Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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–: પરિપત્ર :–

વાણિજ્ય વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૫–૨૬ થી અમલમાં આવનાર T. Y. B. Com. Statistics Sem.-5 & 6 ના અભ્યાસક્રમ અંગે વિચારણા કરતા આંકડાશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૭/૦૩/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંકઃ૪ થી કરેલ ભલામણ સ્વીકારી વાણિજ્ય વિદ્યાશાખાની તા.૦૧/૦૪/૨૦૨૫ ની સભાનાં ઠરાવ ક્રમાંકઃ૩૧ થી કરેલ ભલામણને એકેડેમિક કાઉન્સિલની તા.૦૫/૦૫/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૪ થી સ્વીકારી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

વધુમા, T.Y.B.Com. Sem-6 Statistics Paper-VIII Data Collection Techniques in Ancient India and Vedic Mathematics (Major) નો અભ્યાસક્રમ અભ્યાસ સમિતિ વતી અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ અને વાણિજ્ય વિદ્યાશાખા વતી વાણિજ્ય વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ મંજુર કરેલ છે જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

ક્રમાંકઃઓથો./પરિપત્ર/સિલેબસ/૧૧૭૨૨/૨૦૨૫
તા.૦૮–૦૫–૨૦૨૫

કુલસચિવ(ઇ.ચા.)

પ્રતિ,
૧) વાણિજ્ય વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારૂ.
૨) ડીનશ્રી, વાણિજ્ય વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

21-24
22-22

એકેડેમિક કાઉન્સિલ તા. 21-04-2015
બાબત 24 વિદ્યાપરિષદ 22

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

UNDER GRADUATE PROGRAM
IN
STATISTICS
3 (YEARS DEGREE) AND 4 (YEARS HONOURS)

T.Y.B. Com Sem -V and Sem-VI

Template For Syllabus

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

ProgrammeName :-B. Com Statistics

As Per NEP 2020

About programme :-Semester V & VI (Major/Minor)

Teaching & Evaluation Scheme:- As per NEP 2020

Course Category	Course Code	Course Title	Mark sheet title in English	Level of course	Teaching Hours /week (TH)	Teaching Hours /week (PR)	Exam Duration (TH)	Exam Duration (PR)	Credit (TH)	Credit (PR)	Internal Marks (TH)	Internal Marks (PR)	External Marks (TH)	External Marks (PR)	Total (TH)
Major /Minor	MJSTC 505/ MESTC 505	Paper – 5 : Statistical Inferential Techniques for Decision	Paper – 5 : Statistical Inferential Techniques for Decision	300	4	-	2	-	4	-	50	-	50	-	100
Major	MJSTC 506	Paper – 6 : Statistical Inference	Paper – 6 : Statistical Inference	300	4	-	2	-	4	-	50	-	50	-	100
Major /Minor	MJSTC 607/ MESTC 607	Paper – 7 : Statistical Analytical Methods	Paper – 7 : Statistical Analytical Methods	300	4	-	2	-	4	-	50	-	50	-	100
Major	MJSTC -BGP-608	Paper – 8 : Data Collection Techniques in Ancient India and Vedic Mathematics	Paper – 8 : Data Collection Techniques in Ancient India and Vedic Mathematics	300	4	-	2	-	4	-	50	-	50	-	100

[Subject Code (Major)- 2508000605020003]
[Subject Code (Minor)- 2508000605050005]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.COM SEM –V

Statistics Paper – 5: Statistical Inferential Techniques for Decision (Major & Minor) (4 credit)

