



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**  
**2024-25**



## 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-S1P1-3CR24	Introduction to Functions of Complex Quantities
2		Major II	MHMJ-S1P2-3CR24	Differential Calculus
3		Minor I	MHMN-S1P1-2CR24	Differential Calculus and Complex Variables
4			STMN-S1P1-2CR24	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-S1PR1-2CR24	Fundamentals of Vedic Mathematics- I
9			MHSEC-S1PR2-2CR24	Coordinate Geometry- I
10			MHSEC-S1PR3-2CR24	Basic Mathematics-I
11		Practical I	MHMJ-S1PR1-1CR24	Lab Course-I (Major-P1)
12			MHMJ-S1PR2-1CR24	Lab Course-I (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-S2P1-3CR24	Matrix Theory
2		Major IV	MHMJ-S2P2-3CR24	Integral Calculus & ODE
3		Minor II	MHMN-S2P1-2CR24	Integral Calculus and Matrices
4			STMN-S2P1-2CR24	Correlation and Regression
5		MDC II	MHMDC-S2P1-4CR24	Matrices and Determinants
6			MHMDC-S2P2-4CR24	Ordinary Differential Equations
7			MHMDC-S2P3-3CR24	Descriptive Statistics-II
8		SEC II	MHSEC-S2PR1-2CR24	Fundamentals of Vedic Mathematics- II
9			MHSEC-S2PR2-2CR24	Coordinate Geometry- II
10			MHSEC-S2PR3-2CR24	Basic Mathematics-II
11		Practical II	MHMJ-S2PR1-1CR24	Lab Course-II (Major-P1)
12			MHMJ-S2PR2-1CR24	Lab Course-II (Major-P2)
13			MHMN-S2PR1-2CR24	Lab Course-II (Minor Math)
14			STMN-S2PR1-2CR24	Lab Course-II (Minor Stat)
15			MHMDC-S2PR3-1CR24	Lab Course-II (MDC)



## 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
<b>SEMESTER I</b>									
<b>Major Courses THEORY</b>									
I	Introduction to Functions of Complex Quantities	MHMJ-S1P1-3CR24	3	45	3	15	37	38	75
II	Differential calculus	MHMJ-S1P2-3CR24	3	45	3	15	37	38	75
<b>Minor Course THEORY</b>									
I	Differential Calculus and Complex Variables	MHMN-S1P1-2CR24	2	30	2	15	25	25	50
I	Descriptive Statistics	STMN-S1P1-2CR24	2	30	2	15	25	25	50
<b>Multidisciplinary Courses</b>									
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
<b>Skill Enhance Course (SEC)</b>									
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
<b>Major Courses Practical</b>									
I	Lab Course-I	MHMJ-S1PR1-1CR24	1	30	-	-	12	13	25
II	Lab Course-I	MHMJ-S1PR2-1CR24	1	30	-	-	12	13	25
<b>Minor Courses Practical</b>									
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-S2P1-3CR24	3	45	3	15	37	38	75
II	Integral Calculus & ODE	MHMJ-S2P2-3CR24	3	45	3	15	37	38	75

### Minor Course THEORY

I	Integral Calculus and Matrices	MHMN-S2P1-2CR24	4	60	4	15	25	25	50
I	Correlation and Regression	STMN-S2P1-2CR24	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-II	MHMJ-S2PR1-1CR24	1	30	-	-	12	13	25
II	Lab Course-II	MHMJ-S2PR2-1CR24	1	30	-	-	12	13	25

### Minor Courses Practical

I	Minor Lab Course-II	MHMN-S2PR1-2CR24	2	60	-	-	25	25	50
I	Minor Lab Course-II	STMN-S2PR1-2CR24	2	60	-	-	25	25	50



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

Major Course- I

COURSE TITLE: Introduction to Functions of Complex Quantities

COURSE CODE: MHMJ-S1P1-3CR24 [CREDITS - 03]

Course learning outcome		
At the end of this course, Students will be able to		
<ol style="list-style-type: none"> <li>1. Understand De' Moirve's theorem and its applications.</li> <li>2. Use the concept of Euler's Expression and Hyperbolic functions for real arguments.</li> <li>3. Study and learn to use an exponential, Circular and Hyperbolic functions for complex arguments.</li> <li>4. Understand the Logarithm of complex numbers, inverse hyperbolic functions and separation of these into real and imaginary parts.</li> </ol>		
<b>Module 1</b>	<b>De' Moirve's Theorem and Euler's Expressions</b>	<b>[15L]</b>
<b>Learning Objective</b>		
<ol style="list-style-type: none"> <li>1. To provide an introduction to the theories of functions of complex quantities.</li> <li>2. To introduce students to the complex variable system.</li> </ol>		
<b>Learning Outcomes:</b>		
At the end of this module the learner will be able to		
<ol style="list-style-type: none"> <li>1. Understand De' Moirve's theorem and its applications</li> <li>2. Use the concept of Euler's Expression.</li> </ol>		
<b>1.1</b>	De' Moirve's theorem and its applications	<b>[4L]</b>
<b>1.2</b>	Trigonometric functions for multiple arguments	<b>[4L]</b>
<b>1.3</b>	Euler's Expressions	<b>[4L]</b>
<b>1.4</b>	Evaluation of Indeterminate forms by using Euler's expressions	<b>[3L]</b>
<b>Module 2</b>	<b>Hyperbolic functions for real arguments, Exponential, Circular and Hyperbolic functions for complex quantities</b>	<b>[15L]</b>
<b>Learning Objective</b>		
<ol style="list-style-type: none"> <li>1. To equip students with necessary knowledge and skills to enable them handle mathematical operations.</li> </ol>		
<b>Learning Outcomes:</b>		
At the end of this module the learner will be able to		
<ol style="list-style-type: none"> <li>1. Understand Hyperbolic functions for real arguments.</li> </ol>		



2. Study and learn to use an exponential, Circular and Hyperbolic functions for complex arguments.		
3. To introduce students' mathematical operations, analyses and problems involving complex variables and functions.		
2.1	Hyperbolic functions for real arguments and their inverses	[3L]
2.2	Exponential, Circular and Hyperbolic functions for complex variables and their identities	[3L]
2.3	Euler's Theorem	[3L]
2.4	Relations between Circular and Hyperbolic functions	[3L]
2.5	Separation of Circular and Hyperbolic functions into real and imaginary parts	[3L]
<b>Module 3</b>	<b>Logarithm of Complex quantities and Inverse Circular and Inverse Hyperbolic functions</b>	<b>[15L]</b>
<b>Learning Objective</b>		
1. To introduce students' mathematical operations, analyses and problems involving complex variables and functions.		
<b>Learning Outcomes:</b>		
At the end of this module the learner will be able to		
1. Understand the Logarithm of complex numbers, inverse hyperbolic functions and separation of these into real and imaginary parts.		
3.1	Logarithm of complex quantities	[3L]
3.2	Separation of logarithmic function	[4L]
3.3	Inverse Circular functions into real and imaginary parts.	[4L]
3.4	Inverse Hyperbolic functions into real and imaginary parts.	[4L]

**References:**

1. S. L. Loney: Plane Trigonometry, Part I and II, 6/e, Mc Millan and Co., London.
2. Hari Kishan: Trigonometry, Atlantic Pub., New Delhi, 2005
3. R. S. Verma, K. S. Shukla: Text book of Trigonometry, Pothishala Pvt. Ltd. Allahabad, Edition 1999.
4. B. S. Grewal: Elementary Engineering Mathematics, 9/e, Khanna Publishers, New Delhi.



