MARUDHAR KESARI JAIN COLLEGE FOR WOMEN (AUTONOMOUS)

Vaniyambadi – 635 751

Department of Statistics

for

Undergraduate Programme

Bachelor of Science in Statistics

From the Academic Year 2024-25

CONTENT

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK FOR UNDERGRADUATE

1. Preamble

The Department of Statistics was established in 2018.(Bachelor of Science (B.Sc)Course the Department of Statistics is an exciting space to engage with the quantitative aspects of the social, biological sciences. Focusing on the increasing role of Statistics in diverse areas and its indispensability in marketing, finance and strategy-making, students are trained to acquire tools in the areas of applied statistical methods analysis.

Demonstrate a solid understanding of foundational concepts in statistics, including probability theory, descriptive statistics, inferential statistics, and statistical methods. Apply a variety of statistical techniques and methods to analyze data sets, including hypothesis testing, regression analysis, time series analysis, and multivariate analysis. Acquire skills in data collection, data cleaning, data transformation, and data management techniques to prepare datasets for analysis. Demonstrate proficiency in using statistical software packages such as R, Python and SPSS for data analysis, visualization, and statistical modeling. Design and conduct experiments, surveys, and observational studies, including sample size determination, randomization, and control of experimental variables. Understand the principles of statistical inference, including estimation, hypothesis testing, confidence intervals, and p-values, and apply them to draw conclusions from data. Develop statistical models to describe and predict relationships between variables, including linear models, generalized linear models, and time series models. Apply statistical quality control techniques, such as control charts, process capability analysis, and Six Sigma methodologies, to improve processes and ensure product quality.

Conduct statistical research projects, including formulating research questions, designing studies, collecting and analyzing data, and interpreting and presenting results. Develop critical thinking skills to evaluate statistical methods, assumptions, and conclusions critically and apply appropriate statistical techniques to solve real-world problems. Communicate statistical concepts, methods, and findings effectively through written reports, presentations, and visualizations to diverse audiences. Understand the ethical considerations and responsibilities of statisticians, including confidentiality, integrity, and transparency in statistical practice and research.

PROGRAMME OUTCOMES (PO)

Programme	**B.Sc., Statistics**
Programme Code	**US10**
Duration	**3 years[UG]**
PO1	**Disciplinary Knowledge:** Capable of demonstrating comprehensive knowledge and Understanding of one or more disciplines that form a part of an undergraduate programmedof study.
PO2	**Critical Thinking:** Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge Development.
PO3	**Problem Solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.
PO4	**Analytical Reasoning:** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints
PO5	**Scientific Reasoning:** Ability to analyze, interpret and draw conclusions from quantitative /Qualitative data; and critically evaluate ideas, evidence, and experiences from an openminded and reasoned perspective.
PO6	**Self-directed & Lifelong Learning:** Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.
PO7	**Lifelong learning:** Ability to acquire knowledge and skills, including, learning how to learn', that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development / re skilling.
PO8	**Moral and ethical awareness/reasoning:** Ability to embrace moral/ethical values in conducting one's life, formulates a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PROGRAM SPECIFIC OUTCOMES	
PSO1	Acquire good knowledge and understanding, to solve specific theoretical & applied Problems in different area of statistics.
PSO2	Understand, formulate, develop statistical arguments, logically and use quantitative and qualitative Models to address issues arising in social sciences, business and other context /fields.
PSO3	To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, and beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential Organizations.

Eligibility for Admission:

Candidate for admission to the first year of **(B.Sc.,Statistics)** Department of Statistics shall be required to have passed the Higher Secondary Examination with (Academic or Vocational Stream) conducted by the Government of Tamil Nadu with Statistics/Mathematics/Business Mathematics and Statistics as one subject.

Methods of Evaluation and Assessment

Methods of Evaluation		
Internal Evaluation		**25 Marks**
External Evaluation	**End Semester Examination**	**75 Marks**
	Total	**100 Marks**
Method of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand / Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate Between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Semester - I						
Code	Course Title	Hours Distribution				C
		L	T	P	S	
24UFTA11	Tamil-1	4	1	0	0	3
24UFEN11	English-1	4	1	0	0	3
24USTC11	CC–1-Descriptive Statistics	3	1	2	0	5
24USTC12P	CC-2(Practical) Statistical Practical-I	0	0	4	0	3
24UMAA17	EC-1AL-Mathematics for Statistics	2	1	1	0	3
	SEC–1NM-Statistical Methods	1	0	1	0	2
24USTS12	SEC–2 Basic Computer (MS Excel)	1	0	1	0	2
24USTF11	FC-Elementary Statistics	1	1	0	0	2
TOTAL					**30**	**23**

