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 :–

યુનિવર્સિટી સંલગ્ન વિજ્ઞાન વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૫–૨૬ થી અમલમાં આવનાર T.Y.B.Sc. Statistics Sem.-5 & 6 Major, Minor અને SEC નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ સંદર્ભે આંકડાશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૭/૦૩/૨૦૨૫ ની સભાના ઠરાવ ક્રમાંકઃ૦૨ થી નીચે મુજબ કરેલ ભલામણ સ્વીકારી વિજ્ઞાન વિદ્યાશાખાની તા.૩૦/૦૪/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંકઃ૫ થી કરેલ ભલામણ સ્વીકારી એકેડેમિક કાઉન્સિલની તા.૫/૫/૨૦૨૫ ની સભાનાં ઠરાવ ક્રમાંકઃ ૭૨ થી મંજુર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

ક્રમાંકઃઓથો./પરિપત્ર/સિલેબસ/૧૧૯૪૭/૨૦૨૫
તા.૨૬–૦૫–૨૦૨૫

કુલસચિવ

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

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT

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

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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

UNDER GRADUATE PROGRAMME IN STATISTICS MAJOR /MINOR/SEC 3 (YEARS DEGREE) AND 4 (YEARS HONOURS)

B.Sc.- SEM-V and VI STATISTICS

Programme Outcomes	**PO-01:** Scientific Knowledge & Conceptual Understanding: Develop a strong foundation in scientific principles, theories 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 scientific data, hypothesis and real-world problems, leading to evidence-based conclusions. **PO-03:** Research & Inquiry-based Learning: Develop investigative skills through experimentation, data analysis and scientific inquiry to contribute to research and innovation. **PO-04:** Laboratory & Technical Skills: Gain hands-on experience with laboratory techniques, instrumentation and computational tools relevant to scientific research and industry applications. **PO-05:** Digital & Computational Literacy: Utilize digital tools, computational techniques and emerging technologies such as AI, bioinformatics and statistical modelling to enhance scientific 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 scientific 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 science for 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 of PO and PSO

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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Programme Name: Bachelor of Science Sem-V

About Programme:

Teaching and Evaluation Scheme:

Structure																	
Course Category	Course Code	Course Title	Mark sheet title in English	Level of course	Teaching hours per week		Exam Duration		Credit		Internal Marks		External Marks		Total	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
Major	ST-MJ-501	Mathematical Statistics-I	Mathematical Statistics-I	300	2	4	1	4	2	2	25	25	25	25	50	50
Major	ST-MJ-BGP-502	Indian Contributions To Statistical Science (Major BGP)	Indian Contributions To Statistical Science (Major BGP)	300	2	4	1	4	2	2	25	25	25	25	50	50
Major	ST-MJ-503	Sampling Methods	Sampling Methods	300	2	4	1	4	2	2	25	25	25	25	50	50
Minor	ST-ME-501	Probability Distributions	Probability Distributions	300	2	4	1	4	2	2	25	25	25	25	50	50
Minor	ST-ME-502	Statistical Quality Control	Statistical Quality Control	300	2	4	1	4	2	2	25	25	25	25	50	50
SEC	ST-SEC 501	Excel To Advanced Excel	Excel To Advanced Excel	100	0	4	0	4	0	2	0	25	0	25	0	50

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-V STATISTICS (Major)
Paper-ST-MJ-501
Mathematical Statistics-I(Major) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-501	
Course title	Mathematical Statistics-I (Theory)	
credit	2	
Teaching per week	2 hours	
Effective from	2025-2026	
Purpose of course	The purpose of this course is to provide students with a deep understanding of probability inequalities limit theorems and characteristic function, which are fundamental in statistical inference and probability theory.	
Objective of course	Acquaint students to apply Chebyshev's Inequality and its generalized form and Central Limit Theorem. Understand the Definition and Importance of characteristic functions in probability Study Key Properties such as uniqueness, continuity, and moments of distributions.	
Course outcomes	**CO1**: understand Chebyshev's inequality and its generalized form. will learn weak law of large numbers and central limit theorems its use and applications **CO2**: will be able to evaluate lower bound and upper bound by using Chebyshev's inequality and apply it to solve real world problems. **CO3**:know characteristic function, its properties and use it to find moments. **CO4**: understand inversion theorem, will be able to find probability distribution from Characteristic function.	
Mapping Between COs and PSOs		

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓		✓				✓	✓
CO2		✓	✓	✓	✓		✓	✓
CO3	✓		✓		✓		✓	✓
CO4	✓	✓	✓	✓	✓	✓		✓

