

Semester	SEVEN
Course	Minor
Paper Code	B4ST230722T / B4ST230722P
Paper Title	Applied Statistics
No. of Credits	4
Theory / Practical /Composite	Composite
Classes per week	3 Theory and 2 Practical
Module	1

Course Outcomes

<p>1. Remember basic concepts of sampling theory, index numbers, time series, and analysis of variance used in applied statistical analysis.</p>
<p>2. Understand the principles of probability and non-probability sampling, construction of index numbers, components of time series, and the logic of ANOVA models.</p>
<p>3. Apply appropriate statistical techniques to compute estimators, index numbers, trend measures, and perform one-way and two-way ANOVA for real datasets.</p>
<p>4. Analyse variability and patterns in data arising from surveys, economic indices, and time series using decomposition and variance analysis techniques.</p>
<p>5. Evaluate the suitability and reliability of sampling designs, index number formulas, time series models, and ANOVA assumptions for practical problems.</p>
<p>6. Create statistically sound data-driven solutions by designing sampling plans, constructing indices, modelling time series trends, and interpreting ANOVA results.</p>

Syllabus

Unit/Module	Content	No. of lectures	CO mapping	Cognitive levels
Unit 1	<i>Sample Survey</i> : Concepts of a finite population and a sample. Need for sampling. Complete enumeration and sample surveys. Probability and non-probability sampling. Sampling and non-sampling error. Simple random sampling with and without replacement. Associated unbiased estimators of population mean and proportion, their variances and variance estimators.	12	CO1 CO2 CO3 CO5	K1 K2 K3 K5

Unit 2	<p>Index Numbers: Price indices. Choice of weights. Laspeyres', Paasche's and Fisher's index numbers. Errors in index numbers. Tests of index numbers. Cost of living index number. Uses of price index numbers.</p>	10	CO1 CO3 CO4 CO5	K1 K3 K4 K5
Unit 3	<p>Time Series: Introduction to time series. Examples of time series from different fields. Time series data. Components of a time series: trend, seasonal, cyclical and irregular fluctuations.</p> <p>Classical decomposition of a time series. Additive and multiplicative models for decomposition. Determination of trend: method of mathematical curve fitting (linear and quadratic trend), method of moving averages.</p>	8	CO2 CO3 CO4 CO6	K2 K3 K4 K6
Unit 4	<p>Analysis of variance (ANOVA): Analysis of one-way and two-way classified data (equal observation per cell) - fixed effects model.</p>	9	CO2 CO3 CO4 CO5	K2 K3 K4 K5

List of Practical

1. Simple Random Sampling with and without replacement
2. Construction of Price Index Numbers and Cost of Living Index Number.
3. Estimation of Trend in time series
4. Analysis of Variance of a one way and two way classified data.

Reading/ Reference list

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. II, 8th Edn. The World Press, Kolkata.
2. Chatfield, C., & Xing, H. (2019). <i>The analysis of time series: an introduction with R</i> . Chapman and hall/CRC.
3. Murthy, M.N. (1977): Sampling Theory & Statistical Methods, Statistical Pub. Society, Calcutta.
4. Mukhopadhyay, P. (2011): Applied Statistics, 2nd edition revised reprint, Books and Allied(P) Ltd.

Evaluation

	Theory CIA: 15 Semester Exam: 45	Practical : 40 Continuous assessment
Paper Structure for Semester exam	Short Questions (5 marks each) 3 out of 5	Long Questions (15 marks each) 2 out of 3

CO	CO Description	Cognitive levels
CO1	Remember basic concepts of sampling theory, index numbers, time series, and analysis of variance used in applied statistical analysis	K1
CO2	Understand the principles of probability and non-probability sampling, construction of index numbers, components of time series, and the logic of ANOVA models	K2
CO3	Apply appropriate statistical techniques to compute estimators, index numbers, trend measures, and perform one-way and two-way ANOVA for real datasets	K3
CO4	Analyse variability and patterns in data arising from surveys, economic indices, and time series using decomposition and variance analysis techniques.	K4
CO5	Evaluate the suitability and reliability of sampling designs, index number formulas, time series models, and ANOVA assumptions for practical problems.	K5
CO6	Create statistically sound data-driven solutions by designing sampling plans, constructing indices, modelling time series trends, and interpreting ANOVA results.	K6