

Syllabus

Fourth Semester Courses in Statistics

2024-2025

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APPROVED SYLLABUS

Shinde

PRINCIPAL
ST. XAVIER'S COLLEGE
(AUTONOMOUS)
MUMBAI - 400 001.

Second Year BA in Statistics		
Course Title: Statistical Techniques (B)		Course Code:UASTA5002MN1
Credits: Theory (3) = 45 hr		
No.	Course Objectives	
	The course aims to	
1	understand One-way and Two-way ANOVA.	
2	study various designs of experiments (CRD, RBD, LSD).	
3	orient students on techniques of Time series & Index numbers.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1	recall the fundamental concepts of Analysis of Variance (ANOVA), experimental design principles, the stages involved in the construction of index numbers, the definition and components of time series data.	Knowledge
2	i) understand the concept of Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD). ii) explain the different methods for constructing index numbers and their respective advantages and limitations iii) understand the methods involved in estimating components of time series	Understanding
3	solve numerical problems based on the above topics.	Analysis

Unit 1 : Analysis of Variance :- Introduction, Uses.

(15 L)

One-way classification - Mathematical model with assumptions. Estimates of parameters. Expectation and variance of the estimators. Expectation of various sums of squares, Concept of degrees of freedom of Sum of squares, ANOVA table. (No derivations)

Two-way classification (with one observation per cell) - Mathematical model with assumptions. Estimates of parameters. Expectation and variance of the estimators. Expectation of various sums of squares., Concept of degrees of freedom of Sum of squares, ANOVA table. (No derivations)

Pairwise comparisons of treatments using: Critical Difference method.



Design of Experiments: Experiment, Experimental unit, Treatment, Yield, Replicate, Block, Experimental error and Precision. Principles of design of experiment: Replication, Randomization and Local Control.

Completely randomized design. (CRD), Randomized block design (RBD) & Latin square design (LSD): Mathematical model with assumptions. Expectation of various sums of squares. Estimation of parameters by Least Squares Method. ANOVA table. (Final results only)

Concept of Missing plot technique for one missing observation in RBD & LSD.
(No derivations)

Unit 2 : Time Series

(15 L)

Definition of Time series. Its components. Models of Time Series.

Estimation of trend by i) Freehand curve method. ii) Method of semi averages. iii) Method of moving averages iv) Method of least squares v) Single exponential smoothing method vi) Double exponential smoothing method vii) Holt Winters method

Estimation of seasonal component by i) Method of simple averages ii) Ratio to moving average method iii) Ratio to trend method.

Unit 3 : Index Numbers

(15 L)

Index number as a comparative tool. Stages in the construction of Index Numbers.

Simple and Composite Index Numbers.

Fixed base Index Numbers. Chain Base Index Numbers, Base shifting, Splicing and Deflating. Price and Quantity Index Numbers - Laspeyres', Paasche's, Marshal-Edgeworth's, Dorbisch-Bowley's and Fisher's Index Numbers. Value Index Number. Time reversal test. Factor reversal test, Circular test. Cost of Living Index Number. Concept of Real Income based on the Consumer Price Index Number.

Problems in the construction of Consumer Price Index Number.

List of Recommended Reference Books:

1. Fundamentals of Applied Statistics: S.C. Gupta and V.K. Kapoor, 3rd edition, Sultan Chand & Sons.
2. Designs and Analysis of Experiments: M. N. Das and N.C. Giri 2nd edition, Wiley Eastern Ltd.
3. Designs and Analysis of Experiments : D.C. Montgomery, 6th edition, Wiley Eastern Ltd.
4. S.C.Gupta ,V.K.Kapoor: Fundamentals of Applied Statistics, Third edition, Sultan Chand & Sons.
5. Roland Fried and Ann Cathrice George (2014) Exponential and Holt Winters smoothing.



Second Year BA in Statistics		
Course Title: Statistical Techniques (B) (Practical)		
Course Code: UASTA5002MN1PR		
Credits: Practical (1) = 30 hr		
No.	Course Objectives The course aims to	
1	enable students to understand the application of One-way and Two-way ANOVA, designs of experiments (CRD, RBD, LSD), Time series & Index numbers.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1	solve numerical problems based on One-way and Two-way ANOVA, designs of experiments (CRD, RBD, LSD), Time series & Index numbers.	Analysis

List of Practicals:

1. One Way ANOVA / CRD.
2. Two Way ANOVA / RBD.
3. LSD.
4. Time-Series
5. Index Numbers

Evaluation (Practical, UASTA5002MN1PR)

CIA (Written test /Project): 15 marks,
Journal: 5 marks,
End Semester Examination: 30 marks.

Total marks practical course - 50

Distribution of Bloom's Taxonomy levels for the practical assessment:

Learning Levels	Analysis
Percentage	100%

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Evaluation (Theory, UASTA5002MN1): Total marks per course - 100.

- I. Formative Assessment for Learning
(continuous internal assessment - CIA to improve learning).
CIA: 40 marks
CIA 1: Written test: 20 marks
CIA 2: Written test/Assignment: 20 marks
- II. Summative Assessment of Learning
(focus on outcomes, quantitative data for outcomes of instruction).
End Semester Examination: 60 marks
One question from each unit for 20 marks, with internal choice.
Total marks per question with choice: 25 to 27.

Distribution of Bloom's Taxonomy levels for the course assessment:

Learning Levels	Knowledge	Understanding	Analysis
% Weightage	10-20%	60-80%	10-20%



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