### Mapping of COs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Understand De' Moirve's theorem and its applications.	X	X	X			
Use the concept of Euler's Expression and Hyperbolic functions for real arguments.	X	X	X	X		
Study and learn to use an exponential, Circular and Hyperbolic functions for complex arguments.	X	X				
Understand the Logarithm of complex numbers, inverse hyperbolic functions and separation of these into real and imaginary parts.	X	X	X			

### Question Paper Template

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



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

COURSE TITLE: MAJOR LAB COURSE

COURSE CODE: MHMJ-S1PR1-1CR24 [Credit- 01]

**Course Learning Outcome**

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

1. Demonstrate Mathematical skills.
2. Correlate their Mathematical theory concepts through practical.

**PRACTICAL Major MHMJ-S1PR1-1CR24 (Lab Course - I)**

1. Verify De' Moivre's theorem.
2. Expansion of Trigonometric functions, Finding the last term of Trigonometric functions.
3. Evaluation of Indeterminate forms by Euler's expression.
4. Examples related Hyperbolic functions and Inverse Hyperbolic functions.
5. Relation between Circular and Hyperbolic functions.
6. Application of Euler's theorem.
7. Separation into the Real and Imaginary parts of Circular functions and Hyperbolic functions.
8. Separation into the Real and Imaginary parts of Logarithm functions and Inverse Trigonometric functions.



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

Major Course- II

COURSE TITLE: Differential Calculus

COURSE CODE: MHMJ-S1P2-3CR24 [CREDITS - 03]

Course learning outcome		
At the end of this course, Students will be able to		
<ol style="list-style-type: none"> <li>1. Solve examples of Successive differentiation, nth derivatives, apply Leibnitz theorem in various examples.</li> <li>2. Understand Rolle's and mean value theorems and apply Maclaurin and Taylor's Expansions to solve the examples.</li> <li>3. Solve the examples of the curvatures, asymptotes, concavity and convexity, classify the decreasing and increasing functions.</li> </ol>		
<b>Module 1</b>	<b>Successive Differentiation, Mean value theorems</b>	<b>[15L]</b>
<b>Learning Objective</b>		
<ol style="list-style-type: none"> <li>1. To understand the advance concepts and principles of Differential calculus, Mean value theorems and use of theorems.</li> </ol>		
<b>Learning Outcomes:</b>		
At the end of this module the learner will be able to		
<ol style="list-style-type: none"> <li>1. Solve examples of Successive differentiation, n<sup>th</sup> derivatives, apply Leibnitz theorem in various examples.</li> <li>2. Understand Rolle's and mean value theorems and apply Maclaurin and Taylor's Expansions to solve the examples.</li> </ol>		
<b>1.1</b>	Successive differentiation	<b>[3L]</b>
<b>1.2</b>	Calculation of $n^{th}$ derivatives of some standard functions (rational functions and powers of sine, cosine functions)	<b>[3L]</b>
<b>1.3</b>	Leibnitz theorem and its applications	<b>[3L]</b>
<b>1.4</b>	Maclaurin and Taylor's Expansions	<b>[3L]</b>
<b>1.5</b>	Rolle's and mean value theorems	<b>[3L]</b>
<b>Module 2</b>	<b>Curvature</b>	<b>[15L]</b>
<b>Learning Objective</b>		
<ol style="list-style-type: none"> <li>1. To learn about concept of indeterminate forms, tangent and normal and curvature.</li> </ol>		
<b>Learning Outcomes:</b>		



At the end of this module the learner will be able to		
2. Understand the indeterminate forms, tangent and normal and curvature and radius of curvatures.		
2.1	Indeterminate forms	[3L]
2.2	Tangents and normal	[5L]
2.3	Curvature and Radius of Curvature (except polar form)	[7L]
<b>Module 3</b>	<b>Increasing &amp; Decreasing Functions</b>	<b>[15L]</b>
<b>Learning Objective</b>		
1. To learn about concept of Increasing and decreasing functions, asymptotes, concavity and convexity and their applications		
<b>Learning Outcomes:</b>		
At the end of this module the learner will be able to		
1. Solve the examples of the asymptotes, concavity and convexity, classify the decreasing and increasing functions.		
3.1	Increasing and Decreasing functions	[5L]
3.2	Maxima and minima	[5L]
3.3	Asymptotes, Concavity and Convexity	[5L]

**References:**

1. Hari Kishan: Differential Calculus, Atlantic Publishers and Distributer(p) Ltd., Ed 2007
2. George A. Osborne: Differential and Integral Calculus, D. C. Heath & Co. Publishers, Chicago, Ed.1903.
3. Shanti Narayan and Dr. P.K. Mittal: Differential Calculus, 35/e, S. Chand and Co. New Delhi, 2022.
4. H. S. Dhama: Differential Calculus, New Age International publishers(p) Ltd., Ed. 1998.
5. Madhu Rani : Differential Calculus, Arise Publishers, Edition 2008.



### Mapping of COs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Solve examples of Successive differentiation, nth derivatives, apply Leibnitz theorem in various examples.	X	X	X			
Understand Rolle's and mean value theorems and apply Maclaurin and Taylor's Expansions to solve the examples.	X	X	X	X		
Solve the examples of the curvatures, asymptotes, concavity and convexity, classify the decreasing and increasing functions.	X	X				

### Question Paper Template

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



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

COURSE TITLE: MAJOR LAB COURSE

COURSE CODE: MHMJ-S1PR2-1CR24 [Credit- 01]

**Course Learning Outcome**

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

1. Demonstrate Mathematical skills.
2. Correlate their Mathematical theory concepts through practical.

**PRACTICAL Major MHMJ-S1PR2-1CR24 (Lab Course - I)**

- 1 Examples of Successive Differentiation
- 2 Application of Leibnitz theorem
- 3 Applications of Rolle's and mean value theorems
- 4 Examples of indeterminate forms, tangent, normal
- 5 Examples of Curvature of the curve and Radius of Curvature of the curve
- 6 Examples of Increasing and decreasing functions
- 7 Examples of maxima and minima
- 8 Examples of Asymptotes, Concavity and Convexity



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

Minor Course- I

COURSE TITLE: Differential Calculus and Complex Variables

COURSE CODE: MHMN-S1P1-2CR24 [CREDITS - 02]

