

As per the NEP 2020
Mathematics
(Minor Syllabus)
(Effective from Academic Year 2024-2025 onwards)



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Semester	Course Code	Course Title	Contact Hrs per Week			Credits	Weightage (%)		
			L	T	P		CWS	MTE	EFE
I	24BMS5101M	Elementary Mathematics	2	0	0	2	10	20	70
II	24BMS5201M	Foundations of Set Theory And Mathematical Functions	2	0	0	2	10	20	70
III	24BMS6301M	Basic Calculus	4	0	0	4	10	20	70
IV	24BMS6401M	Basic Statistics And Probability	4	0	0	4	10	20	70
V	24BMT7501M	Basic Vector Algebra and Integration	4	0	0	4	10	20	70
VI	24BMT7601M	Elementary Algebra and Coordinate Geometry	4	0	0	4	10	20	70
VI	24BMT7602M	Elementary Complex Algebra and 3D Geometry	4	0	0	4	10	20	70

Semester – I

Learning Objectives

The learning objectives of this course are:

- understand basic mathematical concepts, including matrices and their applications.
- learn to solve quadratic equations using various methods.
- develop skills to analyze the relationships between straight lines, including parallelism and perpendicularity.
- apply determinants to solve practical problems in areas like systems of equations.

Learning Outcomes

The learning outcomes of this course are:

- students will be able to perform matrix operations and understand their significance.
- students will confidently solve quadratic equations using factorization and the quadratic formula.
- students will be able to graph straight lines using various forms of equations.
- students will use determinants to analyze and solve systems of linear equations

Course Title:	Elementary Mathematics	Course Code: 24BMS5101M
Total Lecture hour 30		Hours
Unit I	Matrices: Definition, types of matrices, operations on matrices: addition, subtraction and multiplication of matrices transpose of a matrix and its properties, trace of Matrices and its properties.	9
Unit II	Determinants: Definition, Minors and Cofactors, Properties of determinants, Area of a Triangle, Adjoint and the inverse of a Matrix, Solution of system of equation.	7
Unit III	Quadratic equation, Solution of quadratic equation: factorization method and Shridharacharya's formula, Nature of roots, formation of quadratic equation from given roots	9
Unit IV	Coordinate geometry: Cartesian coordinate system, locus, Equation of straight line: Intercept form, Slope intercept form, point-slope form, two-points	5

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	form, condition for parallel and perpendicular lines.	
Suggestive Readings:		
1	"Mathematics for Class XI and XII" by R. D. Sharma	
2	"Higher Algebra" by Hall and Knight (Indian Edition)	
3	"Advanced Engineering Mathematics" by Erwin Kreyszig	

Semester – II**Learning Objectives**

The learning objectives of this course are:

- Understand the basic concepts of sets and functions.
- Learn to identify and categorize different types of sets and relations.
- Apply operations on sets and functions to solve practical problems.
- Explore the importance of set theory and functions in different areas

Learning Outcomes

The learning outcomes of this course are:

- Students will be able to define and use basic set terminology and notation.
- Students will confidently perform operations on sets and understand their practical applications.
- Students will analyze relationships between variables using functions
- Students will appreciate the applications of set theory and functions in real-world situations.

Course Title:	Foundations of Set Theory And Mathematical Functions	Course Code: 24BMSS201M
Total Lecture hour 30		Hours
Unit I	Sets: Definition, Types of sets, subsets, cardinality of sets, operations on sets: Union, intersection, complement of sets, set difference; venn diagram and demorgan law, Inclusion-Exclusion principle	8
Unit II	Relations: Cartesian product of sets, Definition of relation, properties of relations: Reflexive Relation Symmetric Relation Transitive Relation, antisymmetric Relation, Equivalence Relation	8
Unit III	Functions: Definition, domain range, Types Of Functions: constant, identity, polynomial, exponential, logarithmic, trigonometric, modulus, greatest integer functions with their graphs.	7
Unit IV	One-One and Onto Function, bijection, composition of functions, inverse function. binary operations, types of binary operations	7
Suggestive Readings:		
1	"Mathematics for Class XI and XII" by R. D. Sharma	
2	"Fundamentals of Mathematics" by S. K. Singh	
3	"Elements of Set Theory" by Herbert B. Enderton	

Semester - III**Learning Objectives**

The learning objectives of this course are:

- Understand basic concepts of limits and continuity in real-life contexts.
- Learn to differentiate simple functions and interpret their meanings.
- Apply calculus to find maximum and minimum values in practical situations.
- Explore real-world applications of derivatives in fields like economics and engineering etc.

Learning Outcomes

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By the end of this course, the students will be able to:

- Students will be able to evaluate limits and understand their significance.
- Students will confidently calculate derivatives of basic functions.
- Students will identify and apply maximum and minimum principles in practical examples.
- Students will relate calculus concepts to real-life scenarios in various disciplines.

Course Title:	Basic Calculus	Course Code: 24BMS6301M
Total Lecture Hours 60		Hours
Unit I	Limits: Definition, properties of limits, Some important limits, evaluation of limits. L'Hospital's Rule. Continuity: Continuity at a point, Continuity in open interval (a, b), Continuity in closed interval [a, b]	14
Unit II	Differentiability: Definition of derivative, derivatives of some standard functions, differentiation of product and quotient of two functions, chain rule.	14
Unit III	Application of derivatives: Tangent, normal, rate of change, increasing and decreasing functions, Maxima and Minima of Functions of one Variable	16
Unit IV	Partial differentiation: Definition and concept of partial derivatives, Chain Rules for One or Two Independent Variables, Euler theorem on homogeneous functions	16
Suggestive Readings:		
1	"Higher Engineering Mathematics" by B. S. Grewal	
2	"Calculus" by S. C. Gupta and S. Kumar	
3	"Calculus: Early Transcendentals" by James Stewart	

Semester – IV

Learning Objectives

The learning objectives of this course are:

- Understand basic concepts of statistics and probability in everyday situations.
- Learn to collect, organize, and interpret data effectively.
- Apply measures of central tendency, dispersion, correlation, regression, and permutations and combinations to analyze data sets.
- Explore the fundamentals of probability to make informed decisions and solve practical problems.