Course content	**Unit-I** Chebyshev's Inequality • Statement and proof. • Generalized Chebyshev's Inequality. • interpretation of Chebyshev's Inequality from generalised Chebyshev's inequality. • Weak law of large numbers(with known variance) . • conditions when law of large number holds good. • Bernoulli's law of large numbers. Central limit theorem • De-Moivre's Laplace theorem. • Lindberg-Levy theorem. Liapounoff's central limit theorem.	50%
	Unit-II Characteristic function • Definition • Properties of characteristic function. • Obtain characteristic function of Distributions. • Inversion theorem. • Uniqueness theorem. • Use of Jacobian Criteria related to characteristics function.	50%
References	Books Recommended: 1. Leove M : Probability Theory. 2. Burrill C.W : Measure, Integration and Probability. 3. Ash Robert: Real Analysis and Probability Theory. 4. Chang K.L: A course in Probability. 5. Dudely R.M: Real analysis and Probability; Wardsworth & books.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-V STATISTICS Practical (Major)
Paper-ST-MJ-501
Mathematical Statistics-I(Major) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-501	
Course title	Mathematical Statistics-I (Practical)	
credit	2	
Teaching per week	4 hours	
Effective from	2025-2026	
List of practicals	1. Examples of Chebyshev's Inequality 2. Examples of Weak law of large numbers. 3. Examples of Bernoulli law of large numbers. 4. Examples of Central limit theorem. 5. Examples of Characteristic function (discrete distribution) 6. Examples of Characteristic function (Continuous distribution) 7. Examples of inversion theorem (discrete distribution). 8. Examples of inversion theorem (continuous distribution)	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-V STATISTICS (Major)
Paper-ST-MJ- BGP-502
Indian Contributions To Statistical Science (Major BGP)
(2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-BGP-502	
Course title	Indian Contributions To Statistical Science (Theory)(BGP)	
Credit	2	
Teaching per week	2 hours	
Effective from	2025-2026	
Purpose of Course	The course aims to provide students with an in-depth understanding of the pivotal role that Indian scholars, practitioners, and institutions have played in the development of statistical science. The course seeks to explore how Indian thinkers have shaped the field of statistics through innovative methodologies, groundbreaking theories, and impactful applications.	
Objective of Course	To understand how Indian contributions in statistics have been applied in fields such as economics, medicine, industry, and government policies, and their global influence.	
Course outcomes	**CO1**: Students will gain a comprehensive understanding of the key contributions of Indian statisticians to statistical theory and practice and will be able to apply the statistical theories and methodologies developed by Indian scholars to real-world problems across various disciplines. **CO2**: Students will have an understanding of the role of Indian institutions like the Indian Statistical Institute in shaping statistical research, education, and applications. **CO3**: Recognize and assess the properties of estimators. Use the Factorization Theorem to determine sufficient statistics. **CO4**: Implement Rao-Blackwell Theorem to improve estimators. Apply Cramer-Rao Inequality to establish lower bounds on estimator variance and understand the conditions for equality.	
Mapping Between COs and PSOs		

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓					✓	✓	✓
CO2		✓	✓	✓	✓			✓
CO3	✓				✓			✓
CO4	✓	✓	✓	✓			✓	✓

Course content	**Unit-I** • History and Origin of statistics in India. • Role of ancient Indian scholars in early statistical concepts • introduction of some Pioneers of Indian Statistical Science and	50%

	their important contributions . • Role of Indian Statistical Institute (ISI) in pioneering large-scale surveys. • Mahalanobis distance meaning . • uses of Mahalanobis Distance • calculation of Mahalanobis Distance	
	Unit-II • Introduction of theory of estimation Parameter, parameter space, General problem of estimating parameter by point estimation, interval estimation. • characteristics of estimators. Unbiasedness, consistency, Sufficiency, Efficiency. • Minimum Variance Unbiased Estimator. • Factorization theorem. • Rao Blackwell Theorem. • Cramer- Rao Inequality: • condition of equality sign in Cramer Rao Inequality.	50%
References	1. **"Statistical Methods in Social Sciences"** – P.C. Mahalanobis 2. **"Collected Works of P.C. Mahalanobis"** – Indian Statistical Institute (ISI) 3. **History of Science in India - Physics, Mathematics and Statistics (Volume I, Part - I)** Edited by Dr. Sibaji Raha, this volume delves into the development of physical sciences, mathematics, and statistics in India, highlighting significant contributions and advancements. 4. Mood A.M, Graybill F.A. and Boes D.C. : An introduction to theory of statistics. Tata Mc.Graw Hill. 5. Goon A M, Gupta M.K. and Dasgupta B.: An outline of Statistical Theory. vol 1,2 The World Press Private Limited. 6. M.C.Jaiswal :statistical Distributions, Univ. Granth Nirman Board, Ahmedabad. 7. Gupta S.C. and Kapoor V.K.(2006) : " Fundamentals or" Applied Statistics"; Sultan Chand & Sons 8. Mukhopadhayay P: Mathematical Statistics; new central book agency Calcutta. 9. Rohtagi V.K. : Introduction to Probability theory and Mathematical Statistics, Wiley Eastern.	
Research papers	1. **"History of Statistics in India"** – Journal of the Indian Statistical Association 2. **"Indian Contributions to Probability and Statistics"** – Published by the Indian Statistical Institute (ISI)	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-V STATISTICS Practical (Major)
Paper-ST-MJ-BGP-502
Indian Contributions To Statistical Science (Major BGP)
(2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-BGP-502	
Course title	Indian Contributions To Statistical Science (Practical)	
credit	2	
Teaching per week	4 hours	
Effective from	2025-2026	
List of practicals	1. Examples of calculation of Mahalanobis Distance. 2. Examples of unbiasedness. 3. Examples of consistency. 4. Examples of efficiency. 5. Examples of sufficiency. 6. examples of properties of estimators. 7. Examples of Minimum Variance Unbiased Estimators(MVUE). 8. Examples of Cramer- Rao Inequality(MVBUE).	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
T.Y.B.Sc.-SEM-V STATISTICS(Major)
Paper-ST-MJ-503
SAMPLING METHODS (Major) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-503	
Course title	Sampling Methods (Theory)	
credit	2	
Teaching per week	2 hours	
Effective from	2025-2026	
Purpose of course	The purpose of this course is to provide students with a comprehensive understanding of sampling techniques used in survey data analysis. It covers sampling methods**,** estimation techniques, and error analysis, enabling students to collect, analyze, and interpret data efficiently for decision-making in research, business, and industry.	
Objective of course	The objective of this course is to provide a fundamental understanding of sampling techniques. Students will learn Simple random, stratified random and systematic sampling along with methods to estimate population parameters and analyze sampling errors.It would help them in understanding the concepts involved in planning and designing their surveys, presentation of survey data analysis of survey data and presentation of results.	
Course outcomes	**CO1**.:Understand the principal steps in sample survey, how to use random number tables, basic principle of sample survey, errors in sampling, complete enumeration versus sampling. **CO2:** understanding of simple random sampling with and without replacement, procedure of selecting a sample and determination of sample size. **CO3:** Know the concept of stratified random sampling and systematic sampling and estimation of mean and variance. **CO4**: will be able to Apply sampling techniques in real-world scenarios for research, business, and industry.	
Mapping Between COs and PSOs		

