



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



SYLLABUS
FOR
B. Sc. Sem. I & II
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 Name	Course Code	Course title
1	I	Major I	MHMJ-S1P1-3CR25	Introduction to Functions of Complex Quantities
2		Major II	MHMJ-S1P2-3CR25	Differential Calculus
3		Minor I	MHMN-S1P1-2CR25	Differential Calculus and Complex Variables
4			STMN-S1P1-2CR25	Descriptive Statistics
5		MDC I	MHMDC-S1P1-4CR25	Elementary Calculus
6			MHMDC-S1P2-4CR25	Fundamentals of Mathematics
7			MHMDC-S1P3-4CR25	Descriptive Statistics-I
8		SEC I	MHSEC-S1P1-2CR25	Fundamentals of Vedic Mathematics- I
9			MHSEC-S1P2-2CR25	Coordinate Geometry- I
10			MHSEC-S1P3-2CR25	Basic Mathematics-I
11		Practical I	MHMJ-S1PR1-1CR24	Lab Course-I (Major-P1)
12			MHMJ-S1PR2-1CR24	Lab Course-II (Major-P2)
13			MHMN-S1PR1-2CR24	Lab Course-I (Minor Math)
14			STMN-S1PR1-2CR24	Lab Course-I (Minor Stat)
1	II	Major III	MHMJ-S2P3-3CR24	Matrix Theory
2		Major IV	MHMJ-S2P4-3CR24	Integral Calculus & ODE
3		Minor II	MHMN-S2P2-2CR24	Integral Calculus and Matrices
4			STMN-S2P2-2CR24	Correlation and Regression
5		MDC II	MHMDC-S2P1-4CR24	Matrices and Determinants
6			MHMDC-S2P2-4CR24	Ordinary Differential Equations
7			MHMDC-S2P3-4CR24	Descriptive Statistics-II
8		SEC II	MHSEC-S2P1-2CR24	Fundamentals of Vedic Mathematics- II
9			MHSEC-S2P2-2CR24	Coordinate Geometry- II
10			MHSEC-S2P3-2CR24	Basic Mathematics-II
11		Practical II	MHMJ-S2PR3-1CR24	Lab Course-III (Major-P3)
12			MHMJ-S2PR4-1CR24	Lab Course-IV (Major-P4)
13			MHMN-S2PR2-2CR24	Lab Course-II (Minor Math)
14			STMN-S2PR2-2CR24	Lab Course-II (Minor Stat)



Detailed Syllabus

B. Sc. Mathematics

(With effect from the Academic year 2024-25)

Course No.	Course Title	Course Code	Credits	Hours	Module	Lectures per module (1 Hr)	Examination		
							Internal Marks	External Marks	Total Marks
SEMESTER I									
Major Courses THEORY									
I	Introduction to Functions of Complex Quantities	MHMJ-S1P1-3CR25	3	45	3	15	37	38	75
II	Differential calculus	MHMJ-S1P2-3CR25	3	45	3	15	37	38	75
Minor Course THEORY									
I	Differential Calculus and Complex Variables	MHMN-S1P1-2CR25	2	30	2	15	25	25	50
I	Descriptive Statistics	STMN-S1P1-2CR25	2	30	2	15	25	25	50
Multidisciplinary Courses									
I	Elementary Calculus	MHMDC-S1P1-4CR25	4	60	4	15	50	50	100
II	Fundamentals of Mathematics	MHMDC-S1P2-4CR25	4	60	4	15	50	50	100
III	Descriptive Statistics-I	MHMDC-S1P3-4CR25	4	60	4	15	50	50	100
Skill Enhance Course (SEC)									
I	Fundamentals of Vedic Mathematics- I	MHSEC-S1P1-2CR24	2	60	-	-	25	25	50
II	Coordinate Geometry- I	MHSEC-S1P2-2CR24	2	60	-	-	25	25	50
III	Basic Mathematics-I	MHSEC-S1P3-2CR24	2	60	-	-	25	25	50
Major Courses Practical									
I	Lab Course-I	MHMJ-S1PR1-1CR24	1	30	-	-	12	13	25
II	Lab Course-I	MHMJ-S1PR2-1CR24	1	30	-	-	12	13	25
Minor Courses Practical									
I	Minor Lab Course-I	MHMN-S1PR1-2CR24	2	60	-	-	25	25	50
I	Minor Lab Course-I	STMN-S1PR1-2CR24	2	60	-	-	25	25	50



SEMESTER II

Major courses THEORY

I	Matrix Theory	MHMJ-S2P3-3CR24	3	45	3	15	37	38	75
II	Integral Calculus & ODE	MHMJ-S2P4-3CR24	3	45	3	15	37	38	75

