B. Sc. Statistics (Faculty of Science)
Semester (V)

Course Code	US05MISTA01	Title of the Course	ELEMENTS OF PROBABILITY THEORY
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	1. Understand Basic Concepts: Explain the fundamental concepts of probability, including sample spaces, events, and probability axioms. 2. Apply Probability Rules: Apply the rules of probability, including addition and multiplication rules, to solve real-life problems. 3. Solve Problems Using Distributions: Use discrete and continuous probability distributions

Course Content		
Unit	Description	Weightage* (%)
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 (with proof), Conditional probability and independent events, Law of total probability, Bayes' theorem, Examples	50%
II	Random variables and probability distribution: Random variable, Types of r.v: 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	50%

Teaching-Learning Methodology	Interactive Class Lectures, ICT Tools, hand on experience in problem solving through practical sessions.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand Basic Probability Concepts: Define and explain fundamental concepts of probability, such as sample space, events, and probability measures.
2.	Apply Probability Axioms and Rules: Use the axioms of probability, addition and multiplication rules, and conditional probability to solve problems.
3.	Differentiate Types of Random Variables: Understand and differentiate between discrete and continuous random variables.
4.	Use Conditional Probability and Bayes' Theorem: Solve problems involving conditional probability and apply Bayes' Theorem in decision-making scenarios.

Suggested Text Books/ References:	
Sr. No.	Text Books
1.	Gupta S.C. and Kapoor V.K.: Fundamentals of Mathematical Statistics
2.	Mood A.M. and Graybill F.A. and Boes D.C.E.: Introduction to theory of statistics
3.	Hogg and Craig: Introduction to Mathematical Statistics
4.	Biswas Purna Chandra: Probability & Statistics (PHI Edition)

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B. Sc. Statistics (Faculty of Science)
Semester (V)

Course Code	US05MISTA02	Title of the Course	STATISTICS PRACTICAL
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	1. Familiarize Students with Excel Interface: To introduce students to the Excel interface, tools, and functionalities for efficient data entry, analysis, and management. 2. Enhance Data Handling Skills: To develop students' ability to organize, sort, filter, and format data effectively in Excel sheets. 3. Apply Mathematical and Statistical Functions: To enable students to use built-in Excel functions (such as SUM, AVERAGE, MAX, MIN, COUNT, etc.) for basic mathematical and statistical calculations. 4. Develop Data Visualization Skills: To teach students how to create and customize charts, graphs, and dashboards for effective data presentation and interpretation.

Course Content	
Sr. No	List of Practicals
1	Introduction to MS Excel, Overview of MS Excel interface, Creating, saving, and opening workbooks, Understanding worksheets, rows, columns, and cells
2	Data Entry and Formatting, entering data, text, and numbers, Cell formatting (font, alignment, borders, number formatting), Using cell styles and themes
3	Basic Formulas and Functions: Arithmetic operations (+, -, *, /), Common functions: SUM, AVERAGE, MAX, MIN, Using AutoSum and Quick Analysis, Data Management and Sorting/Filtering Data validation and drop-down lists
4	Charts and Graphs: Creating different types of charts (Bar, Line, Pie, Column), Customizing chart styles and layouts, Adding chart elements like titles, legends, and data labels
5	Formation of frequency distribution
6	Frequency polygon, frequency curve, ogives and histogram
7	Measures of central tendency and dispersion

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Course Code	US05MISTA03	Title of the Course	TIME SERIES ANALYSIS AND STATISTICAL QUALITY CONTROL
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	1. Understand Time Series Components: To introduce the concept of time series and its components, enabling students to understand patterns and trends in data over time. 2. Analyze Time Series Data: To equip students with the knowledge to analyze time series data using various methods such as moving averages, exponential smoothing, and decomposition techniques. 3. Understand Quality Control Concepts: To introduce the fundamental concepts of statistical quality control (SQC) and its importance in maintaining product quality in manufacturing and service industries. 4. Construct Control Charts: To provide practical knowledge of constructing and interpreting control charts (such as X-bar, R, p, and c charts) for monitoring and improving production processes.

Course Content		
Unit	Description	Weightage* (%)
I	Time series Analysis: Components, Additive and Multiplicative models, Calculation of trend using, Free hand curve, Semi averages method, moving average, least squares method, Calculation of seasonal indices using, Simple Average, Ratio to Trend, Ratio to Moving Average, method	50%
II	Statistical Quality Control (SQC): Introduction, Types of Control charts, For Variables: $\overline{X}$ and R Charts, For Attributes: p, np and C charts	50%

Teaching-Learning Methodology	Interactive Class Lectures, ICT Tools, hand on experience in problem solving through practical sessions.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand Time Series Components: Explain the different components of time series data such as trend, seasonality, cyclic, and irregular variations.
2.	Analyse Time Series Data: Apply various time series analysis techniques like moving averages, exponential smoothing, and trend analysis to identify patterns in data.
3.	Interpret Time Series Results: Interpret the results obtained from time series analysis to support decision-making in business, economics, and industry.
4.	Understand Statistical Quality Control (SQC): Explain the importance and role of statistical quality control in maintaining and improving product and service quality.
5.	Construct and Interpret Control Charts: Develop and interpret different control charts (X-bar, R, p, and c charts) to monitor production processes and detect variations.

Suggested Text Books/ References:	
Sr. No.	Text Books
1.	Gupta S.C. and Kapoor V.K. Fundamentals of applied statistics
2.	Ken Black, Business Statistics (4th edition) Willey student edition
3.	Gupta S.C, Fundamentals of statistics by S.C. Gupta
4.	Douglas C. Montgomery: Introduction to Statistical Quality Control Wiley's student edition

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B. Sc. Statistics (Faculty of Science)
Semester (V)

Course Code	US05MISTA04	Title of the Course	STATISTICS PRACTICAL
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	Enhance Critical Thinking and Decision-making: To develop students' analytical and decision-making skills through hands-on problem-solving exercises and practical projects.

Course Content	
Sr. No	List of Practicals
1	Pivot Table
2	Correlation and Regression
3	Calculation of trend using (i) Semi average method (ii) Moving average
4	Calculation of trend using Least squares method
5	Construction of Variable charts like XBar and R chart
6	Construction of attribute charts like p, np and C chart.

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