As per NEP 2020

To be implemented from the Academic year 2025-'26

		Weightage	Marks
Course code	MJSTC 505/MESTC 505		
Course title	Paper – 5: Statistical Inferential Techniques for Decision		
credit	4		
Teaching per week	4 hours		
Effective from	2025-'26		
Purpose of course	The Purpose of the course is to developed theoretical knowledge and practical applications so learners will develop the skills necessary for effective statistical analysis and interpretation		
Objective of course	The main objective of this course is to provide students with a comprehensive understanding of hypothesis testing and small sample test. Additionally, the course introduces students to Indian official statistics, including the roles of key organizations such as the Central Statistical Organization, National Sample Survey, and Indian Statistical Institute.		
Programme outcomes	**PO-01:** Knowledge & Conceptual Understanding: Develop a strong foundation in principles and concepts across disciplines, fostering interdisciplinary learning, advance knowledge and problem-solving abilities. **PO-02:** Analytical & Critical Thinking: Apply critical thinking and analytical reasoning to evaluate data, hypotheses and real-world problems, leading to evidence-based conclusions. **PO-03:** Research & Inquiry-based Learning: Develop investigative skills through experimentation, data analysis to contribute to research and innovation. **PO-04:** Technical Skills: Gain hands-on experience with instrumentation and computational tools relevant to research and industry applications. **PO-05:** Digital & Computational Literacy: Utilize digital tools, computational techniques and emerging technologies such as AI, statistical modelling to enhance learning and problem-solving. **PO-06:** Environmental & Societal Responsibility: Understand the role of science in addressing environmental, health and societal challenges, promoting sustainability and ethical responsibility. **PO-07:** Effective Communication & Collaboration: Develop proficiency in scientific communication, both written and oral, for effective dissemination of knowledge while collaborating in multidisciplinary teams. **PO-08:** Innovation & Entrepreneurship: Foster an entrepreneurial mind-set by applying knowledge for innovation, technology development, and industry-oriented applications. Develop sustainable solutions to address real-world challenges in research and environmental management. **PO-09:** Lifelong Learning & Professional Growth: Cultivate curiosity and adaptability for continuous learning, equipping students for higher education,		

	research, and professional careers. **PO-10:** Ethical Leadership & Value-based Education: Develop leadership qualities, ethical values, and a sense of responsibility in applying societal progress, aligning with Indian knowledge systems and global perspectives.		
Programme specific outcomes.	**PSO1: Understanding Statistical Principles** Graduate Should comprehend the importance and value of statistical principles and be able to convert problem description into testable research hypothesis. **PSO2:Professional and Entrepreneurial Skills Development** The program enhances student's professional skills and entrepreneurial capabilities, fostering independent logical and analytical thinking. It also emphasizes teamwork and leadership, preparing students for diverse environments by providing skill enhancement Certificate courses. **PSO3:Real-World Problem Solving** Students are trained to investigate, design, and develop practical solutions for real-world challenges, ensuring they can apply theoretical knowledge to practical situations through Experiential Learning and by providing platform for extracurricular activities. **PSO4:Self-Learning and Problem-Solving Skills** Students gain hands-on experience with advanced statistical tools and software, enhancing their ability to tackle real-world problems efficiently. **PSO5:Performing data Analysis** Graduate should be able to apply analytical and statistical methods to analyze data, interpret results, and provide solutions in various settings. **PSO6: Develop Communication Skills** Effectively Communicate Statistical results through clear & informative data visualizations. **PSO7:Commitment to Lifelong Learning and Research** The program focuses not only on imparting core education but also to developing interest in research. **PSO8:Provide Employability** Identify & explore career opportunities in statistics, including roles in industry, government & academia.		
Mapping between POs and PSOs			

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1	✓		✓		✓			
PO2	✓	✓	✓	✓	✓			
PO3	✓		✓				✓	
PO4			✓	✓	✓		✓	
PO5	✓		✓	✓	✓			
PO6	✓		✓		✓			✓
PO7		✓	✓			✓		
PO8	✓	✓						✓
PO9			✓	✓	✓		✓	✓
PO10		✓	✓			✓		

