



Sir P. T. Sarvajani College of Science (Autonomous)
Surat-395001
(Affiliated with Veer Narmad South Gujarat University, Surat)



SYLLABUS
FOR
B. Sc. Sem. III & IV
Program: B. Sc.
Course: Mathematics

From
Academic year
2025-26



Graduate Attributes

After the successful completion of modules in different courses of B.Sc. MATHEMATICS, the learner will be able to:

GA 1: Apply concepts of Mathematics and acquired skill sets to unknown problems in order to establish an effective approach or strategy for dealing with them.

GA 2: Explore and derive quantitative data in the realms of Mathematics.

GA 3: Develop analytical and observation skills through different examples.

GA 4: Approach any real life problem with proper assumption, logic and constraints.

GA 5: Prepare for jobs, career development, and lifelong learning in Mathematics, by using acquired ICT skills and mathematical skills.

Programme Specific Outcomes

PSO - 1 Derive a solution by the use of Definition.

PSO - 2 Use of theorems to solve problems under the given scenario.

PSO - 3 For the solution of Difficult examples usage of abstract knowledge.

PSO - 4 Generalise results for a general set up.

PSO - 5 For problem solving generation of ideas.

PSO - 6 create meritorious students by gained knowledge.



Content

Sr. No	Semester	Course number	Course Code	Course title
1	III	CC V	MHMJ-S3P5-2CR25	Numerical Methods-I
2		CC VI	MHMJ-S3P6-2CR25	Multivariate Differential Calculus
3		CC VII	MHMJ-S3P7-4CR25	Linear Algebra-I
4		MDC III	MHMDC-S3P1-4CR25	Applications of Matrices
5			MHMDC-S3P2-4CR25	Probability Distribution and Testing of Hypothesis
6		SEC III	MHSEC-S3P1-2CR25	Vedic Mathematics and its Technique-III
7			MHSEC-S3P2-2CR25	Linear Programming
		IKS	MHIKS-S3P1-2CR25	Ancient Indian Mathematics
9		Practical III	MHMJ-S3PR5-2CR25	Lab Course-V
10			MHMJ-S3PR6-2CR25	Lab Course-VI
1	IV	CC VIII	MHMJ-S4P8-2CR25	Numerical Methods-II
2		CC IX	MHMJ-S4P9-2CR25	Multivariate Integral Calculus
		CC X	MHMJ-S4P10-4CR25	Linear Algebra-II
3		Minor III	MHMN-S4P3-2CR25	Differential Calculus of Several Variables
4			STMN-S4P3-2CR25	Probability functions and Discrete Probability distribution
8		SEC IV	MHSEC-S4P1-2CR25	Mathematical Modelling
9			MHSEC-S4P2-2CR25	Vedic Mathematics and its Technique-IV
		IKS	MHIKS-S4P2-2CR25	Ancient Indian Mathematicians
11		Practical II	MHMJ-S4PR7-2CR25	Lab Course-VII
12			MHMJ-S4PR8-2CR25	Lab Course- VIII
13			MHMN-S4PR3-2CR25	Lab Course-III
14			STMN-S4PR3-2CR25	Lab Course-III



Detailed Syllabus

B. Sc. (Mathematics) Semester - III/IV

(With effect from the Academic year 2025-25)

Course No.	Course Title	Course Code	Credits	Hours	Module	Lectures per module (1 Hr)	Examination		
							Internal Marks	External Marks	Total Marks
SEMESTER III									
Major Courses THEORY									
CC V	Numerical Methods-I	MHMJ-S3P5-2CR25	2	30	2	15	25	25	50
CC VI	Multivariate Differential Calculus	MHMJ-S3P6-2CR25	2	30	2	15	25	25	50
CC VII	Linear Algebra-I	MHMJ-S3P7-4CR25	4	60	4	15	50	50	100
Multidisciplinary Courses									
I	Applications of Matrices	MHMDC-S3P1-4CR25	4	60	4	15	50	50	100
II	Probability Distribution and Testing of Hypothesis	MHMDC-S3P2-4CR25	4	60	4	15	50	50	100
Skill Enhance Course (SEC)									
I	Linear Programming	MHSEC-S3P1-2CR25	2	60	-	-	25	25	50
II	Vedic Mathematics and its Technique-III	MHSEC-S3P2-2CR25	2	60	-	-	25	25	50
IKS in Mathematics									
I	Ancient Indian Mathematics	MHIKS-S3P1-2CR25	2	30	2	15	25	25	50
Major Courses Practical									
I	Lab Course-V	MHMJ-S3PR5-2CR25	2	60	-	-	25	25	50
II	Lab Course-VI	MHMJ-S3PR6-2CR25	2	60	-	-	25	25	50
SEMESTER IV									
Major courses THEORY									
CC VIII	Numerical Methods-II	MHMJ-S4P8-2CR25	2	30	2	15	25	25	50
CC IX	Multivariate Integral Calculus	MHMJ-S4P9-2CR25	2	30	2	15	25	25	50
CC X	Linear Algebra-II	MHMJ-S4P10-4CR25	4	60	4	15	50	50	100
Minor Course THEORY									
I	Differential Calculus of Several Variables	MHMN-S4P3-2CR25	2	30	2	15	25	25	50