Minor Course THEORY

I	Integral Calculus and Matrices	MHMN-S2P2-2CR24	4	60	4	15	25	25	50
I	Correlation and Regression	STMN-S2P2-2CR24	2	30	2	15	25	25	50

Multidisciplinary Courses

I	Matrices and Determinants	MHMDC-S2P1-4CR24	4	60	4	15	50	50	100
II	Ordinary Differential Equations	MHMDC-S2P2-4CR24	4	60	4	15	50	50	100
III	Descriptive Statistics-II	MHMDC-S2P3-4CR24	4	60	4	15	50	50	100

Skill Enhance Course (SEC)

I	Fundamentals of Vedic Mathematics- II	MHSEC-S2P1-2CR24	2	60	-	-	25	25	50
II	Coordinate Geometry- II	MHSEC-S2P2-2CR24	2	60	-	-	25	25	50
III	Basic Mathematics-II	MHSEC-S2P3-2CR24	2	60	-	-	25	25	50

Major Courses Practical

I	Lab Course-III	MHMJ-S2PR3-1CR24	1	30	-	-	12	13	25
II	Lab Course-IV	MHMJ-S2PR4-1CR24	1	30	-	-	12	13	25

Minor Courses Practical

I	Minor Lab Course-II	MHMN-S2PR2-2CR24	2	60	-	-	25	25	50
I	Minor Lab Course-II	STMN-S2PR2-2CR24	2	60	-	-	25	25	50



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Semester II



F.Y.B.Sc. (Mathematics) SEMESTER II

Minor Course- II

COURSE TITLE: Correlation and Regression

COURSE CODE: STMN-S2P2-2CR24 [CREDITS - 02]

Course learning outcome		
At the end of this course, Students will be able to		
1. The student will demonstrate an understanding of the correlation of two variables 2. Discuss basic ideas of linear regression and correlation. 3. examine the degree and direction of the relationships between two variables 4. Calculate and interpret the correlation coefficient 5. The student will demonstrate an understanding of regression analysis for two variables 6. Calculate and interpret linear regression equations and predict the future values. 7. Understand and interpret coefficient of determination.		
Module 1	Linear Correlation	[15L]
Learning Objective		
1. Interpret the nature of relationship between two variables. 2. Analyze the data and predict the future values using regression lines. 3. Understand applications of correlation theory in various fields, viz., agriculture, business, medical science, industry etc		
Learning Outcomes:		
At the end of this module the learner will be able to		
1. Describe how correlation is used to identify linear relationships between variables 2. Critically examine the degree and direction of the relationships between two variables		
1.1	Bi-variate data Concept about Correlation, definition and Types of correlation	[2L]
1.2	Methods of obtain correlation coefficient (i) Scatter diagram method (with merits and limitations). (ii) Karl Pearson's product moment method (with merits and limitations) (iii) Spearman's Rank Correlation method (with derivation, merits and limitations)	[3L]
1.3	Interpretation correlation coefficient	[1L]



1.4	Properties of correlation coefficient: $-1 \leq r \leq 1$ & change of origin & scale, etc.	[3L]
1.5	Numerical Problems of above topics	[6L]
Module 2	Linear Regression	[15L]
Learning Objective 1. Define the explanatory variable as the independent variable (predictor), and the response variable as the dependent variable (predicted). 2. Plot the explanatory variable (x) on the x-axis and the response variable (y) on the y-axis, and fit a linear regression equation $y = ax + b$ 3. Understand applications of regression theory in various fields, viz., agriculture, business, medical science, industry etc		
Learning Outcomes: At the end of this module the learner will be able to 1. Knowing the difference about Correlation & Regression 2. Fitting regression lines by using minimum least square methods 3. Define correlation of determination.		
2.1	Meaning of Linear Regression: Definition	[1L]
2.2	Fitting Regression lines by principal of least squares	[3L]
2.3	Regression coefficients and their properties	[2L]
2.4	Angle between two regression lines & interpretations	[1L]
2.5	Coefficients of determinations & interpretations	[1L]
2.6	Application of regression analyze in various field, Difference between correlation & regression	[1L]
2.7	Numerical problems	[6L]

References:

- A. M. Gun, M. K. Gupta & B. Dasgupta: Fundamentals of Statistics (Volume One) - World Press Private Ltd (1 August 2013)
- S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics - 12/e, Sultan Chand and Sons;
- Barbara Illowsky, Openstax, Susan Dean: Introductory Statistics - Open Stax Textbooks (23 March 2022)
- Neil Weiss: Introductory Statistics - 10/e, Pearson;
- Marvin E Johnson: Basic Statistics - Independently Published; Illustrated Edition. (11 July 2020)
- Prem S. Mann: Introductory Statistics - 10/e, John Wiley & Sons Inc.
- 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
The student will demonstrate an understanding of the correlation of two variables	X	X				
Discuss basic ideas of linear regression and correlation.	X	X				
examine the degree and direction of the relationships between two variables		X	X			
Calculate and interpret the correlation coefficient.	X	X	X			
The student will demonstrate an understanding of regression analysis for two variables by	X	X				
Calculate and interpret linear regression equation x on y and y on x and analyze the data and predict the future values.			X	X	X	
Understand and interpret coefficient of determination,	X	X				

Question Paper Template

Unit	Remembering/ Knowledge (1)	Understanding (2)	Applying (3)	Analysing (4)	Evaluating (5)	Creating (6)	Total marks
I	15%	30%	40%	-	15%	-	100%
II	10%	40%	30%	-	20%	-	100%



F.Y.B.Sc. (MATHEMATICS) SEMESTER II

COURSE TITLE: MINOR LAB COURSE -II (Statistics)

COURSE CODE: STMN-S2PR2-2CR24 [Credit- 02]

Course Learning Outcomes	
After the successful completion of the Course, the learner will be able to:	
1. Compute and interpret a correlation coefficient 2. Compute linear regression lines 3. Define and provide examples of dependent and independent variables in a study of a regression 4. Compute and interpret a coefficient of determination.	
PRACTICAL Minor (STMN-S2PR2-2CR24) (Lab Course - II Stat)	
1	Calculate of the correlation coefficient by Karl Pearson's' method for simple series
2	Calculate of the correlation coefficient by Karl Pearson's' method for d_x & d_y where $d_x = x - a$ & $d_y = y - b$.
3	Calculate of the correlation coefficient by Karl Pearson's' method for d_x & d_y where $d_x = \frac{x-a}{i}$ & $d_y = \frac{y-b}{j}$.
4	Calculate of the correlation coefficient by Karl Pearson's' method for bivariate frequency distribution
5	Calculate the correlation coefficient by Spearman's rank method
6	Calculate the regression coefficients for simple series
7	Fitting a regression line X on Y
8	Fitting a regression line Y on X
9	Predict the value of dependent variable by using independent variable
10	Calculate the coefficient of determination & interprets.
Minimum number of experiments: 8	



F.Y.B.Sc. (Mathematics) SEMESTER II

Multidisciplinary Course

COURSE TITLE: Descriptive Statistics-II

COURSE CODE: MHMDC-S2P3-4CR24 [CREDITS - 04]

Course learning outcome		
At the end of this course, Students will be able to 1. Familiar with basic concepts of probability 2. Understand the difference between a discrete and a continuous random variable. 3. Know about probability mass functions (p.m.f), probability density functions (p.d.f) Cumulative distribution function (c.d.f.) and obtain probability functions. 4. Understand measure of central tendency and measure of dispersion related to random variables. 5. Distinguish between univariate and bivariate random variables; 6. Understand joint, marginal and conditional p.m.f. and p.d.f. of two random variables; 7. Distinguish different types of correlation 8. Calculate Karl Pearson's correlation coefficient & spearman's rank coefficient. 9. Understand the purpose of a linear regression equation; 10. Learn about importance of measures of association & understand different types of measures of association. 11. Calculate measures of association using different methods.		
Module 1	Probability	[12L]
Learning Objective 1. Understand axioms of probability and various theorems on probability; 2. Find the probabilities of various events; 3. Understand the concepts of conditional probability and independence of events;		
Learning Outcomes: At the end of this module the learner will be able to 1. Use of probability to solve real life problem, social science problem, industrial problem and problem arise in science.		
1.1	➤ Concepts in probability ➤ Some important terms: Random experiment, Sample space, Event, Favourable cases, Mutually exclusive events, Exhaustive events, Equally likely events, Independent events. ➤ Classical and statistical definition of probability, ➤ Axiomatic approach to probability, ➤ Theorem based on above topics (Without proof)	[08L]



