



**S.S. JAIN SUBODH P.G. COLLEGE**  
**RAM BAGH CIRCLE, JAIPUR-302004**

**SYLLABUS**

**Three/Four Years Bachelor of Arts/Science/Commerce**  
**Multidisciplinary Courses**  
**Mathematics**

**EXAMINATION 2025-2026 AND ONWARDS**

<b>Name of University</b>	<b>S.S. Jain Subodh P.G. College</b>
<b>Name of Faculty</b>	<b>Arts/Science/Commerce</b>
<b>Name of Discipline</b>	<b>Mathematics</b>
<b>Type of Discipline</b>	<b>Multidisciplinary Courses</b>
<b>Offered to Non-Collegiate Students</b>	<b>Yes</b>

<b>Three/Four Years Bachler of Arts/Science</b>								
				<b>Mathematics</b>	<b>Credits</b>			
<b>#</b>	<b>L e v e l</b>	<b>Se me ster</b>	<b>Type</b>	<b>Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
<b>1.</b>	<b>6</b>	<b>III</b>	<b>MDC</b>	<b>ELEMENTS OF MATHEMATICS</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>2.</b>	<b>6</b>	<b>IV</b>	<b>MDC</b>	<b>PRELIMINARY MATHEMATICS</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>3.</b>	<b>7</b>	<b>V</b>	<b>MDC</b>	<b>INTRODUCTION OF CALCULUS</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

## **Examination Scheme for MDC**

70% weightage for End of Semester Exam (EoSE) and 30% weightage of Continuous Internal Assessment (CIA)

### **Passing Marks:**

40% marks in each paper/ subject including sessional/ CIA and EoSE put together.

### **Question Paper Pattern**

**Total Marks: 100**

**CIA Max Marks: 30**

**EoSE Max. Marks: 70**

The question paper (EoSE) will consist of two parts A & B.

### **Part A- 14Marks**

Part A is compulsory comprises 10 very short answer-type questions (with a limit of 20 words) of two marks each and candidate can attempt any seven questions.

### **Part B- 56 Marks**

Part B of the question paper shall be divided into four units comprising question number 2-5. There will be one question from each unit with internal choice. Each Question Carries will carry 14 Marks.

## **B.Sc. Semester III**

### **ELEMENTS OF MATHEMATICS**

**1 Credit – 25 Marks**

**4 Credit- 100 Marks**

**Question Paper: 70 Marks**

**Internal Assessment: 30 Marks**

**Objectives of the Course:** The objective of the course is to mastering the fundamental concepts in each topic area, with an emphasis on understanding, application, and problem-solving.

**Prerequisites:** Mathematics courses of X Std. of Central Board of Secondary Education or equivalent.

**Course Learning Outcomes:** The course will enable the students to:

- Understand the definition of complex numbers and distinguish between real and imaginary parts, sequences, and series.
- Apply the fundamental principle of counting, permutations, and combinations.
- Understand and apply the Binomial Theorem and properties of binomial coefficients.
- Understand and apply properties of matrices and determinants, and solve linear equation systems using a matrix's inverse.
- Understand the cartesian system and analyze parallel and perpendicular lines, intercepts of a line, and angles between two lines.

These outcomes will equip students with a comprehensive understanding of each topic and the ability to solve related mathematical problems effectively.

#### **Mark distribution in question paper:**

The question paper (EoSE) will consist of two parts A & B.

#### **Part A- 14Marks**

Part A is compulsory comprises 10 very short answer-type questions (with a limit of 20 words) of two marks each and candidate can attempt any seven questions.

#### **Part B- 56 Marks**

Part B of the question paper shall be divided into four units comprising question number 2-5. There will be one question from each unit with internal choice. Each Question Carries will carry 14 Marks.

## UNIT-I

**Sets:** Empty set, Finite and Infinite sets, Equal sets, Subsets, Subsets of a set of real numbers especially intervals (with notations). Universal set. Venn diagrams. Union and Intersection of sets. Difference of sets. Complement of a set. Properties of Complement.

## UNIT-II

**Relations & Functions:** Cartesian product of sets. Number of elements in the Cartesian product of two finite sets. Cartesian product of the set of reals with itself. Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special type of relation. Pictorial representation of a function, domain, co-domain and range of a function. Real valued functions, domain and range of these functions, constant, identity, polynomial, rational, modulus, exponential, logarithmic and greatest integer functions, with their graphs. Sum, difference, product and quotients of functions.

## UNIT-III

**Complex Numbers:** Definition, real and imaginary parts, complex conjugate, representation of a complex number in a plane, modulus and argument of a complex number, algebra of complex numbers, cube root of unity.

## UNIT-IV

**Permutation and Combination:** Fundamental principle of counting, factorial notation, permutation mean of  $P(n,r)$ , and combination mean of  $C(n,r)$ . Applications of permutation and combination.

### **Suggested Books and References –**

1. Higher Algebra, Hall & Knight, Arihant Publications India Limited, 2019.
2. An Introduction to the Theory of Numbers, Ivan Niven, Herbert S. Zuckerman, Hugh
3. L. Montgomery, 2008.
4. Complex Variables and Applications, James Brown and Ruel Churchill, Mc Graw Hill, 2021
5. Introduction to Probability and Statistics for Engineers and Scientists, Sheldon M. Ross, Elsevier Science Publishing Co Inc, 2014
6. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2012.

## **B.Sc. Semester IV**

### **PRELIMINARY MATHEMATICS**

**1 Credit – 25 Marks**

**4 Credit- 100 Marks**

**Question Paper: 70 Marks**

**Internal Assessment: 30 Marks**

**Objectives of the Course:** The objective of the course is to gain a solid foundation in the key areas of mathematics and enables to apply these concepts to theoretical and practical problems.