<table>
<tr><td>Course outcomes</td><td>CO1: Understand the basic concept of testing of hypothesis.
CO2: Understand the basic concept of small sample test.
CO3: Understand the basic concept of F-distribution & Analysis of Variance and concept of Fisher's Z transformation.
CO4: Apply the course content for the further study of statistics and Acquire Knowledge about Indian official statistics.</td><td></td><td></td></tr>
<tr><td>Mapping between COs with PSOs</td><td>
<table>
<tr><th>CO</th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th><th>PSO6</th><th>PSO7</th><th>PSO8</th></tr>
<tr><td>CO1</td><td>✓</td><td></td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>CO2</td><td>✓</td><td></td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>CO3</td><td>✓</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>CO4</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Course content</td><td>Unit-I: Testing of hypothesis:
• Statistical hypothesis (Simple & Composite)
• Test of a statistical hypothesis
• Null and Alternative hypothesis
• Critical region
• Two types of errors
• Level of significance and power of the test</td><td>10%</td><td>05</td></tr>
<tr><td></td><td>Unit-II: Small Sample test:
Test based on x^2, t and F distributions:
• Test of population variance
• Test of goodness of fit
• Test of independence of attributes
• Yate's correction
• Test of single mean
• Test of difference between two means (for dependent and independent samples)
• Test of significance of sample correlation coefficient.
• Confidence intervals for mean and variance for small samples.
Fisher's Z-transformation:
• Fisher's Z-transformation and its application
• Test of two population variances.</td><td>50%</td><td>25</td></tr>
<tr><td></td><td>Unit-III Analysis of variance:
• One way classifications
• two way classifications</td><td>20%</td><td>10</td></tr>
<tr><td></td><td>Unit-IV: Indian official statistics:
• Central Statistical Organization on (CSO) National Sample Survey (NSS)
• National Council of Applied Economics and Research
• Department of Commercial Intelligence and Statistics (D.C.I.S)
• Indian Statistical Institution (I.S.I)
• Principal Publications containing data on the topics such as population, agriculture and industry.</td><td>20%</td><td>10</td></tr>
<tr><td>References</td><td>1. Goon A.M., Gupta M. K. & Dasgupta (1986): Fundamentals of Statistics Vol-II; Worls Press: Culcutta.
2. Gupta S. C. & Kapoor V. K. : Fundamentals of Mathematical Statistics; Sultan Chand & Sons.
George Casella & Roger L. Berger (2024) : Statistical Inference; CRC Press: Taylor & Francis Group

Unit I: Testing of Hypothesis
Title: Statistical Inference</td><td></td><td></td></tr>
</table>

Author(s): George Casella & Roger L. Berger
Publisher: CRC Press, Taylor & Francis Group
Publication Date: 2024
Description: Covers theoretical foundations of statistical hypothesis testing in depth.

Title: Introduction to the Theory of Statistics
Author(s): Alexander M. Mood, Franklin A. Graybill, Duane C. Boes
Publisher: McGraw-Hill
Publication Date: 1974
Description: Classic reference for probability and hypothesis testing concepts.

Title: Theory of Point Estimation
Author(s): Erich L. Lehmann & George Casella
Publisher: Springer
Publication Date: 1998
Description: Mathematical treatment of estimation and hypothesis testing.
Unit II: Small Sample Tests
Title: Introduction to Statistical Theory: Part 2
Author(s): Sher Muhammad Chaudhry & Shahid Kamal
Publisher: Ilmi Kitab Khana
Publication Date: 2006
Description: Explains small sample distributions with solved problems.

Title: Applied Statistics and Probability for Engineers
Author(s): Douglas C. Montgomery & George C. Runger
Publisher: Wiley
Publication Date: 2020
Description: Provides applied perspective on hypothesis tests including small samples.

Title: Biostatistics: A Foundation for Analysis in the Health Sciences
Author(s): Wayne W. Daniel & Chad L. Cross
Publisher: Wiley
Publication Date: 2018
Description: Focuses on statistical testing with applications in biology and health sciences.

Unit III: Analysis of Variance
Title: Design and Analysis of Experiments
Author(s): Douglas C. Montgomery
Publisher: Wiley
Publication Date: 2020
Description: Covers theory and application of one-way and two-way ANOVA techniques.

Title: Experimental Design and Analysis
Author(s): Howard J. Seltman
Publisher: Carnegie Mellon University
Publication Date: 2018
Description: Open-access text offering detailed explanation of ANOVA and related methods.

Title: Applied Linear Statistical Models
Author(s): Michael H. Kutner, Christopher J. Nachtsheim, John Neter, William Li
Publisher: McGraw-Hill
Publication Date: 2004
Description: Advanced treatment of linear models including ANOVA methods.

Unit IV: Indian Official Statistics
Title: Official Statistics: Concepts, Methods and Applications
Author(s): United Nations Statistics Division (UNSD)

Publisher: United Nations
Publication Date: 2018
Description: Detailed guide on official statistical systems globally, including India.