Semester - II						
Code	Course Title	Hours Distribution				C
		L	T	P	S	
24UFTA12	Tamil-2	4	1	0	0	3
24UFEN12	English-2	4	1	0	0	3
24USTC21	CC–3-Probability Theory	3	1	2	0	5
24USTC22P	CC-4 Statistical Practical- II (Data Analysis using MS Excel)	0	0	4	0	2
24USTA21	EC - 2 AL- Applied Statistics	2	1	1	0	4
24USTA 22P	EC - 3 AL Statistical Practical – III	0	0	2	0	2
24USTS21	SEC – 3 Database Management System	1	0	1	0	2
24USTF11	AEC – 1 Life Skills Through Yoga	1	1	0	0	2
TOTAL					**30**	**23**

L-Lecture T-Tutorial P-Practical S-Seminar C-Credit

Students must complete at least one online course (MOOC) from platforms like SWAYAM, NPTEL, or Nanmudalvan within the fifth semester. Additionally, engaging in a specified Self-learning Course is mandatory to qualify for the degree, and successful participation will be acknowledged with an extra credit of 2*.

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24USTC11	**CC –I Descriptive Statistics**	**CC**	**3**	**1**	**2**	**0**	**5**	**6**	**25**	**75**	**100**

Learning Objectives	
LO1	To understand fundamental concept of Statistics and statistical data.
LO2	To provide the visualization of diagrammatic & graphical representation of data.
LO3	To apply the measure of central tendency of the distribution.
LO4	To analyze the concept of Measures of Dispersion and their importance.
LO5	To analyze graphical methods of correlation, such as Scatter Diagrams, to visually represent relationships between variables.

Unit	Content	Hours
1	**Introduction of Statistics:** Introduction -Definition-Scope of Statistics -Functions and Limitations of statistics Collection of Data: Primary and secondary data - Methods of collecting primary data - Sources of secondary data-Framing a Questionnaire- Sampling: Census and Sample Methods-Measurement scales.	18
2	**Diagrammatic & Graphical Representation:** Classification-Types - Formation of frequency distribution-Tabulation - parts of a Table - Types. Diagrammatic representation–Types. Graphical representation-Ogives, Lorenz Curve -Merits and Limitations of diagrams and graphs.	18
3	**Measures of Central Tendency:** Introduction-Definitions- Types - Mean-Median-Mode-Geometric mean-Harmonic Mean-Simple Problems-Merits and Demerits	18
4	**Measures of Dispersion, Measures of Skewness and Kurtosis:** Introduction–Definition–Types–Range-Quartile Deviation - Mean deviation - Standard deviation - Co-efficient of variation - Karl Pearson‘s – Bowley‘s - Kelly‘s methods – Their merits and demerits. Kurtosis. Moments: Raw Moments, Central moments Simple problems.	18
5	**Correlation& Regression Analysis:** Introduction - Definition - Types – Ungrouped and Grouped data – Rank correlation- Probable error – Coefficient of determination -Merits and demerits of Correlation-Regression-Regression Equation	18

CO	Course Outcomes **The Student will able to**
CO1	Describe the scope, functions, limitations, collections, sampling, and presentation of data in Statistics
CO2	Apply diagrammatic representations their types and presentation of data
CO3	Analyze the importance and uses of central values for the various types of data
CO4	Understand & analyze the concept of Measures of Dispersion and their importance.
CO5	Apply graphical methods of correlation, such as Scatter Diagrams, to visually represent relationships between variables.
Textbooks:	
1	Gupta S. Cand Kapoor,V.K.(2002).Fundamentals of Mathematical Statistics, Sultan Chand &Sons Pvt. Ltd.,New Delhi
2	Pillai,R.S., and Bagavathi (2003):Statistics, S.Chand and Company Ltd., New Del
Reference Books:	
1	Hogg.R.V and Craig.A.T.(1978):Introduction to Mathematical Statistics, 6th Mc Graw Hill Publishing Co.Inc. NewYork.
2	Hogg.R.V.and Craig.A.T.(1978):*I* Introduction to Mathematical Statistics 7th Mc Graw Hill Publishing Co.Inc.NewYork.
3	Rohatgi,V.K.(1984):An Introduction to Probability Theory and Mathematical Statistics,2nd Edition
Web resources:	
1	https://en.wikipedia.org/wiki/Descriptive_statistics
2	https://statistics.laerd.com/statistical-guides/measures-central-tendency-mean-mode-median.php
3	https://byjus.com/maths/dispersion/
4	https://www.sciencedirect.com/topics/computer-science/correlation-analysis
5	https://www.investopedia.com/terms/r/regression.asp