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓		✓		✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓		✓	✓

Course content	**Unit-I** **Introduction to Sampling** • Concept of sampling • Use of random number tables • Sample survey vs complete enumeration, • Planning of sample survey • Sampling from a finite population **Simple Random Sampling:** • Meaning of SRS, Merits and demerits of SRS. • Simple random sampling with and without replacement • Selection of sample/estimation of mean, standard error and coefficient of variation of estimator. • Comparisons of variance of mean with SRSWR and SRSWOR. • Sampling for proportions and percentages. **Determination of sample size** • Determination of optimum sample size	50%
	Unit-II **Stratified Random Sampling:** • Meaning of stratification, Merits and Demerits of Stratified sampling. • Estimation of mean, variance. • Allocation of sample size. • Neyman allocation • Proportional allocation. **Systematic random sampling:** • Mean and variance of systematic sample.	50%
References	**Books recommended:** 1. Cochran W.G.1977. *Sampling Techniques*. John Wiley. 2. Murthy M. N. 1977. *Sampling Theory and Methods*. 2nd Ed. Statistical Publ. Soc., Calcutta. 3. Des Raj 1968.*Sampling theory*. TATA McGraw-Hill Publishing Company Ltd.New Delhi. 4. Deming W.E. 1950.*Some Theory of Sampling*. Dover Publications, Inc. New York.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT T.Y.B.Sc.-SEM-VSTATISTICS PRACTICAL(Major) Paper-ST-MJ-503 SAMPLING METHODS (Major) (2 credits Th+2credits prac) As per NEP 2020 To be implemented from the Academic year 2025-26		
Course code	ST-MJ-503	
Course title	Sampling Methods (Practical)	
credit	2	
Teaching per week	4 hours	
Effective from	2025-2026	
List of Practicals	1. To select a sample using random number table. 2. Determination of possible number of samples of the given size out of given population size in case of SRSWR and SRWOR. 3. Showing the unbiased estimator of population mean and population mean square in case of SRSWOR and to determine its variance and standard errors 4. Showing the unbiased estimator of population mean and biased estimator of population mean square in case of SRSWR and to determine its variance and standard errors 5. Practical on sampling for proportions. 6. Practical on Determination of sample size. 7. Drawing of samples in stratified random sampling under different allocations along with determination of the estimate of the population mean with their variance and standard errors. 8. Practical on Systemic sampling and comparison of its variances with SRSWOR and stratified random sampling.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-V STATISTICS (Minor)
Paper-ST-ME-501
PROBABILITY DISTRIBUTIONS (Minor) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-ME-501	
Course title	Probability Distributions (Theory)	
credit	2	
Teaching per week	2 hours	
Effective from	2025-2026	
Purpose of course	The purpose of this course is to provide students with a strong foundation in probability distributions, enabling them to analyze, and interpret real-world uncertainties. It focuses on discrete and continuous probability distributions and their applications in Real world.	
Objective of course	Learn and differentiate between discrete and continuous distributions and Apply probability distributions to solve real-world problems in various domains.	
Course outcomes	**CO1**: Will learn about various discrete distributions; **CO2**: Will know the properties and applications of distribution. **CO3**: Learner Will become able to decide the applicable distribution to apply for problem solving **CO4**: Will become capable of using probability distributions for solving real-world problem in various fields.	
Mapping Between COs and PSOs		

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓		✓		✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓		✓	✓
CO3	✓		✓		✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓			✓

Course content	**Unit-I** Discrete Probability Distributions: • Bernoulli distribution. • Binomial distribution.	50%