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I	Probability functions and Discrete Probability distribution	STMN-S4P3-2CR25	2	30	2	15	25	25	50
Skill Enhance Course (SEC)									
I	Mathematical Modelling	MHSEC-S4P1-2CR25	2	60	-	-	25	25	50
II	Vedic Mathematics and its Technique-IV	MHSEC-S4P2-2CR25	2	60	-	-	25	25	50
IKS in Mathematics									
I	Ancient Indian Mathematicians	MHIKS-S4P2-2CR25	2	30	2	15	25	25	50
Major Courses Practical									
I	Lab Course-VII	MHMJ-S4PR7-2CR25	2	60	-	-	25	25	50
II	Lab Course-VIII	MHMJ-S4PR8-2CR25	2	60	-	-	25	25	50
Minor Courses Practical									
I	Lab Course-III	MHMN-S4PR3-2CR25	2	60	-	-	25	25	50
I	Lab Course-III	STMN-S4PR3-2CR25	2	60	-	-	25	25	50



S.Y. B. Sc. (Mathematics) Semester-III

Multidisciplinary Course

COURSE TITLE: Probability distributions and Testing of hypothesis

COURSE CODE: MHMDC-S3P2-4CR25 [CREDITS - 04]

Course learning outcome

At the end of this course, Students will be able to

1. Identify the real-life situations to apply discrete probability distributions like Uniform, Bernoulli, Binomial, Poisson and Geometric Probability distributions and compute related probabilities & properties.
2. Identify the real-life situations to apply Continuous probability distributions like Normal, Exponential and Gamma probability distributions and compute related probabilities & properties.
3. Identify the real-life situations to apply large sample tests with Testing of hypothesis.
4. Identify the real-life situations to apply small sample tests with Testing of hypothesis.
5. Understand the p value approach in statistical test of significance.

Module 1 Discrete probability distributions [16L]

Learning Objective

1. To discuss various univariate distributions. Such as Uniform, Bernoulli, Binomial, Poisson and Geometric Probability distributions.
2. To expose the applicability of various distributions in different disciplines.

Learning Outcomes:

At the end of this module the learner will be able to

1. Obtain a probability distribution of random variable (univariate case) in the given situation.
2. Understand some standard discrete probability distributions such as Bernoulli, Binomial, and Poisson distribution.

1.1	Uniform distribution: Definition, Mean, Variance and its applications. Bernoulli distribution: Definition, Mean, Variance.	[2L]
1.2	Binomial Distribution: Definition, Condition for application of it, Uses, Mean, Variance. Applications of binomial distribution with numerical examples.	[6L]
1.3	Poisson Distribution: Definition, Condition for application of it, Uses, Mean, Variance. Applications of Poisson distribution with numerical examples.	[6L]



1.4	Geometric Distribution: Definition, Uses, Mean, Variance. Applications of Geometric distribution with numerical examples.	[2L]
Module 2	Continuous probability distributions	[16L]
Learning Objective		
1. To discuss various continuous distributions. Such as Normal, Exponential and Gamma probability distributions. 2. To expose the applicability of various distributions in different disciplines.		
Learning Outcomes:		
At the end of this module the learner will be able to		
1. Obtain a probability distribution of random variable in the given situation. 2. Apply application of standard continuous probability distribution to different situations.		
2.1	Normal distribution: Definition, Importance, Mean, Variance, Area Property of normal Curve. Different properties of Normal distribution (without proof). Applications of Normal distribution with numerical examples.	[10L]
2.2	Exponential distribution: Definition, Importance, Mean, Variance. Applications of Exponential distribution with numerical examples.	[3L]
2.3	Gamma distribution: Definition, Importance, Mean, Variance. Applications of Gamma distribution with numerical examples.	[3L]
Module 3	Testing of hypothesis - I (Large sample tests)	[18L]
Learning Objective		
1. To discuss the concept of the Testing of Hypothesis & different terms of the Testing of Hypothesis. 2. To discuss hypothesis testing for large sample.		
Learning Outcomes:		
At the end of this module the learner will be able to		
1. Understand the concept of hypothesis and its testing and applications in various fields. 2. Identify the components of a classical hypothesis test, including the parameter of interest, the null and alternative hypotheses, type I error and type II error, Critical region of the test. 3. Understand testing of hypothesis for large sample.		