Title: Statistical System in India
Author(s): S. C. Gupta
Publisher: Sultan Chand & Sons
Publication Date: 2015
Description: Comprehensive coverage of India's official statistical system and institutions.

Title: Fundamentals of Applied Statistics
Author(s): S. C. Gupta & V. K. Kapoor
Publisher: Sultan Chand & Sons
Publication Date: 2020
Description: Includes Indian official statistics along with applied techniques.

[Subject Code- 2508000605030003]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
T.Y.B.COM SEM –V
Statistics Paper – VI: Statistical Inference (Major Paper) (4 credit)
As per NEP 2020
To be implemented from the Academic year 2025-'26

Course code	MJSTC 506	Weightage	Marks
Course title	Paper – VI: Statistical Inference		
credit	4		
Teaching per week	4 Hours		
Effective from	2025-'26		
Purpose of course	The purpose is to make students aware about the application of estimation to find interval of a population parameter.		
Objective of course	The main objective of this course is to provide fundamental knowledge of estimation, methods of estimation and interval estimation.		
Programme outcomes	**PO-01:** Knowledge & Conceptual Understanding: Develop a strong foundation in principlesand concepts across disciplines, fostering interdisciplinary learning, advance knowledgeand problem-solving abilities. **PO-02:** Analytical & Critical Thinking: Apply critical thinking and analytical reasoning to evaluate data, hypothesesand real-world problems, leading to evidence-based conclusions. **PO-03:** Research & Inquiry-based Learning: Develop investigative skills through experimentation, data analysis to contribute to research and innovation. **PO-04:** Technical Skills: Gain hands-on experience with instrumentation and computational tools relevant to research and industry applications. **PO-05:** Digital & Computational Literacy: Utilize digital tools, computational techniques and emerging technologies such as AI, statistical modelling to enhance learning and problem-solving. **PO-06:** Environmental & Societal Responsibility: Understand the role of science in addressing environmental, health and societal challenges, promoting sustainability and ethical responsibility. **PO-07:** Effective Communication & Collaboration: Develop proficiency in scientific communication, both written and oral, for effective dissemination of knowledge while collaborating in multidisciplinary teams. **PO-08:** Innovation & Entrepreneurship: Foster an entrepreneurial mind-set by applying knowledge for innovation, technology development, and industry-oriented applications. Develop sustainable solutions to address real-world challenges in research and environmental management. **PO-09:** Lifelong Learning & Professional Growth: Cultivate curiosity and adaptability for continuous learning, equipping students for higher education, research, and professional careers. **PO-10:** Ethical Leadership & Value-based Education: Develop leadership qualities, ethical values, and a sense of responsibility in applying societal		

progress, aligning with Indian knowledge systems and global perspectives.

Programme specific outcomes

PSO1: Understanding Statistical Principles

Graduate Should comprehend the importance and value of statistical principles and be able to convert problem description into testable research hypothesis.

PSO2:Professional and Entrepreneurial Skills Development

The program enhances student's professional skills and entrepreneurial capabilities, fostering independent logical and analytical thinking. It also emphasizes teamwork and leadership, preparing students for diverse environments by providing skill enhancement Certificate courses.

PSO3:Real-World Problem Solving

Students are trained to investigate, design, and develop practical solutions for real-world challenges, ensuring they can apply theoretical knowledge to practical situations through Experiential Learning and by providing platform for extracurricular activities.

PSO4:Self-Learning and Problem-Solving Skills

Students gain hands-on experience with advanced statistical tools and software, enhancing their ability to tackle real-world problems efficiently.

PSO5:Performing data Analysis

Graduate should be able to apply analytical and statistical methods to analyze data, interpret results, and provide solutions in various settings.

PSO6: Develop Communication Skills

Effectively Communicate Statistical results through clear & informative data visualizations.

PSO7:Commitment to Lifelong Learning and Research

The program focuses not only on imparting core education but also to developing interest in research.

PSO8:Provide Employability

Identify & explore career opportunities in statistics, including roles in industry, government & academia.