	• Poisson Distribution. • Hypergeometric distribution. • Geometric Distribution. • Negative Binomial distribution. Definition, Properties and uses of all above distributions.	
	Unit-II Continuous Probability Distributions: • Gamma Distribution. • Beta Type-I Distribution. • Beta type-II Distribution. • Normal Distribution. • Exponential Distribution. Definition, Properties and uses of all above distributions.	50%
References	1. Mood, Graybill and Boes : Introduction to theory of Statistics. 2. Hogg and Craig: Introduction to mathematical statistics. 3. Gupta and Kapoor: Fundamentals of Mathematical Statistics. 4. Bhatt. B.R. Modern Probability theory; New Age International. 5. Johnson N.L. and Kotz S. (1970): "Distributions in Statistics"; John Wiley. ISBN-13-9780471715812 6. Rohatgi V.K. (1976): "An Introduction to Probability Theory and Mathematical Statistics"; John Wiley. ISBN- ISBN-13-978-0471272144 7. Johnson, N. L., S. And Balakrishnan, N. (2000): Discrete Univariate Distributions, John Wiley ISBN-13-978-0471584953 8. પ્રો.એચ.ડી.શાહ:"ગાણિતિક આંકડાશાસ્ત્ર" યુનિવર્સીટી ગ્રંથ નિર્માણ બોર્ડ, ગુજરાત રાજ્ય અમદાવાદ-૬. 9. ડૉ. આર. ટી. રતાણી: "પ્રાયોજીત આંકડાશાસ્ત્ર" યુનિવર્સીટી ગ્રંથ નિર્માણબોર્ડ, ગુજરાત રાજ્ય અમદાવાદ-૬.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-V STATISTICS PRACTICAL(Minor)
Paper-ST-ME-501
PROBABILITY DISTRIBUTIONS (Minor) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-ME-501	
Course title	Probability Distributions(Practical)	
credit	2	
Teaching per week	4 hours	
Effective from	2025-2026	
List of practicals	1. Practicals on Bernoulli distribution. 2. Practicals on Binomial distribution. 3. Practicals on Poisson Distribution. 4. Practicals on Hyper geometric distribution. 5. Practicals on Geometric Distribution. 6. Practicals on Negative Binomial distribution. 7. Practicals on Gamma Distribution. Examples of 8. Practicals on Beta Type-I Distribution. 9. Practicals on Beta type-II Distribution. 10. Practicals on Normal Distribution. 11. Practicals on Exponential Distribution	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-V STATISTICS (Minor)
Paper-ST-ME-502
STATISTICAL QUALITY CONTROL (Minor)(2credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-ME-502	
Course title	Statistical Quality Control(Theory)	
credit	2	
Teaching per week	2 hours	
Effective from	2025-2026	
Purpose of course	The purpose of this course is to equip students with statistical techniques for quality control and acceptance sampling, ensuring process efficiency and product reliability in manufacturing and service industries.	
Objective of course	The objective of course is to acquaint students with the principles of Statistical Quality Control (SQC) and acceptance sampling plans its applications. apply control charts for process monitoring and improvement. acceptance sampling for product inspection and decision-making.	
Course outcomes	**CO1**:Understand the fundamentals of SQC and its role in quality improvement. **CO2:** student will be able to Apply control charts for process monitoring. **CO3**: will understand acceptance sampling plans (Single, Double, and Multiple Sampling). **CO4**: will learn Use and analyze OC curve, AOQ curve, ASN curve and ATI curve (Single sampling plan, double sampling plan.	
Mapping Between COs and PSOs		
Course content	**Statistical Techniques in quality control – I** ➢ Introduction of Statistical Quality Control (SQC), Importance and Advantages of SQC, Causes of Variations, Types of Quality control charts, Advantages of use of a control chart, 3σ limits,	50%

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓		✓		✓	✓	✓	✓
CO2		✓	✓	✓	✓			✓
CO3	✓		✓		✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓			✓