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	3	2	3	3	3	3
CO2	2	2	2	2	2	2	3	2	2	2	2
CO3	3	3	3	2	3	2	2	3	3	3	3
CO4	2	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	2	2	3	3	3	3	3
Total	14	15	14	13	12	12	12	15	15	15	14
Average	2.8	3.0	2.8	2.6	2.4	2.4	2.4	3.0	3.0	3.0	2.8

3 – Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24USTC12P	**CC-2 Statistical Practical I**	**CC**	**0**	**0**	**4**		**3**	**4**	**25**	**75**	**100**

Learning Objectives	
LO1	To understand fundamental concept of Statistics and statistical data.
LO2	To provide the visualization of diagrammatic & graphical representation of data.
LO3	To apply the measure of central tendency of the data.
LO4	To analyze the concept of Measures of Dispersion and their methods in real data
LO5	To analyze graphical methods of correlation, such as Scatter Diagrams, to visually represent relationships between variables.

Unit	Content	Hours
1	Construction of Univaraiate, Bivariate frequency distribution	6
2	Diagrammatic Representation	6
3	Graphical Representation	6
4	Measures of Location	6
5	Measures of Dispersion	6
6	Measures of Skewness	6
7	Measures of Kurtosis	6
8	Measures of Kurtosis and Moments	6
9	Computation of Correlation Coefficient	6
10	Spearman’s Rank Correlation	6

CO	Course Outcomes The students will able to
CO1	Understand presentation of data in frequency distribution table
CO2	Apply diagrammatic representations their types and presentation of data
CO3	Analyze the importance and uses of central values for the various types of data.
CO4	Understand & analyze the concept of Measures of Dispersion and their importance.
CO5	Analyze the methods of correlation represent relationships between variables.
Textbooks:	
1	Gupta S. Cand Kapoor,V.K.(2002).Fundamentals of Mathematical Statistics, Sultan Chand &Sons Pvt. Ltd.,New Delhi
2	Pillai,R.S., and Bagavathi (2003):Statistics, S.Chand and Company Ltd., New Delhi.
Reference Books:	
1	Hogg.R.V.and Craig.A.T.(1978):Introduction to Mathematical Statistics, 6th Mc Graw Hill Publishing Co.Inc.NewYork.
2	Hogg.R.V.and Craig.A.T.(1978):*I* Introduction to Mathematical Statistics 7th Mc Graw Hill Publishing Co.Inc.NewYork.
3	Rohatgi,V.K.(1984):An Introduction to Probability Theory and Mathematical Statistics,2nd Edition

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	3	2	3	3	3	3
CO2	3	3	3	3	2	3	2	2	3	2	2
CO3	2	3	3	2	3	3	2	2	3	3	2
CO4	2	3	3	3	3	3	3	3	3	2	2
CO5	3	3	3	3	2	3	3	3	3	3	3
Total	13	15	15	13	12	15	12	13	15	13	12
Average	2.6	3.0	3.0	2.6	2.4	3.0	2.4	2.6	3.0	2.6	2.4

3 – Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24USTS12	SEC 2 Basic computer	SEC	1	0	1	0	2	2	25	75	100

Learning Objectives	
LO1	To Gain a basic understanding of Microsoft Excel's interface, functionalities, and features.
LO2	To Understand how to apply formatting options such as fonts, colors, borders, and cell alignment.
LO3	To Understand how to organize and manage multiple worksheets and workbooks efficiently.
LO4	To implement data validation rules to ensure data accuracy and consistency.
LO5	To Understand how to customize charts to effectively communicate insights from descriptive analyses