Course learning outcome		
1. Understand Successive differentiation, nth derivatives, Understand the use and application of Leibnitz theorem. 2. Understand De' Moivre's theorem and its applications. 3. Understand Euler's Expression, Understand Hyperbolic functions for real arguments.		
<b>Module 1</b>	<b>Successive differentiation</b>	<b>[15L]</b>
<b>Learning Objective</b> This module is intended to <ol style="list-style-type: none"> <li>To understand the advance concepts and principles of Differential calculus and understand successive differentiation.</li> </ol>		
<b>Learning Outcomes:</b> At the end of this module the learner will be able to <ol style="list-style-type: none"> <li>Understand Successive differentiation, nth derivatives, Understand the use and application of Leibnitz theorem.</li> </ol>		
<b>1.1</b>	Successive differentiation	<b>[4L]</b>
<b>1.2</b>	Calculation of $n^{th}$ derivatives of some standard functions (rational functions and powers of sine, cosine functions)	<b>[6L]</b>
<b>1.3</b>	Leibnitz theorem and its applications	<b>[5L]</b>
<b>Module 2</b>	<b>De' Moivre's Theorem and Euler's Expressions</b>	<b>[15L]</b>
<b>Learning Objective</b> This module is intended to <ol style="list-style-type: none"> <li>To felicitate students about the concept of De' Moivre's theorem and to establish a connection between complex numbers and trigonometric functions.</li> <li>To introduce students to the complex variable system.</li> </ol>		



### Learning Outcomes:

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

1. To employ De' Moivre's theorem in a number of applications to solve numerical problems and trigonometric functions for multiple arguments.
2. Use the concept of Euler's Expression and Hyperbolic functions and its inverses for real arguments.

2.1	De' Moivre's theorem and its applications	[4L]
2.2	Trigonometric functions for multiple arguments	[4L]
2.3	Euler's Expressions	[4L]
2.4	Evaluation of Indeterminate forms by using Euler's expressions	[3L]

### References:

1. Hari Kishan: Differential Calculus, Atlantic Publishers and Distributer(p) Ltd., Edition 2007.
2. George A. Osborne: Differential and Integral Calculus, D. C. Heath & Co. Publishers, Chicago, Edition 1903.
3. Shanti Narayan and Dr. P.K. Mittal: Differential Calculus, 35/e, S. Chand and Co. New Delhi, 2022.
4. S. L. Loney: Plane Trigonometry, Part I and II, 6/e, McMillan and Co. London.
5. R. S. Verma, K. S. Shukla: Text book of Trigonometry, Pothishala Pvt. Ltd., Allahabad, Edition 1999.



### Mapping of COs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Understand Successive differentiation, nth derivatives, Understand the use and application of Leibnitz theorem.	X	X	X		X	
Understand De' Moirve's theorem and its applications.	X	X	X		X	
Use the concept of Euler's Expression and Hyperbolic functions for real arguments.	X	X	X		X	

### Question Paper Template

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



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

COURSE TITLE: MINOR LAB COURSE

COURSE CODE: MHMN-S1PR1-2CR24 [Credit- 02]

**Course Learning Outcome**

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

1. Demonstrate Mathematical skills.
2. Correlate their Mathematical theory concepts through practical.

**PRACTICAL Minor (MHMN-S1PR1-2CR24) (Lab Course - Minor)**

- 1 Examples of Successive Differentiation.
- 2 Examples of Successive Differentiation of some standard functions.
- 3 Examples based on Leibnitz theorem.
- 4 Application of Leibnitz theorem.
- 5 Verify De' Moivre's theorem, Applications of De' Moivre's theorem.
- 6 Expansion of Trigonometric functions, Finding the last term of Trigonometric functions.
- 7 Evaluation of Indeterminate forms by Euler's expression.
- 8 Examples related Hyperbolic functions and Inverse Hyperbolic functions.



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

Minor Course- I

COURSE TITLE: Descriptive Statistics

COURSE CODE: STMN-S1P1-2CR24 [CREDITS - 02]

Course learning outcome		
At the end of this course, Students will be able to		
<ol style="list-style-type: none"> <li>1. Understand the concept of data.</li> <li>2. Demonstrate a understanding of the fundamental Concepts of Descriptive statistics, including measures of Central tendency and measures of Dispersion.</li> <li>3. Summarize and organize Data effectively using appropriate descriptive statistics techniques.</li> <li>4. Interpret and analyze data sets accurately.</li> <li>5. Apply the appropriate descriptive statistics techniques for different types of data, Such as discrete variable &amp; continuous variables.</li> <li>6. Calculate and interpret various partition values.</li> <li>7. Apply critical thinking and problem-Solving skills to datasets, effectively utilizing descriptive Statistics techniques to draw meaningful conclusions.</li> </ol>		
<b>Module 1</b>	<b>Measures of Central Tendency</b>	<b>[10L]</b>
<b>Learning Objective</b>		
<ol style="list-style-type: none"> <li>1. To provide introduction of the theories of statistics &amp; application of statistics.</li> <li>2. To provide details &amp; computations of different measures of Central tendency.</li> <li>3. Learn to compute different Averages.</li> </ol>		
<b>Learning Outcomes:</b>		
At the end of this module the learner will be able to		
<ol style="list-style-type: none"> <li>1. Recognize, describe, and calculate the measures of the central tendency of data: mean, median, mode, Geometric mean and Harmonic mean.</li> <li>2. Recognize, describe, and calculate the measures of location of data: quartiles, deciles and percentiles.</li> <li>3. Students knowing Merits, Demerits and uses of the Measures of Central tendency.</li> </ol>		
<b>1.1</b>	<ul style="list-style-type: none"> <li>• Concept of data</li> <li>• Types of data: Quantitative data and Qualitative data, Discrete data and continuous data</li> <li>• Types of scales: Nominal, Ordinal, Interval and Ratio</li> </ul>	<b>[1L]</b>
<b>1.2</b>	<ul style="list-style-type: none"> <li>• Concept about Measure of Central tendency</li> </ul>	<b>[2L]</b>