	Theory of runs. Difference between variable charts and attribute charts ➢ Control chart for variables: (i) R Chart (ii) σ Chart and (iii) $\bar{x}$ Chart. ➢ Control chart for attributes: (1) p Chart (11) np Chart and (iii) c Chart (iv) u chart	
	Acceptance sampling plan for attributes: ➢ Introduction, ➢ Principle of accepting sampling. ➢ Sampling risks and indices. ➢ Role of Acceptance sampling. ➢ Producer's risk and Consumer's risk, ➢ Acceptable Quality Level (AQL) and AOQL ➢ Lot Tolerance Proportion Defective (LTPD), ➢ Construction of Operating Characteristic Curve, Ideal Operating Characteristics Curve, ➢ Effect of lot size, sample size on Operating Characteristic Curve ➢ Single and Double Sampling Plan: • Introduction • Operating Characteristics Curve (OC Curve) • Average Sample Number (ASN) • Average Outgoing Quality (AOQ) • Average Total Inspection (ATI)	50%
References	1. Montgomery D.C: introduction to statistical Quality Control, Wiley. 2. Grant E.L.: statistical Quality Control; Tata McGraw Hill. 3. Ott E.R.: Process quality control, ; Tata McGraw Hill. 4. Wetherill G.B: Sampling inspection and quality control: Halsted Press. 5. Wetherill G.B and Brown D.W: Statistical Process Control, theory and practice; Chapmann and Hall. 6. Hopper A.G.: Basic Statistical Quality Control, Tata McGraw Hill. 7. Gupta R.C.:Statistical Quality Control, Khanna Publishers, New Delhi. 8. Ryan T.P.: Statistical Methods for Quality Improvement, John Wiley & Sons. 9. Omachonu V.K. and Ross J.E.: Principles of Total Quality, S. Chand & Co. New Delhi. 10. DrR.T.Ratani. આંકડા શાસ્ત્રિય ગુણવત્તા નિયંત્રણ યુનિવર્સીટી ગ્રંથનિર્માણ બોર્ડ, ગુજરાત રાજ્ય અમદાવાદ-૬.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-V STATISTICS PRACTICAL (Minor)
Paper-ST-ME-502
STATISTICAL QUALITY CONTROL (Minor)(2credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-ME-502	
Course title	Statistical Quality Control (Practical)	
credit	2	
Teaching per week	4 hours	
Effective from	2025-2026	
List of practicals	**1.** Construction and interpretation of $\bar{x}$ and R chart **2.** Construction and interpretation of revised $\bar{x}$ and R chart **3.** Construction and interpretation of p chart. **4.** Construction and interpretation of revised p chart. **5.** Construction and interpretation of np chart. **6.** Construction and interpretation of revised np chart. **7.** Construction and interpretation of c chart. **8.** Construction and interpretation of revised c chart. **9.** Construction and interpretation of U chart. **10.** Construction and interpretation of revised U chart. **11.** Single sampling plan (OC, AOQ, ASN and ATI curves), consumer and producer risk from OC curve **12.** Double sampling plan (OC, AOQ, ASN and ATI curves)	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-V STATISTICS PRACTICAL (Minor)
Paper-ST-SEC-501
Excel to Advanced Excel (SEC) (2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-SEC-501	
Course title	Excel to Advanced Excel (Practical)	
credit	2	
Teaching per week	4 hours	
Effective from	2025-2026	
Purpose of course	To make student efficient to perform basic statistical analysis using Excel.	
Course Objectives	course provides knowledge regarding data analysis using functions of Excel. It shows beauty of statistical tools which are predefined in excel and used to sort information as well as to extract meaning for large datasets. The learner will understand mathematical and Statistical applications available in Excel. They will have knowledge simple commands of Microsoft Excel.	
Course Outcomes	**CO1:**This section touches few but important parts of descriptive statistics; it is providing basic information relating to the statistics in Excel. Thus, the students will have proper understanding of the subject in depth. **CO2:**It helps them to learn that how excel make complex data easy to evaluate. **CO3**: Student will learn to draw diagrams and curves using Excel to represent results more effectively. **CO4:** It helps the learner to analyze data in computer using Excel which can further help them in future to fulfill their job perspective and handle real world problems analytically.	
Mapping Between COs and PSOs		
Contents	**Unit-I Module 1: Introduction to Excel (Basics)** • Overview of Excel Interface, Workbook, Worksheets, and Cell Basics	50 %

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓				✓	✓	✓	✓
CO2		✓	✓	✓	✓		✓	✓
CO3	✓				✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓		✓	✓

	• Data Entry, Formatting, and Editing • Basic Arithmetic Operations in Excel • Basic Functions: SUM, AVERAGE, MIN, MAX, COUNT, COUNTA • Logical Functions: IF, AND, OR, NOT • Text Functions: CONCATENATE, LEFT, RIGHT, MID, LEN, TRIM • Date & Time Functions: TODAY, NOW, DATEDIF. • Sorting and Filtering Data, Find & Replace, Remove Duplicates • Data Validation & Drop-down Lists • Text-to-Columns and Flash Fill	
	Unit-II Module2: Working with Measures of Central Tendency • Understanding Mean, Median, Mode • Using AVERAGE, MEDIAN, and MODE Functions in Excel • Creating Basic Charts: Bar, Line, Pie Charts • Advanced Charts: Histogram, Scatter Plot, Combo Chart. • Creating & Customizing Pivot Tables • Grouping & Filtering Data in Pivot Tables • Calculated Fields & Value Summarization • Creating Pivot Charts for Data Analysis. • Using STDEV.P, STDEV.S, VAR.P, VAR.S for Variability Analysis • Regression Analysis & Trend lines	
References:	1. "Excel for Beginners" M.L. Humphrey 2. "Microsoft Excel Formulas and Functions (Office 2021 and Microsoft 365)" by Paul McFedries, Pearson 3. "Statistical Methods" by S.P. Gupta (published by Sultan Chand & Sons) 4. "Business Statistics" by J.K. Sharma (published by Pearson India) 5. "Excel Statistics: A Quick Guide", By Neil J. Salkind 6. "Statistical Data Analysis using MS-Excel" by B. J. Kore	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Programme Name: Bachelor of Science Sem-VI

About course: B.Sc statistics(Major and Minor)

Teaching and Evaluation Scheme:

Structure																
Course Category	Course Code	Course Title	Mark sheet title in English	Level of course	Teaching hours per week		Exam Duration		Credit		Internal Marks		External Marks		Total	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
Major	ST-MJ-601	Design Of Experiments	Design Of Experiments	300	2	4	1	4	2	2	25	25	25	25	50	50
Major	ST-MJ-602	Mathematical Statistics-II	Mathematical Statistics-II	300	2	4	1	4	2	2	25	25	25	25	50	50
Major	ST-MJ-603	Operations Research-II	Operations Research-II	300	2	4	1	4	2	2	25	25	25	25	50	50
Minor	ST-ME-601	Testing Of Hypothesis	Testing Of Hypothesis	300	2	4	1	4	2	2	25	25	25	25	50	50