Unit	Content	Hours
1	Introduction to MS Excel - Introduction, Navigating MS Excel, Cells, Rows, and Columns, Formulas, Sheet Tabs, Page Margins, Page Orientation, Page Breaks and Printing. Worksheets and Workbooks: Definition of Worksheets and Workbooks, Naming of Worksheets, Adding and Deleting Worksheets, Hiding/ Un hiding Worksheets, Hiding Columns and Rows, Saving Workbooks, Saving an Existing File.	6
2	Entering & Editing Information - Entering Data, Labels and Values, Copying Cells, Rows and Columns, Pasting Cells, Rows, and Columns, Paste an Item from the Clipboard, Inserting and Deleting Rows and Columns, Filling and Editing Cell Data, Find and Replace, Go to Cell Data, Locking Rows and Columns, Spell Check, AutoCorrect.	6
3	Formatting & Adding Elements to a Worksheet - Change Font Styles and Sizes, Adding Borders and Colors to Cells, change a Column Width and Row Height, Merge Cells, Align Cell Contents, Cell Styles, Conditional Formatting, Freeze and Unfreeze Rows and Columns, Adding and Modifying Images, Cropping and Rotating an image, compressing a Picture, Inserting AutoShapes, Adding WordArt, Clip Art, and a Hyperlink.	6

4	Advance Excel - What if Analysis – Goal Seek, Scenario Analysis, Data Tables, Solver Tool, Logical Function – if, nested if. Lookup Functions – Vlookup / HLookup,	6
5	Data Visualization – Charts Elements, Customizing Layouts & Styles, Formatting Chart Elements, Bar and Columns Chart, Histogram, Pie MS Excel using the Data Analysis Took Pak - Descriptive Statistics in Excel - Central Tendency (Mean, Median, Mode), Variability (Standard Deviation, Variance, Range).	6

CO	**Course Outcomes** **The students will able to**
CO1	Understand the format data efficiently using Excel, including applying cell formatting, borders, colors, and font styles.
CO2	Utilize basic Excel functions such as SUM, AVERAGE, MAX, MIN, and COUNT to perform calculations on data sets.
CO3	Understand and apply Excel's data analysis tools such as sorting, filtering, and conditional formatting to organize and analyze data effectively
CO4	Create various types of charts and graphs in Excel, including bar charts, line graphs, pie charts, and scatter plots, to visualize data trends and relationships.
CO5	Perform advanced data analysis and modeling tasks using Excel's statistical functions and scenario analysis tools.
Text Books:	
1	Beverly Dretzke, Statistics with Microsoft Excel Fourth Edition
2	Neil J.Salkind, Excel Statistics
3	Larry Pace, The Excel Data and Statistics Cookbook, Third Edition
Reference Books:	
1	Kumar Bittu, Microsoft Office 2010
2	Frag Curtis, Step by Step Microsoft Excel 2013
3	John Walkenbach, 101 Excel 2013 Tips, Tricks and Time severs
Web Resources:	
1	https://www.geeksforgeeks.org/introduction-to-ms-excel/
2	https://edu.gcfglobal.org/en/excelxp/enter-edit-and-delete-data/1/
3	https://help.tableau.com/current/pro/desktop/en-us/formatting_worksheet.htm
4	https://in.indeed.com/career-advice/career-development/advanced-excel-skills
5	https://en.wikipedia.org/wiki/Data_and_information_visualization

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	3	3	3	3	3	3
CO2	3	2	3	3	2	3	3	3	3	3	3
CO3	3	3	3	2	3	2	3	3	3	3	3
CO4	3	2	3	3	3	3	3	3	3	3	3
CO5	3	3	2	3	2	3	3	3	3	3	3
Total	15	13	13	13	12	14	15	15	15	15	15
Average	3	2.6	2.6	2.6	2.4	2.8	3	3	3	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24USTF11	**FC-1 Elementary Statistics**	**FC**	**1**	**1**	**0**	**0**	**2**	**2**	**25**	**75**	**100**

Learning Objectives	
LO1	To enable the students to understand the basic concepts of set theory.
LO2	To acquire knowledge of the Sequence and series of Arithmetic and Geometric. Find useful applications in commercial problems among others.
LO3	To know the difference between permutation and combination for the purpose of arranging different objects
LO4	To Develop the ability to recognize and identify patterns in number series and sequences
LO5	To enable the important concepts of statistical data.