1.2	➤ Conditional Probability Theorem based on above topics (Without proof)	[04L]
Module 2	Random Variables, Probability functions:	[12L]
Learning Objective 1. Develop a clear understanding of random variables. 2. Learn to apply various probability functions to determine probabilities and distributions for different random variables. 3. Interpret expected values and variances of random variables.		
Learning Outcomes: At the end of this module the learner will be able to 1. Define random variables and distinguish between discrete and continuous random variables. 2. Use probability mass functions (p.m.f), probability density functions (p.d.f) Cumulative distribution function (c.d.f.) to calculate and understand distribution characteristics. 3. Calculate the mean, variance, and standard deviation of random variables.		
2.1	➤ Random variables: Discrete and Continuous, ➤ Probability functions: Probability mass function (p.m.f), ➤ Probability density function (p.d.f) and Cumulative distribution function (c.d.f.) with properties,	[08L]
2.2	➤ Mathematical expectation and Variance with properties.	[04L]
Module 3	Bivariate Random Variables, Probability functions:	[16L]
Learning Objective 1. Develop an understanding of bivariate random variables. 2. Understand to derive marginal and conditional distributions from joint distributions. 3. Analyse the dependence or independence between two random variables. 4. Interpret expected values and variances of Bivariate random variables.		
Learning Outcomes: At the end of this module the learner will be able to 1. Define bivariate random variables and distinguish between univariate and bivariate random variables. 2. distinguish between their joint, marginal, and conditional distributions. 3. Compute probabilities using joint probability mass functions and joint probability density functions. 4. Determine if two random variables are independent or dependent. 5. Calculate the mean, variance, and standard deviation of random variables.		
3.1	➤ Bivariate Random Variables: ▪ Joint, marginal and conditional p.m.f. and p.d.f. of two random variables, ▪ Independence of two random variables,	[08L]
3.2	➤ Bivariate mathematical expectation and variance with properties,	[03L]



3.3	➤ Examples of above topics for only continuous random variables.	[05L]
Module 4	Linear Correlation, Linear Regression and Measures of association	[20L]
Learning Objective 1. Give introduction & types of correlation 2. Interpret the nature of relationship between two variables 3. Find the correlation coefficient using different methods 4. Find regression line and interpret it. 5. Understand the concept of measures of association.		
Learning Outcomes: At the end of this module the learner will be able to 1. Gain knowledge of basic concept of correlation. 2. Distinguish different types of correlation 3. Calculate Karl Pearson's correlation coefficient & spearman's rank coefficient. 4. Thoroughly understand and analyze the given problems with the regression line. 5. Distinguish different types of measures of association and interpretation.		
4.1	➤ Linear Correlation: ▪ Meaning, Definition and Types of correlation, ▪ Methods of studying correlation: (i) Scatter diagram method (ii) Karl Pearson's product moment method (iii) Spearman's Rank Correlation method (Without proof) ▪ Interpretation correlation coefficient, ▪ Properties (Without proof)	[08L]
4.2	➤ Linear Regression: ▪ Concept of linear regression, ▪ Regression coefficients and Regression lines and their properties (Without proof), ▪ Coefficient Determination and its interpretation, ▪ Utility of study of regression,	[08L]
4.3	➤ Measures of association ▪ Idea of notations and terminology for classification of attributes, Contingency table, Consistency of data, ▪ Types of association, ▪ Methods of measures of association (for two attributes): (i) Proportion method (ii) Method of Probability (iii) Yule's Coefficient of association (with its characteristics) (iv) Coefficient of contingency, ▪ Comparison between measure of association and correlation.	[04L]



References:

1. A. M. Gun, M. K. Gupta & B. Dasgupta: Fundamentals of Statistics (Volume One) - World Press Private Ltd (1 August 2013)
2. Sheldon Ross: A First Course in Probability – 10/e, Pearson Education;
3. Seymour Lipschutz, Marc Lipson: Schaum's Outline of Probability – 3/e, McGraw Hill;
4. Barbara Illowsky, Openstax, Susan Dean: Introductory Statistics - Open Stax Textbooks (23 March 2022)
5. Neil Weiss: Introductory Statistics – 10/e, Pearson;
6. Marvin E Johnson: Basic Statistics - Independently Published; Illustrated Edition. (11 July 2020)
7. Prem S. Mann: Introductory Statistics – 10/e, John Wiley & Sons Inc.
8. Daren Starnes, Josh Tabor: The Practice of Statistics: For the Ap Exam – 6/e, W.H.Freeman & Co Ltd.

Mapping of COs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Familiar with basic concepts of probability	X	X				
Understand the difference between a discrete and a continuous random variable.	X	X				
Know about probability mass functions (p.m.f), probability density functions (p.d.f) Cumulative distribution function (c.d.f.) and obtain probability functions.	X	X	X	X		
Understand measure of central tendency and measure of dispersion related to random variables.	X	X				
Distinguish between univariate and bivariate random variables;	X	X				
Understand joint, marginal and conditional p.m.f. and p.d.f .of two random variables.		X	X			
Distinguish different types of correlation	X	X			X	X
Calculate Karl Pearson's correlation coefficient & spearman's rank coefficient.		X	X		X	
Understand the purpose of a linear regression equation		X		X	X	



Learn about importance of measures of association & understand different types of measures of association.	X	X			X	X
Calculate measures of association using different methods.		X			X	

Question Paper Template

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