[Subject Code-2603000506011101]

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-VI STATISTICS (Major)
Paper-ST-MJ-601
DESIGN OF EXPERIMENTS (Major) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-601	
Course title	DESIGN OF EXPERIMENTS	
credit	2	
Teaching per week	2 hours	
Effective from	2025-2026	
Purpose of course	The purpose of the Design of Experiments (DOE) course is to equip students with systematic experimental design techniques to improve processes, optimize performance, and make data-driven decisions.	
Objective of course	The course aims to teach systematic methods for planning, conducting, and analyzing experiments to optimize processes and improve quality. Students will learn key principles along with statistical techniques such as ANOVA**.** The course equips them with practical skills to apply DOE in engineering, manufacturing, Agriculture and research for .	
Course outcomes	**CO1**:Understand the Fundamentals of Experimental Design and principles of Design. **CO2**:Conduct ANOVA to assess the statistical significance of experimental results. **CO3**:Develop and implement various experimental designs such as CRD, RBD**,** and LSD. **CO4**:Implement DOE techniques in fields such as manufacturing, healthcare, agriculture, and engineering to improve efficiency and quality.	
Mapping Between COs and PSOs		

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓					✓	✓	✓
CO2	✓	✓	✓	✓	✓			✓
CO3	✓					✓	✓	✓
CO4	✓	✓	✓	✓	✓			✓

Course content	**Unit-I** • Introduction • Terminology in experimental Designs(Important terms and definitions) • Three principles of experimental Design.	50%

	• Analysis of variance with fixed effect model (one way and two way classification). • Analysis of variance with random effect model (one way and two way classification).	
	Unit-II • Completely randomized design and its analysis. • Randomized block design and its analysis. • Latin square design and its analysis. • Factorial experiments involving three factors at two levels only	50%
References	1. Cochran W.G. and Cox G.M. (2003): "Experimental Designs"; 2nd Edition, John Wiley (wie) ISBN: 9971513110, ISBN-13: 9789971513115, 978-9971513115. 2. Cochran W.G. and Cox G.M. (1957): "Experimental Designs"; 2nd Edition, John Wiley & Sons Inc., New York, ISBN: 0471162035, ISBN-13: 9780471162032. 3. Montgomery, D. C. (2006): "Design and Analysis of Experiments"; 5th Ed, Wiley (India), ISBN: 812651048X, ISBN-13: 9788126510481, 978-8126510481. 4. R. Mead. (1990): "The Design of Experiments: Statistical Principles for Practical Application"; Cambridge Uni. Press. ISBN-10: 0521287626, ISBN-13: 978-0521287623. 5. Das M.N. and Giri N.C.(1999) : "Design and Analysis of Experiments"; 2nd Edition, New Age International Publishers Ltd, ISBN: 0852269145, ISBN-13: 9780852269145. 6. Federer, W. T. (1955): "Experimental Design: Theory and Application"; The Macmillan Co., New York. ISBN 0387985336. 7. Kempthorne, O. (1952), The Design and Analysis of Experiments, John Wiley & Sons, New York ISBN:9780471551775 8. Fisher R. A. (2005): "Statistical Methods for Research Workers"; Cosmo Publications, ISBN: 8130701332, ISBN-13: 9788130701332, 978-8130701332.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-VI STATISTICS PRACTICAL (Major)
Paper-ST-MJ-601
DESIGN OF EXPERIMENTS (Major) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-601	
Course title	DESIGN OF EXPERIMENTS (Practical)	
credit	2	
Teaching per week	4 hours	
Effective from	2025-2026	
List of practicals	1. Analysis of One way classification. 2. Analysis of Two way classification 3. Analysis of LSD. 4. Analysis of RBD with One missing observation 5. Analysis of LSD with One missing observation. 6. Analysis of 2^2 and 2^3 factorial experiment.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-VI STATISTICS (Major)
Paper-ST-MJ-602
Mathematical Statistics-II (Major) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-602	
Course title	Mathematical Statistics-II (Theory)	
credit	2	
Teaching per week	2 hours	
Effective from	2025-2026	
Purpose of course	Introduce students to understand and apply various probability distributions, Enable students to dissect and understand the individual and combined effects of multiple independent variables on a dependent variable.	
Objective of course	Enable students to apply statistical methods to real-world problems, Comprehend the principles of multiple regression, including the estimation of coefficients and the interpretation of regression equations. acquaint them to calculate partial correlation coefficients and understand their significance in assessing relationships between variables while controlling for others.	
Course outcomes	**CO1**:Comprehend the definitions and key properties of the Lognormal, Cauchy, and Laplace distributions, including their probability density functions and characteristic functions. **CO2**: Model and solve real-life problems using these distributions, understanding their applicability and limitations in various contexts. **CO3**:Explain the fundamentals of multiple regression and multiple correlation and partial correlation its applications in predictive modeling. **CO4:** Apply multiple regression, correlation and partial correlation techniques in fields such as economics, social sciences, and business analytics and Interpret the results of analysis in different research and practical scenarios.	
Mapping Between COs and PSOs	<table><tr><th></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** Lognormal Distribution: Definition, r^{th} raw moment, mean ,variance, coefficient of variance. Cauchy Distribution: Definition, characteristic function, Additive property, Distribution of sample mean, Quartiles. Laplace Distribution(Double exponential distribution): Definition, characteristic function, mean variance.	50%