Mapping between POs and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1	✓		✓		✓			
PO2	✓	✓	✓	✓	✓			
PO3	✓		✓				✓	
PO4			✓	✓	✓		✓	
PO5	✓		✓	✓	✓			
PO6	✓		✓		✓			✓
PO7		✓	✓			✓		
PO8	✓	✓						✓
PO9			✓	✓	✓		✓	✓
PO10		✓	✓			✓		

Course outcomes

CO1: Understand the basic concept of estimation.
CO2: Understand the properties of good estimators.
CO3: Understand the methods of estimation.
CO4: Understand the concept of interval estimation and apply the course content for the further study of statistics.

Mapping between COs with PSOs	**CO**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**		
	CO1	✓	✓		✓	✓	✓				
	CO2	✓	✓		✓	✓	✓				
	CO3	✓	✓	✓	✓	✓	✓				
	CO4	✓	✓	✓	✓	✓	✓	✓	✓		
Course content	Unit-I: Estimation: • Meaning of parameters of probability distributions, discussion of different types of probability distributions and their parameters, Parametric Space. • Definition of Estimator and Estimate.									10%	5
	Unit-II: Properties of a good estimator: • Unbiasedness • Consistency • Efficiency • Sufficiency • Definition of likelihood function.									20%	10
	Unit-III: Application of different methods of Estimation: • Methods for finding estimators • Method of Moments with its limitations. • Method of Maximum Likelihood Estimation procedure. • Properties of MLE (without proof) • Cramer Rao inequalities • Method of Least Square.									40%	20
	Unit-IV: Interval Estimation: • Confidence Interval for Small Sample • Confidence Interval for population mean μ of N (μ, σ^2) (both case when σ is known & unknown) • Confidence Interval for σ^2 • Confidence Interval for Large Sample • Population means • Population correlation coefficient • Proportion of success • Number of successes									30%	15
References	1. H.A.Taha Operation Research, Macmillian Publishing CO.1999. 2. Goon A.M., Gupta M.K. and Dasgupta B. (2000): Fundamentals of Statistics, Vol. I & II, 8thEdn. The World Press, Kolkata. 3. Elhance D.N. (1986): Fundamental of Statistics, Kitab Mahal Ahmadabad. 4. Johnsons, N.L.andKotz, S. (1977): Distributions in Statistics, John Wiley. 5. Ferguson, T. (1967): Mathematical Statistics; Academic Press. 6. Jaiswal, M. C. (1973): Statistical Distributions; Guj. Uni. Book Pub. Board, Ahmedabad. 7. Rohatgi, V.K. (1984): Introduction to Probability Theory and Mathematical Statistics; Wiley Eastern.										

[Subject Code (Major) -2508000606020003]

[Subject Code (Minor) -2508000606040006]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.COM SEM –VI

Statistics Paper – 7: Statistical Analytical Methods (Major/ Minor) (4 credit)

As per NEP 2020

To be implemented from the Academic year 2025-'26

Course code	MJSTC 607/MESTC 607	Weightage	Marks
Course title	Paper – 7:Statistical Analytical Methods		
credit	4		
Teaching per week	4 hours		
Effective from	2025-'26		
Purpose of course	The purpose of the course is to developed practical applications and theoretical knowledge, learners will develop essential skills for statistical analysis in social sciences and economics		
Objective of course	The main objective of this course is to provide students with a foundational understanding of non-parametric tests. The purpose is to make students aware about the application of demography in social science and additionally, the course explores the concept of national income, its estimation methods, and income distribution using the Lorenz curve and Pareto's law.		
Programme outcomes	**PO-01:** Knowledge & Conceptual Understanding: Develop a strong foundation in principles and concepts across disciplines, fostering interdisciplinary learning, advance knowledge and problem-solving abilities. **PO-02:** Analytical & Critical Thinking: Apply critical thinking and analytical reasoning to evaluate data, hypotheses and real-world problems, leading to evidence-based conclusions. **PO-03:** Research & Inquiry-based Learning: Develop investigative skills through experimentation, data analysis to contribute to research and innovation. **PO-04:** Technical Skills: Gain hands-on experience with instrumentation and computational tools relevant to research and industry applications. **PO-05:** Digital & Computational Literacy: Utilize digital tools, computational techniques and emerging technologies such as AI, statistical modelling to enhance learning and problem-solving. **PO-06:** Environmental & Societal Responsibility: Understand the role of science in addressing environmental, health and societal challenges, promoting sustainability and ethical responsibility. **PO-07:** Effective Communication & Collaboration: Develop proficiency in scientific communication, both written and oral, for effective dissemination of knowledge while collaborating in multidisciplinary teams. **PO-08:** Innovation & Entrepreneurship: Foster an entrepreneurial mind-set by applying knowledge for innovation, technology development, and industry-oriented applications. Develop sustainable solutions to address real-world challenges in research and environmental management. **PO-09:** Lifelong Learning & Professional Growth: Cultivate curiosity and		