Unit	Content	Hours
1	Introduction of Set Theory – Subset, Types of Sets, Relations, Functions – Simple problems	6
2	Sequence and Series of Arithmetic and Geometric Progressions – Introduction to Sequence, Series, Arithmetic Progression, Geometric Progression – Simple Problems.	6
3	Basic Concepts of Permutations & Combination – Fundamental Principles of Counting, Factorial, Permutations, Circular Permutations, Permutation with Restrictions, Combinations – Simple Problems.	6
4	Logical Reasoning– Number Series, Coding and decoding and odd man out	6
5	Concept of Statistical population and a sample – quantitative and qualitative data- Measurement scales – nominal, ordinal, interval and ratio.	6

CO	Course Outcomes **The students will able to**
CO1	Understand the basic concepts of quantitative ability
CO2	Understand the basic concepts of logical reasoning Skills
CO3	Acquire satisfactory competency in use of reasoning
CO4	Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability.
CO5	Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC,GPSC etc
Text Books:	
1	Agarwal, R. S.A Modern Approach to verbal & Non-Verbal Reasoning
2	Sijwali, B. S. A Analytical and Logical reasoning.
3	Freund, John E., and Perles, Benjamin M. (2019): Modern Elementary Statistics, Pearson Education, 13th Edition.
4	Triola, Mario F. (2017): Elementary Statistics, Pearson Education, 13th Edition.
5	Dr. P.R. Vittal (2012) Allied Mathematics.
Reference Books:	
1	Agarwal, R. S. Quantitative aptitude for Competitive examination.
2	Sijwali, B. S. Analytical and Logical reasoning for CAT
Web Resources:	
1	https://www.math.uh.edu/~dlabate/settheory_Ashlock.pdf
2	http://matematicas.uis.edu.co/adrialba/sites/default/files/SetTheoryDover-%20Charles%20C%20Pinter.pdf
3	https://ncert.nic.in/pdf/publication/exemplarproblem/classXI/mathematics/keep207.pdf

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	2	3	3	3	3	3
CO2	3	2	3	3	2	2	3	3	3	3	3
CO3	3	2	2	2	3	3	3	3	3	3	3
CO4	3	2	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	2	3	3	3	3	3	3
Total	15	12	14	13	12	13	15	15	15	15	15
Average	3	2.4	2.8	2.6	2.4	2.6	3	3	3	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24USTC21	CC3 Probability Theory	CC3	3	1	2	0	5	6	25	75	100

Learning Objectives	
LO1	To describe the importance and scope of probability theory and to predict the chance of an experimental outcomes.
LO2	To provide the study of random variable, distribution function.
LO3	To Explore Two-dimensional variables and its distributions.
LO4	To Explore the expected value of a function of a random variable and understand its applications.
LO5	To Understand the concept of Generating functions and characteristic function.

Unit	Content	Hours
1	**Theory of Probability** Introduction-Basic terminology- Definition - Axiomatic approach – Types of Events– Addition and Multiplication theorems of Probability for two events(Statement and Proof) -Conditional Probability –Independent Events-Baye's theorem of Probability (Statement and Proof)-Simple problems	**18**
2	**Random variables and Distribution functions** Introduction - Discrete random variable: Probability mass function-Discrete distribution function, Properties. Continuous random variable: Probability density function –Continuous distribution Function and properties-Simple Problems	**18**
3	**Two dimensional Random variables** Joint probability mass function- Marginal probability function, Conditional Probability function. Two dimensional distribution functions-Marginal distribution functions-Joint density function-Marginal density function-Conditional distribution function-Conditional probability density function only.	**18**
4	**Mathematical Expectations** Introduction- Expected value of a random variable (Discrete and Continuous)-Expected value of function of a random variable - Properties of Expectation-Properties of variance. Covariance. Simple Problems.	**18**
5	**Generating functions** Moment Generating Function-Properties- Cummulant Generating Function-Properties- Probability Generating Function- Properties. Characteristic Function-Properties–Necessary and Sufficient condition - Inversion theorems (Statement only)- Uniqueness theorem (Statement only). Chebychev's Inequality (Statement and Proof).	**18**