	Unit-II Multiple Regression • Plane of regression. • Properties of residuals. • Variance of residual. Multiple and partial Correlation(for three variables only). • Coefficient of multiple correlation. • Properties of multiple correlation coefficient. • Coefficient of multiple Determination. • Test for significance of observed Multiple Correlation Coefficient. • Coefficient of partial correlation. • Test for significance of observed Multiple Correlation Coefficient. • Relation between total Partial and multiple correlation coefficients.	50%
References	1. Mood A.M, Graybill F.A. and Boes D.C. : An introduction to theory of statistics. Tata Mc.Graw Hill. 2. Goon A M, Gupta M.K. and Dasgupta B.: An outline of Statistical Theory. vol 1,2 The World Press Private Limited. 3. Patel J.K : Hand book of Statistical Distributions; Marcel Dekker. 4. Gupta S.C. and Kapoor V.K.(2006) : " Fundamentals or" Applied Statistics"; Sultan Chand & Sons. 5. M.C.Jaiswal :statistical Distributions, Univ. Granth Nirman Board, Ahmedabad. 6. Johnson N.L. and Kotz.S : Distributions in Statistics; John Wiley. 7. Anderson T.W : An introduction to Multivariate Statistical Analysis. John Wiley. 8. Johnson and Wichern: Applied Multivariate Statistical Analysis. 9. Kshirsagar A.M. Multivariate Analysis, Marcel Dekker. 10. Srivastava and Khatri C.G.: An introduction to the multivariate Statistics. North Holland.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-VI STATISTICS PRACTICAL(Major)
Paper-ST-MJ-602
Mathematical Statistics-II (Major) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-602	
Course title	Mathematical Statistics-II (Practical)	
credit	2	
Teaching per week	4 hours	
Effective from	2025-2026	
List of practicals	1. Practical of lognormal distribution. 2. Practical of cauchy distribution. 3. Practical of laplace distribution. 4. Obtain line of regression from given data (three variables). 5. Find estimate of variable when other two variables are known. 6. Calculation of multiple correlation coefficient. 7. Test for significance of multiple correlation coefficient. 8. Calculation of partial correlation coefficient. 9. Test for significance of partial correlation coefficient.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-VI STATISTICS (Major)
Paper-ST-MJ-603
OPERATIONS RESEARCH -II (Major) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-603	
Course title	OPERATIONS RESEARCH-II (Theory)	
credit	2	
Teaching per week	2 hours	
Effective from	2025-2026	
Purpose of course	The purpose of this course is to develop problem-solving and decision-making skills **in** optimization and project management**.** These techniques are essential for improving efficiency in logistics, operations, and project execution.	
Objective of course	This course equips students with optimization and project management techniques for efficient resource allocation and scheduling. It covers Transportation and Assignment Problems to minimize(maximize) costs(profit). for Students will learn to apply project planning and scheduling of CPM & PERT in real-world scenarios using analytical and computational tools.	
Course outcomes	**CO1:** Formulate transportation and assignment problems mathematically and apply optimization techniques. **CO2:** Solve transportation and assignment problems to get optimum solution methods. Analyze real-world transportation logistics and make decisions for efficient resource allocation and workforce scheduling, project management, and other industrial applications.. **CO3:** understand CPM and PERT networks working and procedure and apply deterministic time estimates for project scheduling. **CO4:** Apply CPM and PERT techniques in real-world project management scenarios for efficient planning and execution.	
Mapping Between COs and PSOs		

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓		✓			✓	✓	✓
CO2		✓	✓	✓	✓			✓
CO3	✓		✓				✓	✓
CO4	✓	✓	✓	✓	✓	✓		✓

Course content	**Unit-I**
	Transportation problems (TP).
	• Introduction, Unbalanced Transportation Problem.
	• Mathematical formulation of the problem.
	• Methods of finding initial basic feasible solution.
	  ◦ The North-West Corner Rule.
	  ◦ The Row Minima Method.
	  ◦ The Column Minima Method.
		50%