	<ul style="list-style-type: none"> <li>Measures of Central tendency: Mean {Arithmetic Mean (AM), Geometric Mean (GM), Harmonic mean (HM)}, Weighted mean Combined mean.</li> <li>Relations between A.M, G.M &amp; H.M</li> <li>Merits, demerits and uses of the above measures of central tendency</li> </ul>	
1.3	<ul style="list-style-type: none"> <li>Median: Definition, Merits, demerits and uses</li> <li>Mode : Definition, Merits, demerits and uses</li> </ul>	[2L]
1.4	Partition values : Quartiles, Deciles & Percentiles	[1L]
1.5	<ul style="list-style-type: none"> <li>Characteristics of an ideal measure of central tendency</li> <li>Limitations of measures of central tendency</li> </ul>	[1L]
1.6	Numerical Problems.	[3L]
<b>Module 2</b>	<b>Measures of Dispersion &amp; Moments, Skewness &amp; Kurtosis</b>	<b>[20L]</b>
<b>Learning Objective</b>		
<ol style="list-style-type: none"> <li>To introduce students to the Measures of Dispersion.</li> <li>Gain knowledge of Relative measure &amp; Absolute Measure.</li> <li>Comparison of two data set by using Coefficient of Variations.</li> <li>Describe the concepts of Moments and skewness;</li> <li>Explain the different measures of skewness;</li> <li>Describe the concepts of kurtosis;</li> <li>Explain the different measures of kurtosis;</li> <li>Explain how skewness and kurtosis describe the shape of a distribution.</li> </ol>		
<b>Learning Outcomes:</b>		
At the end of this module the learner will be able to		
<ol style="list-style-type: none"> <li>Know the limitation of measure of central tendency</li> <li>Recognize, describe, and calculate the measures of the dispersion of data: standard deviation, mean deviation about mean, quartile deviation and range.</li> <li>Know the complementary relationship of skewness with measures of central tendency and dispersion in describing a set of data.</li> <li>Understand 'moments' as a convenient and unifying method for summarizing several descriptive statistical measures</li> </ol>		
2.1	<ul style="list-style-type: none"> <li>Concept about Measure of Dispersion</li> <li>Characteristics of the ideal measures of dispersion.</li> </ul>	[2L]
2.2	<ul style="list-style-type: none"> <li>Relative &amp; Absolute measures of dispersion: {Range, Quartile deviation, Mean deviation, Standard Deviation}, Variance, Combined variance &amp; Coefficient of Variation (CV),</li> </ul>	[4L]



	<ul style="list-style-type: none"><li>• Merits &amp; demerits and uses of the above measures of dispersion</li></ul>	
2.3	Relationship between Quartile deviation, Mean deviation, Standard Deviation	[1L]
2.4	Moments: <ul style="list-style-type: none"><li>• Purpose of moments</li><li>• Raw moments, Central moments, Moments about arbitrary value and relation moments,</li><li>• Coefficients based on moments (<math>\beta_1, \beta_2, \gamma_1, \gamma_2</math>) and interpretation of various values of <math>\beta_1, \beta_2, \gamma_1, \gamma_2</math>.</li></ul>	[3L]
	Skewness: <ul style="list-style-type: none"><li>• Meaning of skewness,</li><li>• Types of skewness,</li><li>• Methods of determining skewness and the coefficient of skewness: (i) Karl Pearson's coefficient of skewness, (ii) Bowley's coefficient of skewness (iii) skewness based on the moments.</li></ul>	[3L]
	Kurtosis: <ul style="list-style-type: none"><li>• Types of Kurtosis curves,</li><li>• Measures of Kurtosis.</li></ul>	[1L]
2.5	Numerical Problems	[6L]

**References:**

1. A. M. Gun, M. K. Gupta & B. Dasgupta: Fundamentals of Statistics (Volume One) - World Press Private Ltd (1 August 2013)
2. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, 12/e, Sultan Chand and Sons;
3. Barbara Illowsky, Openstax, Susan Dean: Introductory Statistics - Open Stax Textbooks (23 March 2022)
4. Neil Weiss: Introductory Statistics - 10/e, Pearson;
5. Marvin E Johnson: Basic Statistics - Independently Published; Illustrated Edi. (11 July 2020)
6. Prem S. Mann: Introductory Statistics - 10/e, John Wiley & Sons Inc;
7. 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
Understand the concept of data.	X	X				
Demonstrate a understanding of the fundamental Concepts of Descriptive statistics, Including measures of Central tendency and measures of Dispersion.	X	X				
Summarize and organize Data effectively using appropriate descriptive statistics techniques.	X	X	X			
Interpret and analyze data sets accurately.				X	X	
Apply the appropriate descriptive statistics techniques for different types of data, Such as discrete variable & continuous variables.	X	X	X			
Calculate and interpret various partition values.	X	X	X			
Apply critical thinking and problem-Solving skills to datasets, effectively utilizing descriptive Statistics techniques to draw meaningful conclusions.		X	X	X		

### Question Paper Template

Unit	Remembering/ Knowledge (1)	Understanding (2)	Applying (3)	Analysing (4)	Evaluating (5)	Creating (6)	Total marks
I	25%	35%	30%	10%	-	-	100%
II	25%	35%	30%	10%	-	-	100%



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

COURSE TITLE: MINOR LAB COURSE (Statistics)

COURSE CODE: STMN-S1PR1-2CR24 [Credit- 02]

Course Learning Outcomes

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

1. Students will be able to draw the descriptive statistics for the data and interpret the data
2. Learn how to calculate measures of central tendency and measures of dispersion

**PRACTICAL Minor (STMN-S1PR1-2CR24) (Lab Course - Minor)**

- 1 Calculation of Arithmetic Mean, Geometric mean and Harmonic mean for the simple series, discrete frequency distribution & continuous frequency distribution
- 2 Calculation of Median for the simple series, discrete frequency distribution & continuous frequency distribution
- 3 Calculation of Mode for the simple series, discrete frequency distribution & continuous frequency distribution
- 4 Calculation of quartiles, deciles and percentiles for simple series, Discrete frequency distribution, Continuous frequency distribution.
- 5 Finding missing frequency for discrete frequency distribution & continuous frequency distribution
- 6 Calculation of Combine Mean and Weighted Mean
- 7 Calculation of range, relative measure of range, quartile deviation, coefficient of quartile deviation
- 8 Calculation of Mean deviation, coefficient of mean deviation
- 9 Calculation of variance & standard deviation
- 10 Comparison of two series with the use of coefficient of variation.
- 11 Calculation of Raw Moments, Central Moments and moments about arbitrary value,
- 12 Coefficient of skewness and Kurtosis for a simple series, discrete frequency distribution & continuous frequency distribution
- 13 Calculation of Karl Pearson's coefficient of skewness
- 14 Calculation of Bowley's coefficient of skewness.