CO	Course Outcomes The students will able to
CO1	Understand concepts of probability and identify the different approaches of probability theory
CO2	Apply concept of random variable and its respective probability values and to compare a discrete and continuous random variable.
CO3	Apply how marginal distributions can be extracted from two-dimensional distributions.
CO4	Analyze the expected value of a random variable and variance, covariance of random variable
CO5	Demonstrate the use of generating functions , Inversion& Uniqueness theorem Chebychev's inequality
Text Books:	
1	Gupta S.C. and Kapoor V.K (2015): Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
2	Mood A.M. Gray bill, F.A. and Bose. D.C. (1974): Introduction to the theory of Statistics, McGraw Hill Publishing Co. Inc. New York
3	A.M.Goon, M.K.Gupta & B. Dasgupta (1980): An outline of Statistical theory, Vol. I, 6 th revised, World Press.
4	A.M.Mood, F.A. Graybill and D.C. Boes (1974): Introduction to the theory of Statistics, International student ed. McGraw Hill.
5	Marek Fisz (1961): Probability theory and Mathematical Statistics, John Wiley.
Reference Books:	
1	Hogg. R.V. and Craig. A.T. (1978) :Introduction to Mathematical Statistics, McGraw Hill Publishing Co. Inc. New York.
2	Hogg, R.V. and Craig, A.T. (1998): Introduction to Mathematical Statistics, 4th ed. Academic Press.
3	Rohatgi, V.K. (1984): An introduction to probability theory and mathematical statistics.
4	Sanjay Arora and Bansilal (1989): New Mathematical Statistics, Satya prakashan, New Delhi
5	Murry R. Spiegal (1982): Theory and problems of Probability and Statistics, Schaum's outline series, McGraw Hill
Web Resources:	
1	https://www.coursera.org/browse/data-science/probability-and-statistics
2	https://www.youtube.com/watch?v=sbbYntt5CJk
3	https://oli.cmu.edu/courses/probability-statistics-open-free/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	2	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	2	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	3	2	3	3	3	3	3	3
Total	15	12	14	13	12	13	15	15	15	15	15
Average	3	2.4	2.8	2.6	2.4	2.6	3	3	3	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24USTC22P	**CC–4 Statistical Practical-II (Data Analysis using MS Excel)**	**CC**	**0**	**0**	**4**	**0**	**2**	**4**	**25**	**75**	**100**

Learning Objectives	
LO1	To understand Practical knowledge in, probability theory.
LO2	To apply students with skills to solve problems related to random variables
LO3	To develop proficiency in analyzing random variables and their distribution functions.
LO4	To apply expected values and variance.
LO5	To analyze moment generating function and characteristics function.

Unit	**Content**	**Hours**
1	Problems related to Addition and Multiplication theorem	6
2	Problem related to Conditional Probability and Independence	6
3	Problems related to Bayes Theorem	6
4	Random Variables	6
5	Distribution Functions	6
6	Joint Distribution Function	6
7	Expectation, Variance and Correlation Coefficient	6
8	Moment Generation Function	6
9	Cummulant Generating Function	6
10	Characteristics Function	6

CO	Course Outcomes **The students will able to**
CO1	Analyze problems involving conditional probability and evaluate the independence of events.
CO2	Understand the concept of random variables
CO3	Calculate and interpret statistical measures such as expectation, variance.
CO4	Apply moment and cumulant generating functions to summarize statistical distributions.
CO5	Analyze statistical concepts using MS Excel to organize, compute, and present data effectively.
Text Books:	
1	Gupta S.C. and Kapoor V.K (2015): Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
2	Mood A.M. Gray bill, F.A. and Bose. D.C. (1974): Introduction to the theory of Statistics, McGraw Hill Publishing Co. Inc. New York
3	A.M.Goon, M.K.Gupta & B. Dasgupta (1980): An outline of Statistical theory, Vol. I, 6 th revised, World Press.
4	A.M.Mood, F.A. Graybill and D.C. Boes (1974): Introduction to the theory of Statistics, International student ed. McGraw Hill.
5	Marek Fisz (1961): Probability theory and Mathematical Statistics, John Wiley.
Reference Books:	
1	Hogg. R.V. and Craig. A.T. (1978) :Introduction to Mathematical Statistics, McGraw Hill Publishing Co. Inc. New York.
2	Hogg, R.V. and Craig, A.T. (1998): Introduction to Mathematical Statistics, 4th ed. Academic Press.
3	Rohatgi, V.K. (1984): An introduction to probability theory and mathematical statistics.
4	Sanjay Arora and Bansilal (1989): New Mathematical Statistics, Satya prakashan, New Delhi
5	Murry R. Spiegal (1982): Theory and problems of Probability and Statistics, Schaum's outline series, McGraw Hill.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	2	3	3	3	3
CO3	3	2	3	3	3	3	3	3	2	3	3
CO4	3	3	2	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	14	14	15	15	15	14	15	14	15	15
Average	3	2.8	2.8	3	3	3	2.8	3	2.8	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24USTA21	**EC-2 Applied Statistics**	**EC**	**2**	**1**	**1**	**0**	**4**	**4**	**25**	**75**	**100**

Learning Objectives	
LO1	To Understand the significance of time series and its components.
LO2	To Explore the various methods related to measuring seasonal variations in the data.
LO3	To understand and apply the concepts of Index numbers and its usage.
LO4	Analyze Quantitative Index Numbers and its applications and Study the Classification of Index Number.
LO5	To apply understand the concept of demand, factors influencing consumer demand, and the role of consumer preferences in determining demand.

