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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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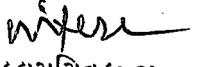
-: પરિપત્ર :-

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 ક્રમાંક:૦૨ થી નીચે મુજબ કરેલ ભલામણ સ્વીકારી વિજ્ઞાન વિદ્યાશાખાની તા.૩૦/૦૪/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંક:૫ થી કરેલ ભલામણ સ્વીકારી એકેડેમિક કાઉન્સિલની તા.૫/૫/૨૦૨૫ ની સભાનાં ઠરાવ ક્રમાંક: ૭૨ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ

ક્રમાંક:ઓથો./પરિપત્ર/સિલેબસ/૧૧૮૪૭/૨૦૨૫

તા.૨૬-૦૫-૨૦૨૫


કુલસચિવ

પ્રતિ,

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

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	<p>PO-01: <u>Scientific Knowledge & Conceptual Understanding</u>: Develop a strong foundation in scientific principles, theories and concepts across disciplines, fostering interdisciplinary learning, advance knowledge and problem-solving abilities.</p> <p>PO-02: <u>Analytical & Critical Thinking</u>: Apply critical thinking and analytical reasoning to evaluate scientific data, hypothesis and real-world problems, leading to evidence-based conclusions.</p> <p>PO-03: <u>Research & Inquiry-based Learning</u>: Develop investigative skills through experimentation, data analysis and scientific inquiry to contribute to research and innovation.</p> <p>PO-04: <u>Laboratory & Technical Skills</u>: Gain hands-on experience with laboratory techniques, instrumentation and computational tools relevant to scientific research and industry applications.</p> <p>PO-05: <u>Digital & Computational Literacy</u>: Utilize digital tools, computational techniques and emerging technologies such as AI, bioinformatics and statistical modelling to enhance scientific learning and problem-solving.</p> <p>PO-06: <u>Environmental & Societal Responsibility</u>: Understand the role of science in addressing environmental, health and societal challenges, promoting sustainability and ethical responsibility.</p> <p>PO-07: <u>Effective Communication & Collaboration</u>: Develop proficiency in scientific communication, both written and oral, for effective dissemination of knowledge while collaborating in multidisciplinary teams.</p> <p>PO-08: <u>Innovation & Entrepreneurship</u>: 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.</p> <p>PO-09: <u>Lifelong Learning & Professional Growth</u>: Cultivate curiosity and adaptability for continuous learning, equipping students for higher education, research, and professional careers.</p> <p>PO-10: <u>Ethical Leadership & Value-based Education</u>: Develop leadership qualities, ethical values, and a sense of responsibility in applying science for societal progress, aligning with Indian knowledge systems and global perspectives.</p>
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<p>Programme Specific Outcomes</p>	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>PSO6: Develop Communication Skills Effectively Communicate Statistical results through clear & informative data visualizations.</p> <p>PSO7:Commitment to Lifelong Learning and Research The program focuses not only on imparting core education but also to developing interest in research.</p> <p>PSO8:Provide Employability Identify & explore career opportunities in statistics, including roles in industry, government & academia.</p>								
<p>Mapping of PO and PSO</p>		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 (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: <ul style="list-style-type: none"> • Bernoulli distribution. • Binomial distribution. 									50%

	<ul style="list-style-type: none"> • Poisson Distribution. • Hypergeometric distribution. • Geometric Distribution. • Negative Binomial distribution. <p>Definition, Properties and uses of all above distributions.</p>	
	<p>Unit-II Continuous Probability Distributions:</p> <ul style="list-style-type: none"> • Gamma Distribution. • Beta Type-I Distribution. • Beta type-II Distribution. • Normal Distribution. • Exponential Distribution. <p>Definition, Properties and uses of all above distributions.</p>	50%
References	<ol style="list-style-type: none"> 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” યુનિવર્સિટી ગ્રંથ નિર્માણ બોર્ડ, ગુજરાત રાજ્ય અમદાવાદ-૬. 9. ડૉ. આર. ટી. રતાણી: “પ્રાયોજીત આંકડાશાસ્ત્ર” યુનિવર્સિટી 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	<ol style="list-style-type: none"> 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 	

	<p>Theory of runs. Difference between variable charts and attribute charts</p> <ul style="list-style-type: none"> ➤ 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 	
	<p>Acceptance sampling plan for attributes:</p> <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> • Introduction • Operating Characteristics Curve (OC Curve) • Average Sample Number (ASN) • Average Outgoing Quality (AOQ) • Average Total Inspection (ATI) 	50%
References	<ol style="list-style-type: none"> 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; Chapman 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 શાસ્ત્રીય ગુણવત્તા નિયંત્રણ યુનિવર્સિટી 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	<ol style="list-style-type: none"> 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

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

<p style="text-align: center;">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</p>										
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	<p>CO1: Understand the concept of hypothesis and its testing and applications in various fields;</p> <p>CO2: Utilize large sample statistical testing methods in research, business analytics, healthcare, and quality control.</p> <p>CO3: Understand the difference between large and small sample and tests based on it. Understand various small sample tests and its applications.</p> <p>CO7: Utilize small sample statistical testing methods in research, business analytics, healthcare, and quality control.</p>									
Mapping Between COs and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
	CO1	✓				✓	✓	✓	✓	
	CO2	✓	✓	✓	✓	✓		✓	✓	
	CO3	✓				✓		✓	✓	
	CO4	✓	✓	✓	✓	✓		✓	✓	
Course content	<p>UNIT-I</p> <p>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.</p> <p>Large sample tests:</p>									50%

	<p>1. Test of attributes:</p> <ul style="list-style-type: none"> • Test for significance of single proportion. • Test for significance of Difference of proportions. <p>2. Test of Variables:</p> <ul style="list-style-type: none"> • Test for significance of single mean. • Test for significance of difference between means. • Test for significance of difference between standard deviations. 	
	<p>UNIT-II Small Sample tests:</p> <p>1. Chi-Square variate, Assumptions and its Applications:</p> <ul style="list-style-type: none"> • Test the goodness of fit. • Test for independence of attributes, Yates correction • Test for specified value of the variance of the population. <p>2. t-test: t- statistic, Assumptions and its applications:.</p> <ul style="list-style-type: none"> • Test for significance of single mean. • Test for significance of difference of means for dependent and independent Samples. <p>3. F-test: F-statistic, Assumptions of F-Test and its application.</p> <ul style="list-style-type: none"> • Test for equality of two population variances 	50%
References	<p>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.</p>	

<p style="text-align: center;">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</p>		
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	<p>Large Sample test:</p> <ol style="list-style-type: none"> 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. <p>Small Sample test:</p> <ol style="list-style-type: none"> 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. 	