Minimum number of experiments: 12



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

Multidisciplinary Course

COURSE TITLE: Elementary Calculus

COURSE CODE: MHMDC-S1P1-4CR25 [CREDITS - 04]

Course learning outcome		
<p>After the successful completion of the Course, the learner will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand Cartesian product of sets, real valued function and different types of functions.</li> <li>2. Understand the concept of limit and differentiability &amp; continuity of functions.</li> <li>3. Understand the concept of derivatives and solve examples of differentiation.</li> <li>4. Understand integration and solve finite &amp; definite integration by various method.</li> </ol>		
<b>Module 1</b>	<b>Real valued functions</b>	<b>[15L]</b>
<p><b>Learning objectives:</b></p> <p>The module is intended to</p> <ol style="list-style-type: none"> <li>1. Develop the basic idea of Cartesian product, ordered pairs and relation.</li> <li>2. Give knowledge of Real valued functions and different types of functions and its operations.</li> </ol>		
<p><b>Learning outcomes:</b></p> <p>After the successful completion of the module, the learner will be able to</p> <ol style="list-style-type: none"> <li>1. Understand Cartesian product of sets, real valued function and different types of functions</li> <li>2. Understand product and quotients of functions.</li> </ol>		
<b>1.1</b>	Ordered pairs, Cartesian product of sets. Number of elements in the Cartesian product of two finite sets. Cartesian product of the reals with itself (up to $R \times R \times R$ ).	[4L]
<b>1.2</b>	Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special kind of relation from one set to another	[3L]



1.3	Pictorial representation of a function, domain, co-domain and range of a function. Real valued functions, domain and range of these functions.	[3L]
1.4	constant, identity, polynomial, rational. Sum, difference, product and quotients of functions	[4L]
<b>Module 2</b>	<b>Limit and Continuity of function</b>	<b>[15L]</b>
<b>Learning objectives:</b> This module is intended to <ol style="list-style-type: none"><li>1. Give deep knowledge of Limit and Continuity of function</li><li>2. Enhance the skill of solving problems using rules of Limit.</li></ol>		
<b>Learning outcome:</b> After the successful completion of the module, the learner will be able to <ol style="list-style-type: none"><li>1. Understand the concept of limit and differentiability &amp; continuity of functions.</li></ol>		
2.1	Basic concept of a limit of a function, Rules of limits.	[5L]
2.2	Infinite limits and limits at infinity, Continuity and types of discontinuities.	[5L]
2.3	Differentiability of a function.	[5L]
<b>Module 3</b>	<b>Differentiation</b>	<b>[15L]</b>
<b>Learning objectives:</b> This module is intended to <ol style="list-style-type: none"><li>1. Develop the concept of differentiation of different types of functions.</li></ol>		
<b>Learning outcome:</b> After the successful completion of the module, the learner will be able to <ol style="list-style-type: none"><li>1. Understand the concept of derivatives and solve examples of differentiation.</li></ol>		
3.1	Derivative of composite functions, Chain rule, Derivatives of trigonometric functions.	[5L]
3.2	Derivative of implicit function, Concepts of exponential, Logarithmic functions	[5L]



3.3	Derivatives of $\log_e x$ and $e^x$ by definition of differentiation.	[5L]
<b>Module 4</b>	<b>Integration</b>	<b>[15L]</b>
<b>Learning objectives:</b> This module is intended to 1. Develop the concept of integration of different types of functions by various methods.		
<b>Learning outcome:</b> After the successful completion of the module, the learner will be able to 1. Understand integration and solve finite & definite integration by various method.		
4.1	Integration as an inverse process of differentiation, Definite integrals.	[5L]
4.2	Integration of some functions by substitution, integration by partial fractions	[5L]
4.3	Integration by parts, Finite integral.	[5L]

**References:**

1. Tom M. Apostol: Calculus, Volume I and II, 2/e, John Wiley & Sons Inc., New York.
2. Serge Lang: Basic Mathematics, 1/e, Addison -Wesley Publishing Company, 1971.
3. Shanti Narayan and Dr. P.K. Mittal: Differential Calculus, 35/e, S. Chand and Co. New Delhi, 2022
4. Jain and Iyengar: Advanced Engineering Mathematics, 4/e, Narosa Publishing House



### Mapping of COs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Understand Cartesian product of sets, real valued function and different types of functions.	X					
Understand the concept of limit and differentiability & continuity of functions.	X	X	X			
Understand the concept of derivatives and solve examples of differentiation.	X	X			X	
Understand integration and solve finite & definite integration by various method.	X		X		X	

### Question Paper Template

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



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

Multidisciplinary Course

COURSE TITLE: Fundamentals of Mathematics

COURSE CODE: MHMDC-S1P2-4CR25 [CREDITS - 04]

Course learning outcome		
<p>After the successful completion of the Course, the learner will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand various number including complex numbers and linear inequalities.</li> <li>2. Understand the concept of sets, principle mathematical induction and its application.</li> <li>3. Understand linear equations and solve equations of two variables by various methods.</li> <li>4. Understand the concept of co-ordinate geometry, graphical method to solve linear equations and concept of function including different type of functions.</li> </ol>		
<b>Module 1</b>	<b>Numbers</b>	<b>[15L]</b>
<p><b>Learning objectives:</b></p> <p>The module is intended to</p> <ol style="list-style-type: none"> <li>1. Develop the basic idea of different types of numbers including complex numbers.</li> </ol>		
<p><b>Learning outcomes:</b></p> <p>After the successful completion of the module, the learner will be able to</p> <ol style="list-style-type: none"> <li>1. Understand various number including complex numbers and linear inequalities.</li> </ol>		
<b>1.1</b>	Whole numbers, Integers, Fractions, Exponents and radicals.	[5L]
<b>1.2</b>	Complex Numbers, Arithmetic operations on complex numbers	[5L]
<b>1.3</b>	Absolute Value, Interval notation and linear inequalities.	[5L]
<b>Module 2</b>	<b>Sets</b>	<b>[15L]</b>
<p><b>Learning objectives:</b></p> <p>This module is intended to</p> <ol style="list-style-type: none"> <li>1. Give idea of sets, Mathematical inductions and its applications</li> </ol>		
<p><b>Learning outcome:</b></p>		



After the successful completion of the module, the learner will be able to		
2. Understand the concept of sets, principle mathematical induction and its application.		
2.1	Sets, Intervals, Boundedness of sets, Supremum and Infimum, and Countable and uncountable sets.	[5L]
2.2	Process of the proof by mathematical induction, application of the method by looking at natural numbers as the least inductive subset of real numbers	[5L]
2.3	The principle of mathematical induction (weak and strong) and simple applications.	[5L]
<b>Module 3</b>	<b>System of Linear equations</b>	<b>[15L]</b>
<p><b>Learning objectives:</b></p> <p>This module is intended to</p> <p>1. Give knowledge of fundamental of mathematics which gives idea of various methods to solve equations.</p>		
<p><b>Learning outcome:</b></p> <p>After the successful completion of the module, the learner will be able to</p> <p>1. Understand linear equations and solve equations of two variables by various methods.</p>		
3.1	Linear equation in two variables, Solution of simultaneous linear equations in two variables – Method of substitution.	[5L]
3.2	Cramer’s Rule, Elimination method, Cross multiplication	[5L]
3.3	Quadratic equations, methods to solve quadratic equations.	[5L]
<b>Module 4</b>	<b>Geometry and Functions</b>	<b>[15L]</b>
<p><b>Learning objectives:</b></p> <p>This module is intended to</p> <p>1. Develop understanding of geometry and various functions in Mathematics.</p>		
<p><b>Learning outcome:</b></p> <p>After the successful completion of the module, the learner will be able to</p>		



1. Understand the concept of co-ordinate geometry, graphical method to solve linear equations and concept of function including different type of functions.		
4.1	Coordinate plane, points, distance, midpoint, lines	[5L]
4.2	Graphical method to solve system of linear equation and linear inequalities.	[5L]
4.3	Introduction to functions, Polynomial functions, Graphs of functions, Exponential function, Logarithms.	[5L]

#### References:

1. Serge Lang: Basic Mathematics, 1/e, Addison -Wesley Publishing Company, 1971.
2. S.C. Malik and Savita Arora, Mathematical Analysis, 2/e, New Age International (P) Limited, New Delhi, India, 1994.
3. Colin McGregor, Jonathan Nimmo, Wilson Stothers: Fundamentals of University Mathematics, 3/e, Woodhead Publishing, 1994.
4. Sanjay Mishra : Fundamentals of Mathematics : Functions and Graphs, 2/e, Pearson, 2016.