Unit	Content	Hours
1	Time series - Concept - Components of time Series -Additive and multiplicative Models - Measurement of trend - Free hand method - Semi average method - Moving average method - Least square method- Simple Problems	12
2	Measurement of seasonal variations - Simple average method - Ratio to trend method - Ratio to moving average method - Link relative method-Simple Problems	12
3	Index Numbers - Uses –Basic Problems involved in the Construction of Index Number- Methods of constructing index numbers - Unweighted index numbers - weighted index numbers- Fixed Base Index Number and chain base index numbers- Simple Problems	12
4	The criteria of a Good Index Number -Unit test-Time reversal test - Factor reversal test –Circular Test. Classification of Index Number-Wholesale price Index Number-cost of living index Numbers-Consumer Price Index Number-Limitations of Index Numbers- Simple Problems	12
5	Demand Analysis Theory and analysis of consumer's demand Law of demand, Price elasticity of demand functions and supply – Partial and cross elasticity's of Demand- Simple Problems.	12

CO	Course Outcomes **The students will able to**
CO1	Understand the Time Series concept and Measurement of Trend
CO2	Estimate the Measurement of seasonal variations and its various methods
CO3	Understand and apply the concept and purposes of Index Numbers
CO4	Apply the criteria of a good index numbers and Classification of Index Number.
CO5	Understand the basic concepts of demand, the law of demand, and factors affecting consumer demand.
Text Books:	
1	Kapoor,V.K and Gupta,S.C (1978); Fundamentals of Applied Statistics, Sultan chand & Sons.
2	Mukhopadhyay P.(1999): Applied Statistics, New Central Book Agency Pvt. Ltd., Calcutta.
3	Pillai RSN and Bagavathi V, Statistics,S.Chand & Co.,2010
4	Gupta, S.P (1999): Statistical Methods, Sultan & Sons, New Delhi.
5	Croxton, F.E & Cowdon, D.J. (1973): Applied general statistics, Prentice Hall
Reference Books:	
1	Box, G.E.P., Jenkins, G.M., Reinsel, G.C. and Ljung, G.M. Time Series Analysis: Forecasting and Control, 5th Edition, John Wiley& sons,Inc.,2015.
2	Brockwell,P.J.and Davis, R.A., Introduction to TimeSeries Analysis. Springer, 2003.
3	Srinivasan, K. (1998). Demographic Techniques and Applications. Sage Publications.
4	Srivastava O.S. (1983). A Text Book of Demography. Vikas Publishing House.
5	Garret, H.E., Education and Psychological Statistics, Paragan International Publications, 2005.
Web Resources:	
1	https://www.stat.berkeley.edu/~bartlett/courses/153-fall2010/lectures/1.pdf
2	http://www.gdcboysang.ac.in/About/droid/uploads/EconomicsPart4.pd
3	http://ocw.jhsph.edu/courses/demographicmethods/PDFs/idm-sec1.pdf

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	2	3	3	3	3
CO3	3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	2	3	3	3	2	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	15	13	15	15	15	13	15	14	15	15
Average	3	3	2.6	3	3	3	2.6	3	2.8	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24USTA22P	**EC-3 Statistical Practical -III**	**EC**	**0**	**0**	**2**		**2**	**2**	**25**	**75**	**100**

Learning Objectives	
LO1	To equip with the fundamental methods and techniques for analyzing time series data.
LO2	To provide hands-on experience in calculating and interpreting trend and seasonal variation.
LO3	To construct and apply different index numbers for price and quantity.
LO4	To validate the reliability of index numbers through tests like time reversal and factor reversal.
LO5	To understand the consistency and reliability of index numbers.

