



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



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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



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Semester-IV



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

Minor Course- III (Statistics)

COURSE TITLE: Probability functions & Discrete Probability distributions

COURSE CODE: STMN-S4P3-2CR25 [CREDITS - 02]

Course learning outcome		
At the end of this course, Students will be able to		
1. Apply the idea of random variables and their expected values to study the behaviour of random phenomenon occurring in business, industry and daily life activities. 2. Demonstrate the skill of finding moment generating function of different probability distributions. 3. Demonstrate the skill of finding function of random variables and finding their measure of central tendency and measure of dispersion. 4. Apply Bernoulli and Binominal Probability Distribution and compute related probabilities, expected values, M.G.F, and limiting form. 5. Apply Poisson & Geometric Probability Distribution and compute related probabilities & expected values M.G.F, and limiting form. 6. Apply Negative Binominal & Hyper Geometric Probability Distribution and compute related probabilities, expected values, and limiting form.		
Module 1	Random Variable, Probability functions and Moment generating function	[15L]
Learning Objective		
1. Understand basic concept of random variables. 2. Know about Probability mass function (p.m.f), Probability density function (p.d.f) and Cumulative distribution function (c.d.f.) and Moments generating function (M.G.F). 3. Understand Bivariate random variable and properties. 4. Learn Mathematical Expectation & various types of Measure of central tendency, Measure of dispersion and Moments.		
Learning Outcomes:		
At the end of this module the learner will be able to		
1. Distinguish between random and non-random experiments. 2. Identify Random variable and their mathematical expectation. 3. Interpret the expectation, variance and standard deviation of a discrete and continuous random variable. 4. Understand measure of central tendency and measure of dispersion related to random variables. 5. Obtain different moments of a probability distribution.		



6. Understand joint, marginal and conditional p.m.f. and p.d.f. of two random variables.		
7. Obtain moment generating function of a probability function.		
1.1	Probability: Basic concept, Theorem of probability (without proof), Numerical Examples based on probability. Random variables: Discrete and Continuous.	[3L]
1.2	Probability functions: Probability mass function (p.m.f), Probability density function (p.d.f) and Cumulative distribution function (c.d.f.) with properties. Mathematical expectation and standard deviation with properties.	[3L]
1.3	Bivariate Random Variables: Joint, marginal and conditional p.m.f. and p.d.f. of two random variables, Independence of two random variables, Bivariate Mathematical expectation and standard deviation with properties.	[3L]
1.4	Moments (of a random variable): Raw moments, Central moments with relationship. Moment generating function (m.g.f.) about origin and mean with properties and their relationship.	[3L]
1.5	Measure of Central tendency: Mean, Mode, Median, Harmonic mean and Geometric mean. Measure of Dispersion: Range, Quartile deviation, Mean deviation, Standard deviation.	[3L]
Module 2	Discrete Probability distributions	[15L]
Learning Objective		
1. To apply standard discrete probability distribution to different situations. 2. To learn different properties of discrete probability distribution.		
Learning Outcomes:		
At the end of this module the learner will be able to		
1. Know the applications of discrete probability distribution in different situations. 2. Understand some standard discrete probability distributions such as Binomial, Poisson, Geometric, Hyper geometric, Negative binomial, with real life situations.		
2.1	Bernoulli distribution: Definition, Mean, Variance, M.G.F. about origin and mean, β_1 , β_2 , γ_1 and γ_2 , Additive property. Binomial Distribution: Definition, Condition for application of it, Uses, Mean, Variance, M.G.F. about origin and mean, β_1 , β_2 , γ_1 and γ_2 , Additive property, Limiting form.	[4L]



2.2	Poisson Distribution: Definition, Condition for application of it, Uses, Mean, Variance, M.G.F. about origin and mean, β_1 , β_2 , γ_1 and γ_2 , Additive property.	[3L]
2.3	Geometric distribution: Definition, Condition for application of it, Applications, Mean, Variance, M.G.F. about origin.	[3L]
2.4	Hyper geometric distribution: Definition, Condition for application of it, Applications, Mean, Variance.	[2L]
2.5	Negative-Binomial distributions: Definition, Condition for application of it, Applications, Mean, Variance, M.G.F. about origin.	[3L]

References:

1. S. C. Gupta, V. K. Kapoor: Fundamentals of Mathematical Statistics -12/e, Sultan Chand & Sons
2. Gupta S.P: Statistical Methods -34/e, S. Chand & Sons., New Delhi.
3. Goon A.M., Gupta M. K. and Dasgupta 8: Fundamentals of Statistics, Vol I., 8/e, The world press, Kolkata.
4. Neil Weiss: Introductory Statistics – 10/e, Pearson.
5. Roxy Peck, Chris Olsen, Jay L. Devore: Introduction to Statistics and Data Analysis – 5/e, Cengage Learning

Mapping of COs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Apply the idea of random variables and their expected values to study the behaviour of random phenomenon occurring in business, industry and daily life activities.	X			X	X	X
Demonstrate the skill of finding moment generating function of different probability distributions.			X		X	X
Demonstrate the skill of finding function of random variables and finding their measure of central tendency and measure of dispersion.	X					
Apply Bernoulli and Binominal Probability Distribution and compute related probabilities, expected values, M.G.F, and limiting form.		X	X		X	
Apply Poisson & Geometric Probability Distribution and compute related probabilities & expected values M.G.F, and limiting form.		X	X		X	
Apply Negative Binominal & Hyper Geometric Probability Distribution and compute related probabilities, expected values, and limiting form.		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
1	10%	30%	25%	-	35%	-	100%
2	15%	25%	35%	-	25%	-	100%



SEMESTER IV

COURSE TITLE: Minor Lab Course (Statistics practical)

COURSE CODE: STMN-S4PR3-2CR25 Credit- 02

Course Learning Outcomes

After the successful completion of the Course, the learner will be able to:

1. Obtain the Marginal and Conditional distributions for Bivariate distribution.
2. Fitting of probability distributions such as Bernoulli, Binomial, Poisson, Geometric and Negative Binomial.

PRACTICAL III

[30 Hr]

1	Find the Marginal and Conditional distributions for Bivariate distribution.
2	Find the Mean and Variance for Bivariate distribution.
3	Find the Mathematical expectation and variance of Conditional distributions for Bivariate distribution.
4	Find covariance and correlation coefficient for Bivariate distribution.
5	Test of goodness of fit for the binomial distribution.
6	Test goodness of fit for the Poisson distribution.
7	Test goodness of fit for the Geometric distribution.
8	Test goodness of fit for the Negative Binomial distribution.

Minimum number of experiments: 7