adaptability for continuous learning, equipping students for higher education, research, and professional careers.

PO-10: Ethical Leadership & Value-based Education: Develop leadership qualities, ethical values, and a sense of responsibility in applying societal progress, aligning with Indian knowledge systems and global perspectives.

Programme specific outcomes

PSO1: Understanding Statistical Principles

Graduate Should comprehend the importance and value of statistical principles and be able to convert problem description into testable research hypothesis.

PSO2:Professional and Entrepreneurial Skills Development

The program enhances student's professional skills and entrepreneurial capabilities, fostering independent logical and analytical thinking. It also emphasizes teamwork and leadership, preparing students for diverse environments by providing skill enhancement Certificate courses.

PSO3:Real-World Problem Solving

Students are trained to investigate, design, and develop practical solutions for real-world challenges, ensuring they can apply theoretical knowledge to practical situations through Experiential Learning and by providing platform for extracurricular activities.

PSO4:Self-Learning and Problem-Solving Skills

Students gain hands-on experience with advanced statistical tools and software, enhancing their ability to tackle real-world problems efficiently.

PSO5:Performing data Analysis

Graduate should be able to apply analytical and statistical methods to analyze data, interpret results, and provide solutions in various settings.

PSO6: Develop Communication Skills

Effectively Communicate Statistical results through clear & informative data visualizations.

PSO7:Commitment to Lifelong Learning and Research

The program focuses not only on imparting core education but also to developing interest in research.

PSO8:Provide Employability

Identify & explore career opportunities in statistics, including roles in industry, government & academia.

Mapping between POs and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1	✓		✓		✓			
PO2	✓	✓	✓	✓	✓			
PO3	✓		✓				✓	
PO4			✓	✓	✓		✓	
PO5	✓		✓	✓	✓			
PO6	✓		✓		✓			✓
PO7		✓	✓			✓		
PO8	✓	✓						✓
PO9			✓	✓	✓		✓	✓
PO10		✓	✓			✓		

Course outcomes

CO1: Understand the basic concept of Non parametric inference.

	CO2: Understand the basic concept of demography. **CO3:** Understand the concept of mortality. **CO4:** Understand the concept of national incomeand apply the course content for the further study of statistics.		
Mapping between COs with PSOs	<table><tr><th>CO</th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th><th>PSO6</th><th>PSO7</th><th>PSO8</th></tr><tr><td>CO1</td><td>✓</td><td></td><td></td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr><tr><td>CO2</td><td>✓</td><td></td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td><td></td></tr><tr><td>CO3</td><td>✓</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr><tr><td>CO4</td><td>✓</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr></table>		
Course content	Unit-I: Non parametric tests: • Introduction • Comparison of parametric and non-parametric tests • Sign test for single sample and paired samples • Wilcoxon signed-rank test for one sample and paired samples • Mann-Whitney test • Median test.	40%	20
	Unit-II: Demography: • Meaning • Uses • Methods of collecting demographic statistics • Defects of demographic statistics • Mortality and Fertility: o Infant mortality o Neonatal mortality o Maternal mortality o Death rates o Standardized death rates	20%	10
	Unit-III: Fertility and Reproduction: • Crude Birth Rate (CBR) • General Fertility Rate (GFR) • Age specific fertility rate • Total Fertility Rate (TFR) • Gross Reproduction Rate (GRR) • Net Reproduction Rate (NRR)	20%	10
	Unit-IV: National Income: • Concept of National Income • Uses • Methods of its estimation • Lorenz curve and Pareto's law of Income distribution o Concept o Derivations and Applications.	20%	10
References	1. Goon A.M., Gupta M. K. & Dasgupta B. : Fundamentals of Statistics Vol-II; Worls Press: Kolkata 1991. 2. GibhonsJ.E. : Non-Parametric Methods, McGraw Hills. 3. Barkley G.W/(1958): "Techniques of population analysis" John Wiley & Sons Inc First Ed. 4. Pathak, K.B. and F. Ram (1998): "Techniques of Demography		