3.1	Define terms: Parameter, Statistic, Sampling distribution of a statistic, Standard error, Hypothesis, Statistical hypothesis, Null and alternative hypothesis, Simple and composite hypothesis, Level of significance, Type I and Type II errors, Power of a test, Rejection region, Critical value, Test statistic, Two-tailed and One-tailed test, Degrees of freedom, P value.	[6L]
3.2	Procedure for testing of hypothesis.	[2L]
3.3	Tests of significance for Large sample tests: <u>Tests of attributes:</u> (i) Test of significance for single proportion, (ii) Test of significance for the difference of proportions. Applications of above topics with numerical examples.	[4L]
3.4	<u>Tests of variables:</u> (i) Test of significance for single mean, (ii) Test of significance for the difference of means, (iii) Test of significance for the difference of standard deviations. Applications of above topics with numerical examples.	[6L]
Module 4	Testing of hypothesis - II (Small sample tests)	[10L]
Learning Objective		
1. To introduce the basic concepts of hypothesis testing for Small sample test. 2. To apply application of the small sample test with testing of hypothesis.		
Learning Outcomes:		
At the end of this module the learner will be able to		
1. Understand the difference between large sample and small sample test. 2. Understand the concept of testing of hypothesis for small test and its applications in various fields.		
4.1	<u>Chi square test:</u> Chi square variate, Assumptions of Chi square test. <u>Applications:</u> (i) To test the 'goodness of fit', (ii) To test the independence of attributes (iii) To test a specified value of the variance of the population.	[4L]
4.2	<u>t- Test:</u> - t- statistic, Assumptions of t – test. - Applications: (i) Test for single mean, (ii) Test for difference of means: For independent samples and for dependent samples, (iii) Test the significance of an observed sample correlation coefficient.	[5L]
4.3	<u>F- Test:</u> - F- statistic, Assumptions of F – test. - Application: Test for equality of two population.	[1L]



References:

1. S. C. Gupta, V. K. Kapoor: Fundamentals of Mathematical Statistics -12th e, Sultan Chand & Sons
2. Goon A.M., Gupta M. K. and Dasgupta: Fundamentals of Statistics, Vol. I, 8th e the world press, Kolkata.
3. Sheldon M. Ross: Introduction to Probability and Statistics for Engineers and Scientists, Elsevier; 6th e (1 January 2021).
4. Mood, Graybill and Boes: Introduction to theory of Statistics
5. Erich L. Lehmann and Joseph P. Romano: Testing Statistical Hypotheses (Springer Texts in Statistics), 3rd e, Springer-Verlag New York Inc.; 2005
6. Barbara Illowsky, OpenStax, Susan Dean: Introductory Statistics - Open Stax Textbooks (23 March 2022)
7. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): "Introduction to the Theory of Statistics", 3rd e, (Reprint), Tata McGraw-Hill Pub. Co. Ltd.
8. Marvin E Johnson: Basic Statistics - Independently Published; Illustrated Edition. (11 July 2020)
9. Jim Frost: Hypothesis Testing: An Intuitive Guide for Making Data Driven Decisions, Statistics by Jim Publishing (17 September 2020).
10. Daren Starnes, Josh Tabor: The Practice of Statistics: For the Ap Exam- 6th e, W.H.Freeman & Co Ltd.

Mapping of COs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Identify the real-life situations to apply discrete probability distributions like Uniform, Bernoulli, Binomial, Poisson and Geometric Probability distributions and compute related probabilities & properties.	X	X	X		X	
Identify the real-life situations to apply Continuous probability distributions like Normal, Exponential and Gamma probability distributions and compute related probabilities & properties.	X	X	X		X	
Identify the real-life situations to apply large sample tests with Testing of hypothesis.	X	X	X		X	
Identify the real-life situations to apply small sample tests with Testing of hypothesis.	X	X	X		X	
Understand the p value approach in statistical test of significance.	X	X	X			



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Question Paper Template

Unit	Remembering/ Knowledge (1)	Understanding (2)	Applying (3)	Analysing (4)	Evaluating (5)	Creating (6)	Total Marks
I	10%	40%	30%	-	20%	-	100%
II	10%	40%	30%	-	20%	-	100%
III	-	35%	35%	30%	-	-	100%
IV	-	35%	35%	30%	-	-	100%