**Prerequisites:** Mathematics courses of X Std. of Central Board of Secondary Education or equivalent.

**Course Learning Outcomes:** The course will enable the students to:

- Understand the basic concepts of sets, relations, functions, and induction.
- Understand mathematical logic and logical operations in various fields.
- Understand the notion of order and maps between partially ordered sets.
- Minimize a Boolean polynomial and apply Boolean algebra techniques to decode switching circuits. Learn modeling of real-world problems by graphs.

#### **Mark distribution in question paper:**

The question paper (EoSE) will consist of two parts A & B.

#### **Part A- 14Marks**

Part A is compulsory comprises 10 very short answer-type questions (with a limit of 20 words) of two marks each and candidate can attempt any seven questions.

#### **Part B- 56 Marks**

Part B of the question paper shall be divided into four units comprising question number 2-5. There will be one question from each unit with internal choice. Each Question Carries will carry 14 Marks.

### **UNIT-I**

**Binomial Theorem:** Statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, simple applications.

**Sequences and Series:** Sequence and series (finite and infinite),  $n^{\text{th}}$  term, arithmetical progression (A.P.), sum of  $n$  terms of an A.P., arithmetic mean (G.M.), Geometric progression (G.P.), sum of  $n$  terms and infinite terms of a G.P., Geometric mean (G.M.), Harmonic progression (H.P.), Harmonic mean (H.M.), relation between A.M., G.M. and H.M.

## UNIT-II

**Two-Dimensional Co-ordinate Geometry:** Cartesian coordinate system, distance, and section formula, condition for collinearity of three points in a plane, equation of a straight-line slope form, intercept form, general form, parallel and perpendicular line, intercept of a line, the angle between two lines, distance of a point from a line.

## UNIT-III

**Statistics and Probability:** Range, Mean deviation, variance and standard deviation of ungrouped/grouped data. Events; occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events. Probability of an event, probability of 'not', 'and' and 'or' events.

## UNIT-IV

**Matrices and Determinants:** Concept of a matrix, Types of matrices, Transpose and adjoint of a matrix, addition, and multiplication of matrices, rank of matrix, elementary row, and column transformations, the inverse of a matrix, solutions of linear equations in two or three variables using the inverse of a matrix, Determinants of a square matrix, properties of determinates.

### Suggested Books and References –

1. Higher Algebra, Hall & Knight, Arihant Publications India Limited, 2019.
2. The elements of coordinate geometry, S. L. Loney, London: Macmillan and Co., 1896.
3. Introduction to Probability and Statistics, William Mendenhall, Robert J. Beaver, and Barbara M. Beaver: Brooks/Cole Cengage Learning, 2012
4. Matrix Algebra, James E. Gentle, Springer, 2007
5. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2012.

## **B.Sc. Semester V**

### **INTRODUCTION OF CALCULUS**

**1 Credit – 25 Marks**

**4 Credit- 100 Marks**

**Question Paper: 70 Marks**

**Internal Assessment: 30 Marks**

**Objectives of the Course:** The objective of the course is to gain a solid foundation in the key areas of mathematics and enables to apply these concepts to theoretical and practical problems.

**Prerequisites:** Mathematics courses of X Std. of Central Board of Secondary Education or equivalent.

**Course Learning Outcomes:** The course will enable the students to:

- Understand and define limits and the concept of rate of change and apply the concept of limits to various functions and scenarios.
- Understand the concept of derivatives of polynomial and trigonometric functions.
- Understand and apply rules for differentiation.
- Understand the concept of integration as the inverse process of differentiation.
- Understand the concept of vectors.

#### **Mark distribution in question paper:**

The question paper (EoSE) will consist of two parts A & B.

#### **Part A- 14Marks**

Part A is compulsory comprises 10 very short answer-type questions (with a limit of 20 words) of two marks each and candidate can attempt any seven questions.

#### **Part B- 56 Marks**

Part B of the question paper shall be divided into four units comprising question number 2-5. There will be one question from each unit with internal choice. Each Question Carries will carry 14 Marks.



## UNIT-I

**Limits and Derivatives:** Derivative introduced as rate of change both as that of distance function and geometrically. Intuitive idea of limit. Limits of polynomials and rational functions trigonometric, exponential and logarithmic functions. Definition of derivative relate it to slope of tangent of the curve, derivative of sum, difference, product and quotient of functions. Derivatives of polynomial and trigonometric functions.

## UNIT-II

**Integration:** integral as the converse of differentiation, indefinite integral, integration by substitution, integration of the product of two functions, definite integrals, properties and problems, substitution in definite integrals, Basic properties of definite integrals and evaluation of definite integrals.

## UNIT-III

**Differential Equations:** Definition, order and degree, general and particular solutions of a differential equation. Solution of differential equations by method of separation of variables, solutions of homogeneous differential equations of first order and first degree.

## UNIT-IV

**Vectors:** Vectors and scalars, magnitude and direction of a vector. Direction cosines and direction ratios of a vector. Types of vectors (equal, unit, zero, parallel and collinear vectors), addition of vectors, multiplication of a vector by a scalar, scalar (dot) product of vectors, vector (cross) product of vectors.

### **Suggested Books and References –**

1. Calculus, Thomas and Finny, Pearson Education Asia, 1999
2. Advanced Engineering Mathematics, H.K. Dass, S. Chand and Company Ltd., New Delhi, 2009.
3. Differential Calculus, Shanti Narayan, S. Chand Limited, 2005.
4. Schaum's Outline of Calculus, 6th Edition, Frank Ayres, Jr., Elliott Mendelson, The McGraw-Hill Companies, 2013.
5. Calculus: A Complete Course, Robert A. Adams, Christopher Essex, Pearson Canada, 2009