#### Mapping of COs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Understand various number including complex numbers and linear inequalities.	X					
Understand the concept of sets, principle mathematical induction and its application.	X	X				
Understand linear equations and solve equations of two variables by various methods.	X	X			X	
Understand the concept of co-ordinate geometry, graphical method to solve linear equations and concept of function including different type of functions.	X		X			



### Question Paper Template

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



**F.Y.B.Sc. (Mathematics) SEMESTER I**

**Multidisciplinary Course**

**COURSE TITLE: Descriptive Statistics-I**

**COURSE CODE: MHMDC-S1P3-4CR25 [CREDITS - 04]**

<b>Course learning outcome</b>		
<p>At the end of this course, Students will be able to</p> <ol style="list-style-type: none"> <li>1. Distinguish between different types of data.</li> <li>2. Collect, classify and tabulate a given data and study graphical and diagrammatic representations through Bar diagrams, Pie diagram, Histogram, Frequency polygon</li> <li>3. Understand measures of central tendency, viz., Mean, Median, Mode etc.</li> <li>4. Workout simple problems in discrete and continuous series.</li> <li>5. Draw meaningful conclusions from a set of data.</li> <li>6. Analyze measures of dispersion namely range, quartile deviation, standard deviation and co-efficient of variation for individual, discrete and continuous type data.</li> </ol>		
<b>Module 1</b>	<b>Collection, Classification and Tabulation of data</b>	<b>[12L]</b>
<p><b>Learning Objective</b></p> <ol style="list-style-type: none"> <li>1. Students will understand the meaning and purpose of data collection.</li> <li>2. Students will learn about classification of data for further statistical analysis</li> <li>3. Students will learn about tabulation of the data.</li> </ol>		
<p><b>Learning Outcomes:</b></p> <p>At the end of this module the learner will be able to</p> <ol style="list-style-type: none"> <li>1. Identify the types of data.</li> <li>2. Collect, classify and tabulate a given data</li> </ol>		
<b>1.1</b>	<p>➤ Concept and Types of Data:</p> <ul style="list-style-type: none"> <li>▪ Qualitative and quantitative data, Discrete and continuous data,</li> <li>▪ Level of measurements of data</li> </ul>	<b>[02L]</b>
<b>1.2</b>	<p>➤ Collection of data:</p> <ul style="list-style-type: none"> <li>▪ Primary data and Secondary data</li> </ul>	<b>[02L]</b>
<b>1.3</b>	<p>➤ Classification of data:</p> <ul style="list-style-type: none"> <li>▪ Meaning, and Types of classification,</li> </ul>	<b>[01L]</b>



1.4	<p>➤ Tabulation of data:</p> <ul style="list-style-type: none"><li>▪ Meaning and Types of tables,</li><li>▪ Univariate frequency distribution: Discrete and continuous frequency distribution, Cumulative frequency distribution,</li><li>▪ Bivariate frequency distribution: Discrete and continuous bivariate frequency distribution, marginal and conditional frequency distribution.</li></ul>	[07L]
<b>Module 2 Diagrammatic and graphic presentation of data</b>		<b>[14L]</b>
<b>Learning Objective</b> <ol style="list-style-type: none"><li>1. Learn importance of diagrammatic presentation of data.</li><li>2. Construct and interpret different types of diagrams and graphs.</li></ol>		
<b>Learning Outcomes:</b> <p>At the end of this module the learner will be able to</p> <ol style="list-style-type: none"><li>1. Learn how to visualize data.</li></ol>		
2.1	<p>➤ Diagrams:</p> <ul style="list-style-type: none"><li>▪ Introduction and Types of diagrams:<ul style="list-style-type: none"><li>○ Line diagrams, Bar diagrams (simple, multiple, sub-divided and percentage-divided), Box plot and Pie diagram</li></ul></li></ul>	[08L]
2.2	<p>➤ Graphs:</p> <ul style="list-style-type: none"><li>▪ Introduction of Graphs:</li><li>▪ Graphs of frequency distributions: Histogram, Frequency polygon, Frequency curve, Cumulative frequency polygon, Cumulative frequency curve.</li></ul>	[06L]
<b>Module 3 Measures of central tendency</b>		<b>[16L]</b>
<b>Learning Objective</b> <ol style="list-style-type: none"><li>1. To provide details &amp; computations of different measures of Central tendency.</li><li>2. Distinguish between different types of averages.</li></ol>		
<b>Learning Outcomes:</b> <p>At the end of this module the learner will be able to</p> <ol style="list-style-type: none"><li>1. Understand measures of central tendency, viz., Mean, Median and Mode in series of individual observations and Discrete or Continuous series.</li><li>2. Recognize, describe, and calculate the measures of location of data: quartiles and percentiles.</li><li>3. Draw meaningful conclusions from a set of data.</li></ol>		
3.1	<p>➤ Concept of measures of central tendency, Requisites of good measures of central tendency</p>	[02L]
3.2	<p>➤ Measures of central tendency: Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, and Mode</p>	[08L]
3.3	<p>➤ Partition values: Quartiles and Percentiles</p>	[04L]



3.4	➤ Empirical relationship between mean, median and mode.	[02L]
<b>Module 4</b>	<b>Measures of Dispersion and moments</b>	<b>[18L]</b>
<b>Learning Objective</b> 1. Understand various types of measures of dispersion 2. Differentiate between absolute and relative measures. 3. Learn to calculate different measure of dispersion.		
<b>Learning Outcomes:</b> At the end of this module the learner will be able to 1. Understand the limitations of average and so that uses of various measures of dispersion for analysis of data; 2. Draw meaningful conclusions from a set of data.		
4.1	➤ Meaning of dispersion, Significance of measuring variation	[02L]
4.2	➤ Characteristic of an ideal measure of dispersion. ➤ Absolute and relative measures of dispersion: Range, Quartile deviation, Standard deviation ➤ Variance and Coefficient of variation	[12L]
4.3	➤ Moments: Raw moments, Central moments, ➤ Relations of above moments (without proof)	[04L]