	Analysis" 2nd Ed, Himalaya Pub. House, Delhi. 5. Cox P.R : "Demography" Cambridge University Press. 6. Srivastava, O.S.(1983): A Texbook of Demography; Vikas Publishing House. 7. Dr. Ashwini M. Kapadiya (2016): "Population Education"; Amol prakashan. Jaiswal, M. C. (1984) : Arth Vishayakankadashashtra (in Gujarati); University Granth Nirman Board, Ahmedabad.		

[Subject Code - 2508000606030003]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.COM SEM –VI

Statistics Paper – VIII: Data Collection Techniques in Ancient India and Vedic Mathematics

(Major Paper-VIII) (4 credit)

As per NEP 2020

To be implemented from the Academic year 2025-'26

Course code	MJSTC-BGP-608	Weightage	Marks
Course title	Statistics Paper – VIII: Data Collection Techniques in Ancient India and Vedic Mathematics		
credit	4		
Teaching per week	4hours		
Effective from	2025-'26		
Purpose of course	The purpose of this course is to provide students with an understanding of the origins and development of data collection and record-keeping practices in ancient India.		
Objective of course	The main objective of this course is to help students explore the rich traditions of data collection and record-keeping in ancient India, including both formal and informal systems. Students will understand how demographic records were maintained using various indigenous methods and analyze how these early practices connect to and influence modern data collection techniques. Through historical examples and comparisons, students will gain a deeper appreciation of India's contributions to data management and its relevance in today's world.		
Programme outcomes	**PO-01:** Knowledge & Conceptual Understanding: Develop a strong foundation in principle and concepts across disciplines, fostering interdisciplinary learning, advance knowledge and problem-solving abilities. **PO-02:** Analytical & Critical Thinking: Apply critical thinking and analytical reasoning to evaluate data, hypotheses and real-world problems, leading to evidence-based conclusions. **PO-03:** Research & Inquiry-based Learning: Develop investigative skills through experimentation, data analysis to contribute to research and innovation. **PO-04:** Technical Skills: Gain hands-on experience with instrumentation and computational tools relevant to research and industry applications. **PO-05:** Digital & Computational Literacy: Utilize digital tools, computational techniques and emerging technologies such as AI, statistical modelling to enhance learning and problem-solving. **PO-06:** Environmental & Societal Responsibility: Understand the role of science in addressing environmental, health and societal challenges, promoting sustainability and ethical responsibility. **PO-07:** Effective Communication & Collaboration: Develop proficiency in scientific communication, both written and oral, for effective dissemination of knowledge while collaborating in multidisciplinary teams. **PO-08:** Innovation & Entrepreneurship: Foster an entrepreneurial mind-set by applying knowledge for innovation, technology development, and		

	industry-oriented applications. Develop sustainable solutions to address real-world challenges in research and environmental management. **PO-09:** Lifelong Learning & Professional Growth: Cultivate curiosity and adaptability for continuous learning, equipping students for higher education, research, and professional careers. **PO-10:** Ethical Leadership & Value-based Education: Develop leadership qualities, ethical values, and a sense of responsibility in applying societal progress, aligning with Indian knowledge systems and global perspectives.		
Programme specific outcomes	**PSO1: Understanding Statistical Principles** Graduate Should comprehend the importance and value of statistical principles and be able to convert problem description into testable research hypothesis. **PSO2:Professional and Entrepreneurial Skills Development** The program enhances student's professional skills and entrepreneurial capabilities, fostering independent logical and analytical thinking. It also emphasizes teamwork and leadership, preparing students for diverse environments by providing skill enhancement Certificate courses. **PSO3:Real-World Problem Solving** Students are trained to investigate, design, and develop practical solutions for real-world challenges, ensuring they can apply theoretical knowledge to practical situations through Experiential Learning and by providing platform for extracurricular activities. **PSO4:Self-Learning and Problem-Solving Skills** Students gain hands-on experience with advanced statistical tools and software, enhancing their ability to tackle real-world problems efficiently. **PSO5:Performing data Analysis** Graduate should be able to apply analytical and statistical methods to analyze data, interpret results, and provide solutions in various settings. **PSO6: Develop Communication Skills** Effectively Communicate Statistical results through clear & informative data visualizations. **PSO7:Commitment to Lifelong Learning and Research** The program focuses not only on imparting core education but also to developing interest in research. **PSO8:Provide Employability** Identify & explore career opportunities in statistics, including roles in industry, government & academia.		
Mapping between POs and PSOs			