Unit	Content	Hours
1	Measurement of Trend	5
2	Measurement of Seasonal Variation	5
3	Constructing Index Numbers	5
4	Quantity Index Number	5
5	Time Reversal Factor Reversal Test	5
6	Classification of index Number	5

CO	Course Outcomes The students will able to
CO1	To identify and analyze trends and seasonal variations in time series data.
CO2	Understand constructing and interpreting different types of index numbers.
CO3	Analyzing quantity index numbers using various methods.
CO4	Understand and apply the time reversal and factor reversal tests to verify index numbers.
CO5	Analyze the ability to classification of index numbers

Text Books:	
1	Kapoor,V.K and Gupta,S.C (1978); Fundamentals of Applied Statistics, Sultan chand & Sons.
2	Mukhopadhyay P.(1999): Applied Statistics, New Central Book Agency Pvt. Ltd., Calcutta.
3	Pillai RSN and Bagavathi V, Statistics,S.Chand & Co.,2010
4	Gupta, S.P (1999): Statistical Methods, Sultan & Sons, New Delhi.
5	Croxton, F.E & Cowdon, D.J. (1973): Applied general statistics, Prentice Hall
Reference Books:	
1	Box, G.E.P., Jenkins, G.M., Reinsel, G.C. and Ljung, G.M. Time Series Analysis: Forecasting and Control, 5th Edition, John Wiley& sons,Inc.,2015.
2	Brockwell,P.J.and Davis, R.A., Introduction to TimeSeries Analysis. Springer, 2003.
3	Srinivasan, K. (1998). Demographic Techniques and Applications. Sage Publications.
4	Srivastava O.S. (1983). A Text Book of Demography. Vikas Publishing House.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	2	3	3	3	3
CO3	3	2	3	3	3	3	3	3	2	3	3
CO4	3	3	2	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	14	14	15	15	15	14	15	14	15	15
Average	3	2.8	2.8	3	3	3	2.8	3	2.8	3	3

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24USTS21	SEC-3 Database Management System	SEC	1	0	1		2	2	25	75	100

Learning Objectives	
LO1	To Understand the components and functions of a database system, including the database, DBMS and user applications.
LO2	To Identify and enforce constraints in a database design to maintain data integrity.
LO3	To Understand the syntax and semantics of the key operations in Relational Algebra.
LO4	To Understand the equivalence and differences between relational algebra and relational calculus, focusing on their capabilities in terms of query expressiveness.
LO5	To Understanding of constraints and integrity constraints in relational databases, and to enable them to effectively using SQL

Unit	Content	Hours
1	Introduction to Databases and Transactions -What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management.	6
2	Database design and ER Model: Overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas.	6
3	Relational Algebra and Calculus Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics.	6
4	Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs. algebra, computational capabilities.	6
5	A constraint, Views and SQL what is constraints, types of constraints, Integrity constraints, SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations.	6

CO	Course Outcomes The students will able to
CO1	Understand the fundamental components and objectives of a database system.
CO2	Create and interpret ER diagrams for clear and efficient database design.
CO3	Develop skills to formulate database queries declaratively using relational calculus syntax and semantics.
CO4	Analyze the computational capabilities of relational query languages and their impact on database operations.
CO5	Learn to define and manage the structure of relational databases using DDL commands.

Text Books	
1	H.F. Korth and A.Silberschatz (1988): Database system Concept, McGraw Hill Publication.
2	Mc Graw-Hill,Rob,Coronel,“Database Systems”,Seventh Edition,Cengage Learning.
3	Albert Lulushi (1997): Developing ORACLE FORMS Applications, Prentice Hall
4	A Silberschatz,H Korth,S Sudarshan,“Database System and Concepts”,fifth Edition
Reference Books	
1	Ramez Elmasri and B. Navathe, Fundamentals of Database Systems, 3/e, Addison Wesley.
2	Date C.J. (1981). Introduction to Database Systems, Addison-Wesley/
Web Resources:	
1	https://nptel.ac.in/courses/106104135
2	https://onlinecourses.nptel.ac.in/noc20_cs03/preview

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	1	3	1	1	1	2	2	1
CO2	3	3	3	1	3	1	1	1	2	2	1
CO3	3	3	3	2	3	1	1	1	2	3	1
3CO4	3	3	3	2	3	1	1	1	3	3	2
CO5	3	3	3	2	3	2	2	1	3	3	2
Total	15	14	14	15	15	15	14	15	14	15	15
Average	3	2.8	2.8	3	3	3	2.8	3	2.8	3	3

3 – Strong, 2- Medium, 1- Low