**References:**

2. A. M. Gun, M. K. Gupta & B. Dasgupta: Fundamentals of Statistics (Volume One) - World Press Private Ltd (1 August 2013)
3. Barbara Illowsky, Openstax, Susan Dean: Introductory Statistics - Open Stax Textbooks (23 March 2022)
4. Neil Weiss: Introductory Statistics - 10/e, Pearson;
5. Marvin E Johnson: Basic Statistics - Independently Published; Illustrated Edi. (11 July 2020)
6. Prem S. Mann: Introductory Statistics - 10/e, John Wiley & Sons Inc;
7. Roxy Peck, Chris Olsen, Jay L. Devore: Introduction to Statistics and Data Analysis - 5/e, Cengage Learning.
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
Distinguish between different types of data.		X				
Collect, classify and tabulate a given data and study graphical and diagrammatic representations through Bar diagrams, Pie diagram, Histogram, Frequency polygon	X			X		X
Understand measures of central tendency, viz., Mean, Median, Mode etc.	X	X	X			X
Analyses measures of dispersion namely range, quartile deviation, standard deviation and co-efficient of variation for individual, discrete and continuous type data.			X		X	X
Workout simple problems in discrete and continuous series.	X			X	X	X
Draw meaningful conclusions from a set of data.	X				X	X

### Question Paper Template

Unit	Remembering/ Knowledge (1)	Understanding (2)	Applying (3)	Analysing (4)	Evaluating (5)	Creating (6)	Total marks
I	40%	45%	-	-	-	15%	100%
II	30%	40%	-	-	-	30%	100%
III	25%	35%	30%	10%	-	-	100%
IV	25%	35%	30%	10%	-	-	100%



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

Skill Enhancement Course- I

COURSE TITLE: Fundamentals of Vedic Mathematics- I

COURSE CODE: MHSEC-S1PR1-2CR25 [CREDITS - 02]

**Course learning outcome**

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

1. Apply Vedic Mathematics techniques to perform rapid and accurate calculation practically.
2. Demonstrate computational skills in the government competitive examinations and correlate their mathematical concepts through practical.
3. Develop the understanding of objectives and features of Vedic maths and understand the historical and cultural significance of Vedic Mathematics and recognize the meaning of mathematical sutras in Sanskrit.
4. Understand the concept of addition, multiplication and subtraction using completing the whole and from left to right calculation and solve arithmetic problems using Vedic sutras for addition, multiplication and subtraction.
5. Compute superfast subtraction and general subtraction, subtraction by starting complements in the middle of the sum and by leaving complements in the middle of the sum using vedic sutra.
6. Manage to solve the multiplication using vertically and crosswise, moving multiplier method and obtain the algebraic product of two binomials.
7. Demonstrate multiplication by 11, 12 and multiplication of numbers consisting of all 9s by using Vedic sutras of multiplication.
8. Understand and obtain multiplication of numbers nearest to the base 10, 100, 1000 and 10000 etc and also multiplication of numbers with sub base 50, 500, 5000 etc.

**PRACTICAL (MHSEC-S2PR1-2CR24) (Lab Course - SEC)**

**[60L]**

1. Practical based approach of objectives and features of Vedic mathematics and recognize the meaning of mathematical sutras and subsutras in Sanskrit.
2. Problems based on High speed addition by using the concept of computing the whole and from left to right calculation: Addition, multiplication and subtraction.
3. Process to calculate superfast subtraction by Nikhilam Navatascharamam Dashatah Sutra from basis 100, 1000, 10000 through various approaches.
4. Calculation of general subtraction by Nikhilam Navatascharamam Dashatah Sutra.
5. Calculation of subtraction by starting complements in the middle of the sum by Nikhilam Navatascharamam Dashatah Sutra.



6. Calculation of subtraction by leaving complements in the middle of the sum by Nikhilam Sutram.
7. Problem based on General multiplication of two figure numbers by another two figure numbers by using Urdhvatiryagbhyam Sutra.
8. Problem based on General multiplication of three figure numbers by another three figure numbers by using Urdhvatiryagbhyam Sutra.
9. Problem based on General multiplication of four figure numbers by another four figure numbers by using Urdhvatiryagbhyam Sutra.
10. Examples based on moving multiplier method and obtain the algebraic product of two binomials.
11. Examples based on multiplication by writing left to right sums and right to left sums.
12. Problems based on multiplication by specific number such as 11 by Antyayoreva sutra.
13. Problems based on multiplication by specific number such as 12 by Sopantyadvayamantyam sutra.
14. Problems based on multiplication of numbers consisting of all 9s using Ekanyunena Purvena and Nikhilam Navatascharamam Dashatah sutra.
15. Problems based on Multiplication of numbers nearest to the base 10,100,1000 and 10000 etc.
16. Problems based on Multiplication of numbers with sub base 50, 500, 5000.

#### References:

1. Sri Bharatikrishna Tirthaji: Vedic Mathematics, 17/e, Published by Motilal Banarsidass, 1965.
2. Vedic Mathematics: Sixteen Simple Mathematical formulae from the Vedas, Jagadguru Swami Sri Bharati Krishna Trithaji, Motilal Banarasidas, New Delhi 2015.
3. Williams K.R.: Discover Vedic Mathematics, Vedic Mathematics Research Group, 1984. (Revised edition)
4. Williams K.R. and M. Gaskell: The Cosmic Calculator, 1/e, Motilal Banarsidass, 2002. (Revised 2005)
5. Nicholas A. P., Williams, J. Pickles: Vertically and Crosswise, 2/e, Inspiration books, 1984.
6. Kenneth R. Williams: Vedic Mathematics- Teacher's manual. (Elementary and Advanced level), 1/e, Inspiration books, 2002, (Revised 2009).
7. Vandana Singhal: Vedic Mathematics for all ages-A beginner's guide, 2/e, Motilal Banarsidass Publishers, 2014.
8. The Essential of Vedic Mathematics, Rajeshkumar Thakur, Rupa



publications, New Delhi, 2019.

9. Learn Vedic Speed Mathematics Systematically, Chaitnaya A. Patil 2018.

10. Enjoy Vedic Mathematics, S M Chauthaiwale, R Kollaru, The Art of Living, Bangalore.

### Mapping of COs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Apply Vedic Mathematics techniques to perform rapid and accurate calculation practically.	X	X	X	X	X	
Demonstrate computational skills in the government competitive examinations and correlate their mathematical concepts through practical.	X	X	X	X	X	
Develop the understanding of objectives and features of Vedic maths and understand the historical and cultural significance of Vedic Mathematics and recognize the meaning of mathematical sutras in Sanskrit.	X	X	X		X	
Understand the concept of addition, multiplication and subtraction using completing the whole and from left to right calculation and solve arithmetic problems using Vedic sutras for addition, multiplication and subtraction.	X	X	X	X	X	
Compute superfast subtraction and general subtraction, subtraction by starting complements in the middle of the sum and by leaving complements in the middle of the sum using vedic sutra.	X	X	X		X	X
Manage to solve the multiplication using vertically and crosswise, moving multiplier method and obtain the algebraic product of two binomials.	X	X	X	X		X
Demonstrate multiplication by 11, 12 and multiplication of numbers consisting of all 9s by using Vedic sutras of multiplication.	X	X	X		X	X
Understand and obtain multiplication of numbers nearest to the base 10, 100, 1000 and 10000 etc and also multiplication of numbers with sub base 50, 500, 5000 etc.	X	X	X		X	X



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

Skill Enhancement Course- I

COURSE TITLE: Coordinate Geometry- I

COURSE CODE: MHSEC-S1PR2-2CR24 [CREDITS - 02]

**Course learning outcome**

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

1. Understand the principles of cartesian coordinates and their applications.
2. Analyse and manipulate equations of straight lines and circles along with practical approach.
3. Explore the properties and equations of conic sections.
4. Solve real-world problems using coordinate geometry methods.
5. Develop and enhance the concept of coordinate geometry relevant to real world applications.
6. Understand the basic concept of pairs of straight lines and able to apply it practically.
9. Understand concept of circle and conics along with some basic common results and with some standard equations.