	• The Matrix Minima Method. • Min(Min- max) and Max (Min- Max) method • Vogel's Approximation Method (VAM). • Maximization problem • Optimum solution of TP by Modified Distribution method. **Assignment problem.** • Introduction, Unbalanced assignment problems • Mathematical formulation of the problem. • The Hungarian method. • Maximization problem.	
	Unit-II **Network Scheduling by CPM.** • Network diagram. • Network diagram representation. • Rules of Construction of Network diagram. • Time estimates & critical path in Network analysis. • Disadvantages of Network techniques. **Critical Path Method (CPM):** Procedure. **Programme Evaluation & Review Technique (PERT).:** • Procedure. • Difference between PERT and CPM.	50%
References	1. K. Swarup, Gupta P.K, Man Mohan: Operations Research; S Chand & Co. New Delhi. 2. Sharma S.D. : Operations Research: Kedarnath & Ramnath & Co. Publisher, Meerut. 3. Hira D.S, Gupta P.K : Operations Research; S Chand & Co. New Delhi. 4. Kapoor V.K: Operations Research; Jain book depot. 5. G. Hadley: Linear Programming; Narosa Book distributors pvt Ltd.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-VI STATISTICS PRACTICAL (Major)
Paper-ST-MJ-603
OPERATIONS RESEARCH -II (Major) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-MJ-603	
Course title	OPERATIONS RESEARCH-II (Practical)	
credit	2	
Teaching per week	4 hours	
Effective from	2025-2026	
List of practicals	1. Initial solution of transportation problem by NWCM. 2. Initial solution of transportation problem by Row Minima Method. 3. Initial solution of transportation problem by Column Minima Method. 4. Initial solution of transportation problem by The Matrix Minima Method. 5. Initial solution of transportation problem by Min(Min-max) and Max (Min-Max) method 6. Initial solution of transportation problem by Vogel's Approximation Method (VAM). 7. Optimum solution of Transportation Problem. 8. Solution of Assignment problem. 9. Draw Network Diagram and determine Critical path. 10. Prepare Critical analysis table to calculate Independent, total and free floats. 11. Draw network diagram of PERT. 12. Determine Critical path ,expected project completion time its variance. 13. Evaluation of probabilities of project t completion within specific time.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-VI STATISTICS (Minor)
Paper-ST-ME-601
TESTING OF HYPOTHESIS (Minor) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-ME-601	
Course title	TESTING OF HYPOTHESIS	
credit	2	
Teaching per week	2 hours	
Effective from	2025-2026	
Purpose of course	The purpose of this course is to provide students with a strong foundation in hypothesis testing for statistical analysis. It focuses on tests helping students make accurate inferences and comparisons based on data. This course is essential for research, quality control, and decision-making in various fields.	
Objective of course	The objective of the course is to equip students with the knowledge and skills to analyze data using hypothesis tests based on underlying statistical assumptions. Students will learn to apply these tests in real-world scenarios for making reliable data-driven decisions.	
Course outcomes	**CO1:** Understand the concept of hypothesis and its testing and applications in various fields; **CO2:** Utilize large sample statistical testing methods in research, business analytics, healthcare, and quality control. **CO3:** Understand the difference between large and small sample and tests based on it. Understand various small sample tests and its applications. **CO7**:Utilize small sample statistical testing methods in research, business analytics, healthcare, and quality control.	
Mapping Between COs and PSOs		

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓				✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓		✓	✓
CO3	✓				✓		✓	✓
CO4	✓	✓	✓	✓	✓		✓	✓

Course content	**UNIT-I** Basic concepts of testing of hypothesis: Definition of hypothesis, statistical hypothesis, simple and composite hypothesis, null and alternative hypothesis, test of statistical hypothesis, Type-I error and Type-II errors, Power of a test, Level of Significance, Rejection Region, Critical value, Test statistic, Two tailed and One tailed test, degrees of freedom, concept of p-value. **Large sample tests:**	50%

	1. **Test of attributes:** • Test for significance of single proportion. • Test for significance of Difference of proportions. 2. **Test of Variables**: • Test for significance of single mean. • Test for significance of difference between means. • Test for significance of difference between standard deviations.	
	UNIT-II **Small Sample tests:** 1.Chi-Square variate, Assumptions and its Applications: • Test the goodness of fit. • Test for independence of attributes, Yates correction • Test for specified value of the variance of the population. 2. t-test: t- statistic, Assumptions and its applications:. • Test for significance of single mean. • Test for significance of difference of means for dependent and independent Samples. 3. F-test: F-statistic, Assumptions of F-Test and its application. • Test for equality of two population variances	50%
References	1.Mood, Graybill and Boes : Introduction to theory of Statistics. 2. Hogg and Craig: Introduction to mathematical statistics. 3. Gupta and Kapoor: Fundamentals of Mathematical Statistics. 4. Bhatt. B.R. Modern Probability theory; New Age International. 5. Jhonston and Korz: Distributions in Statistics. 6. Stuart. G. and Ord. J.K. ; Advanced theory of Statistics Vol.2.	

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
T.Y.B.Sc.- SEM-VI STATISTICS PRACTICAL (Minor)
Paper-ST-ME-601
TESTING OF HYPOTHESIS (Minor) (2 credits Th+2credits prac)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code	ST-ME-601	
Course title	Testing of hypothesis(Practical)	
credit	2	
Teaching per week	4 hours	
Effective from	2025-2026	
List of practicals	**Large Sample test:** **1.** Test of significance of Proportion. **2.** Test of significance difference between two Proportions. **3.** Test of significance of a population mean, **4.** Test of significance of two means. **5.** Test of significance of two standard deviations. **Small Sample test:** **6.** Test of significance of a population mean. **7.** Testing the significance difference of two population means(independent samples) **8.** Testing the significance difference of two population means(dependent samples) **9.** Test for independence of attributes. **10.** Goodness of fit test(only discrete distribution). **11.** Test for specific value of variance of population. **12.** Test of significance of difference between two standard deviations.	