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1	✓		✓		✓			
PO2	✓	✓	✓	✓	✓			
PO3	✓		✓				✓	
PO4			✓	✓	✓		✓	
PO5	✓		✓	✓	✓			
PO6	✓		✓		✓			✓
PO7		✓	✓			✓		
PO8	✓	✓						✓

PO9			✓	✓	✓		✓	✓
PO10		✓	✓			✓		

Course outcomes	**CO1:** Students will understand the formal and informal systems of data collection and record-keeping in ancient India. **CO2:** Students will understand how people kept demographic and administrative records. **CO3:** Students will know about King Todar Mal's contributions to data and revenue systems. **CO4:** Students will relate ancient data practices to modern data collection techniques. **CO5:** Students will get a basic idea of Vedic Mathematics and how it is useful today.		
Mapping between COs with PSOs			
Course content	Unit-I: Data collection in ancient India ➢ Formal and Informal Systems of Data Recording in Ancient India ➢ How Demographic Records keep in Ancient India	**20%**	**10**
	Unit-II: Data collection methods in ancient India ➢ Different methods use to keep records in ancient india ➢ Linking Ancient and Modern Data Collection Methods	**10%**	**5**
	Unit-III: King Todar Mal ➢ Early life of King Todar Mal ➢ Early career under Sher Shah Suri ➢ Service under Emperor Akbar ➢ Revenue Reforms and Administrative Achievements ➢ Record keeping and Local administration	**20%**	**10**
	Unit-IV: Introduction to Vedic Mathematics ➢ Origin and history (Attributed to Jagadguru Shri Bharati Krishna Tirthaji Maharaj) ➢ Importance and applications in modern times ➢ 16 Sutras and 13 Sub-Sutras (only basic idea, not all in-depth)	**50%**	**25**
References	1. **"A History of India"** – Romila Thapar (Good for understanding early Indian society, administration, and record-keeping.) 2. **"The Wonder That Was India"** – A.L. Basham (Covers ancient Indian social, political, and administrative systems.) 3. **"Ancient Indian History and Civilization"** – Sailendra Nath Sen (Useful for methods of data recording and demographic practices.) 4. **"Indian Administration"** – M.V. Pylee (Background on early administrative practices and evolution.) 5. **"Akbar and His India"** – Irfan Habib (coverage of Akbar's administration, including Todar Mal's revenue reforms.)		

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	✓			✓		✓		
CO2	✓			✓		✓		
CO3	✓	✓			✓		✓	
CO4	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓		✓		✓		✓

	6. **"The Mughal Empire"** (Volume 1 of The New Cambridge History of India) – John F. Richards (for Todar Mal's career under Akbar and general Mughal record systems.) 7. **"Medieval India: From Sultanat to the Mughals"** – Satish Chandra (Covers Sher Shah Suri's and Akbar's administrative and revenue systems.). 8. **"Vedic Mathematics"** – Jagadguru Shri Bharati Krishna Tirthaji Maharaj (The original classic text — must refer.) 9. **"Vedic Mathematics Made Easy"** – Dhaval Bathia (Simplified approach for beginners, very practical.) 10. **"Speed Mathematics Using Vedic Sutras"** – Dr. Aditi Singhal (Modern applications of Vedic techniques, suitable for practice.) 11. **"India's Ancient Past"** – R.S. Sharma (Background for general ancient Indian society and culture.) 12. **Administrative System of the East India Company"** – B.B. Mishra (comparison when linking ancient and modern administrative ideas.)		