**PRACTICAL (MHSEC-S2PR2-2CR24) (Lab Course - SEC)**

**[60L]**

1. Problems based on rectangular cartesian coordinates, division formula and area of a triangle.
2. Obtain rectangular Cartesian equations of a straight line.
3. Calculation of intersecting straight lines and angle between straight lines.
4. Find the length of perpendicular from a point to a line.
5. Problems based on Cartesian Coordinates in three dimensions.
6. Problems based on Product of two vectors.
7. Examples based on direction cosines of a line.
8. Obtain angle between a pair of straight lines and point of intersection for general second degree equation in x and y.
9. Examples based on equation of bisectors of angle between lines  $ax^2 + 2hxy + by^2 = 0$  and equation of pair of lines joining origin to points of intersection of a curve and a line.
10. Obtain equation of a circle in rectangular Cartesian coordinates, given centre and Radius.
11. Examples based on Standard equations of Parabola, Ellipse and Hyperbola.
12. Examples based on circles and conics.
13. Problems based on general second degree equation represent a conic.
14. Problems based on equations of tangents, normals and chords of contact for circles and conics.
15. Problems based on pairs of tangents for circles and conics.
16. Obtain equation of tangent at a point and normal at a point.



**References:**

1. S.L. Loney: Coordinate Geometry, 13/e, Arihant Prakashan, 2017.
2. Henry Burchard Fine & Henry Dallas Thompson: Coordinate Geometry, The Macmillan Comp., N.Y., Edition 1911.
3. P. R. Vittal: Analytical Geometry 2D & 3D, 1/e, Pearson, 2013.
4. S.K. Sharma: Introduction to Coordinate Geometry
5. R. S. Aggarwal: Coordinate Geometry, S. Chand Publishers.
6. Mishra Sanjay: Fundamentals of Mathematics- Coordinate Geometry, 2/e, Pearson, 2015.

**Mapping of COs and PSOs**

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Understand the principles of cartesian coordinates and their applications.	X	X	X		X	
Analyse and manipulate equations of straight lines and circles along with practical approach.	X	X	X		X	
Explore the properties and equations of conic sections.	X	X	X		X	
Solve real-world problems using coordinate geometry methods.	X	X	X	X	X	
Develop and enhance the concept of coordinate geometry relevant to real world applications.	X	X	X	X	X	
Understand the basic concept of pairs of straight lines and able to apply it practically.	X	X	X	X	X	
Understand concept of circle and conics along with some basic common results and with some standard equations.	X	X	X	X	X	



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

Skill Enhancement Course- I

COURSE TITLE: Basic Mathematics- I

COURSE CODE: MHSEC-S2PR3-2CR24 [CREDITS - 02]

**Course learning outcome**

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

1. Study basic about mathematics to explore concepts and basic mathematics in terms of practical approach.
2. Develop and enhanced mathematical skills with practical problems after studying mathematical fundamental concepts.
3. Equip themselves with essential mathematical knowledge and skills, promote problem-solving abilities, demonstrate real-life applications and enhance their employability in the academic field.
4. Develop and enhance mathematical logic relevant to real world applications.
5. Understand the basic concept of sets and relations and able to apply it practically.
6. Understand concept of Boolean algebra and principle of mathematical induction.
10. Understand the concept of matrices and determinant and some special types of matrices and operations on matrices along with Cramer's rule.

**PRACTICAL (MHSEC-S2PR3-2CR24) (Lab Course - SEC)**

**[60L]**

1. Problems based on logic, Statement and Connectives.
2. Problems based on Truth values, truth tables, Equivalent statements and connectives " $\Rightarrow$ " and " $\Leftrightarrow$ ".
3. Examples based on Tautology and contradiction, Algebra of statements Deductive reasoning, Arguments.
4. Examples based on Joint denial, compound statements and applications to switching circuits problems.
5. Examples based on set theory, operations with sets and their properties.
6. Problems based on Algebra of sets and Venn diagrams.
7. Problems based on applications of set theory.
8. Obtain Cartesian product of two sets and examples based on types and properties of relations.
9. Problems based on Binary composition and Boolean algebras.
10. Examples based on principle of mathematical induction.
11. Problems based on different types of matrices, Algebra of matrices.
12. Obtain multiplication of matrices and transpose of a matrix.
13. Calculate elementary matrices and obtain reduction of a matrix to echelon form.
14. Problems based on system of linear equations and obtain inverse of a matrix.
15. Obtain determinant of order two, three, four and problem based on properties of determinants.
16. Obtain multiplications of two determinants, minors, cofactors and problems based on Cramer's rule for solution of linear equations.



**References:**

1. Serge Lang: Basic Mathematics, 1/e, Springer Nature B.V., US, 1998.
2. Behnke H. & at al: Fundamental of Mathematics-Volume-1, The MIT Press Cambridge. 1986. (Third Printing)
3. Sanjay Mishra: Fundamentals of Mathematics: Functions and Graphs, 2/e, Pearson, 2016.
4. Qazi Zameeruddin, V. K. Khanna and S.K. Bhambri: Business Mathematics, 2/e, Vikas Publishing House Pvt. Ltd., 2006.

**Mapping of COs and PSOs**

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Study basic about mathematics to explore concepts and basic mathematics in the terms of practical approach.	X	X	X		X	
Develop and enhanced mathematical skills with practical problems after studying mathematical fundamental concepts.	X	X	X	X	X	
Equip themselves with essential mathematical knowledge and skills, promote problem-solving abilities, demonstrate real-life applications and enhance their employability in the academic field.	X	X	X	X	X	
Develop and enhance mathematical logic relevant to real world applications.	X	X	X	X	X	
Understand the basic concept of sets and relations and able to apply it practically.	X	X	X	X	X	
Understand concept of Boolean algebra and principle of mathematical induction.	X	X	X	X	X	
Understand the concept of matrices and determinant and some special types of matrices and operations on matrices along with Cramer's rule.	X	X	X	X	X	