting of an exponential curve
4. Fitting of modified exponential curve by the method of
   a. Three selected points
   b. Partial sums
5. Fitting of Gompertz curve by the method of
   a. Three selected points
   b. Partial sums
6. Fitting of logistic curve by the method of three selected points
7. Fitting of trend by moving average method (for n even and odd)
8. Measurement of seasonal indices by
   a. Method of simple averages
   b. Ratio-to-trend method
   c. Ratio-to-moving-average method
9. Construction of price and quantity index numbers by simple aggregate method.
10. Construction of price and quantity index numbers by Laspeyres, Paasche's, Drobish-Bowley, Marshall-Edgeworth, Walsch and Fisher's Formula.
11. Construction of price and quantity index numbers by simple and weighted average of price relatives.
12. Construction of index number by Chain base method.
13. Construction of consumer price index number by
    a. Family budget method
    b. Aggregate expenditure method
14. Time Reversal Test and Factor Reversal Test

Practical work to be conducted using electronic spreadsheet / EXCEL/ Statistical Software Package/ SPSS/ calculators.

ESSENTIAL READINGS
- Goon A M, Gupta M K and Dasgupta B (2018): Fundamentals of Statistics, Volume II, 9th Edition and 4th reprint.
- Gupta, S.C. and Kapoor, V.K. (2014). Fundamentals of Applied Statistics, 11th Ed., Sultan Chand.
- Croxton, Fredrick E, Cowden, Dudley J. and Klein, S. (1973): Applied General Statistics, 3rd edition, Prentice Hall of India Pvt. Ltd.

SUGGESTIVE READING
- Mukhopadhyay, P. (1999). Applied Statistics, New Central Book Agency, Calcutta.
- Allen R.G.D. (1975): Index Numbers in Theory and Practice, Macmillan

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

**COMMON POOL OF GENERIC ELECTIVES (GE) COURSES
OFFERED BY DEPARTMENT OF STATISTICS
CATEGORY-VI**

GENERIC ELECTIVES – :   SAMPLING DISTRIBUTIONS

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	**Tutorial**	**Practical/ Practice**		
Sampling Distributions	4	3	0	1	**Passed Class XII with Mathematics**	Introductory Probability

Learning Objectives:
 The learning objectives include:
● To understand the concept of sampling distributions and their applications in statistical inference.
● To understand the process of hypothesis testing.
● To have a clear understanding of when to apply various tests of hypothesis about population parameters using sample statistics and draw appropriate conclusions from the analysis.

Learning Outcomes:
After successful completion of this course, students should be able to:
● Understand the basic concepts of hypothesis testing, including framing of the null and alternative hypotheses.
● Apply hypothesis testing based on a single sample and two samples using both classical and p-value approaches.
● Understand the Chi-square distribution.
● Analyze categorical data by using Chi-square techniques.
● Apply t and F distributions

SYLLABUS OF GE-3A
Theory
Unit I   **(15 hours)**
Large sample tests
Large sample tests: Definitions of random sample, parameter and statistic, sampling distribution of a statistic, sampling distribution of sample mean, standard errors of sample mean, and sample proportion. Null and alternative hypotheses, level of significance, Type I