Learning Outcomes

By the end of this course, the students will be able to:

- Students will confidently interpret data distributions and identify trends.
- Students will apply statistical concepts to solve practical problems in various fields.
- Students will apply permutations and combinations to solve counting problems and make predictions in various scenarios.
- Students will calculate and explain basic probabilities, and analyze correlations and regression in real-life contexts.

Course Title:	Basic Statistics And Probability	Course Code: 24BMS6401M
Total Lecture Hours 60		Hours
Unit I	Frequency distribution, Measures of central tendency: Arithmetic Mean, Mode, Median,	15


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	Geometric Mean, Harmonic Mean Measures of dispersion: Mean deviation, Standard Deviation, Variance, Coefficient of variation	
Unit II	Correlation Analysis: Definition, Types of correlation, Karl pearson Method, Regression analysis: Regression Coefficients and Equation of Regression lines	15
Unit III	Factorial, Permutation and Combination, Inclusion-Exclusion principle	15
Unit IV	Basic probability, Conditional Probability, Bayes Theorem	15
Suggestive Readings:		
1	"Fundamentals of Statistics" by S. C. Gupta and V. K. Kapoor	
2	Statistics: Theory, Methods & Application D. C. Sancheti, V. K. Kapoor	
3	"A Textbook of Probability and Statistics" by A. G. K. Bhat	
4	"Introduction to Probability and Statistics" by William Mendenhall, Robert J. Beaver, and Barbara Beaver	


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Semester- V
Basic Vector Algebra and Integration

Course Objective:

1. A vector algebra course aims to introduce the fundamentals of vectors, their operations, and applications, equipping students with the ability to solve problems using vector algebra. Specifically, the course aims to develop an understanding of vector addition, scalar multiplication, dot product, cross product.
2. Students should grasp the fundamental principles of integration, including its relationship to differentiation and the concept of accumulation. Students should be able to perform various integration methods.

Course outcomes:

1. Students will be able to know the meaning of vectors and use them when adding and subtracting. They will be able to learn how to use magnitude and direction with vectors.
2. Student will be able to calculate the definite and indefinite integral.

Course Title:	Basic Vector Algebra and Integration	Course Code: 24BMT7501M
Total Lecture hour: 60		Hours
Unit I	Vector Algebra: 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), position vector of a point, negative of a vector, components of a vector.	15
Unit II	Vector Algebra: addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Properties and application of scalar and vector product of vectors.	15
Unit III	Indefinite Integration: Integration as inverse process of differentiation. Integration of a variety of functions by various methods.	15
Unit IV	Definite Integration: Calculate definite integral by various methods.	15
Reference and Reading Books:		
1. Mathematics for class XI & XII by R.D.Sharma,		
2. Integral Calculus- Gokhroo & Saini, Navkar Prakashan, Ajmer		
3. Mathematics by NCERT		

Semester- VI
Elementary Algebra and Coordinate Geometry

Course Objective:

1. To develop a solid understanding of sequences and series including arithmetic and geometric progressions.
2. To enable students to apply the Binomial Theorem for positive integral indices in algebraic expansions and problem-solving.
3. To enable students to understand the basic knowledge of conic section in two dimensional geometry.

Course outcomes:

1. Identify and compute the n th term and sum of arithmetic and geometric sequences (finite and infinite).
2. Apply the Binomial Theorem to expand expressions and solve related problems.
3. Use Pascal's Triangle to find binomial coefficients and understand pattern-based expansions.

4. Identify and use of various properties of conic section in two dimensional geometry.

Course Title:	Elementary Algebra and Coordinate Geometry	Course Code: 24BMT7601M
Total Lecture hour: 60		Hours
Unit I	Sequences and Series: Sequence and series (finite and infinite), nth term, Arithmetic Progression, Sum of n terms of an arithmetic progression, Arithmetic Mean.	15
Unit II	Geometric progression, Sum of n terms and infinite terms of a Geometric progression, Geometric Mean.	15
Unit III	Binomial Theorem: Binomial theorem for positive integral indices. Pascal's triangle, Simple applications.	15
Unit IV	Conic section: Elementary properties of Circle, Parabola and Ellipse.	15
Reference and Reading Books:		
1.Mathematics by NCERT		
2. Mathematics by R.D. Sharma		

Elementary Complex Algebra and 3D Geometry

Course Objective:

1. Students should understand the definition of complex numbers, their representation on the complex plane, and various operations like addition, subtraction, multiplication and division.
2. Students should understand the various properties of straight line and plane in three dimensional geometry.

Course outcomes:

1. Students are able to solve the problem involving complex numbers.
2. Students are able to solve the various problem of plane and straight line in 3D Geometry.

Course Title:	Elementary Complex Algebra and 3D Geometry	Course Code: 24BMT7602M
Total Lecture hour: 60		Hours
Unit I	Complex Numbers: Definition, real and imaginary parts, conjugate of a complex number, representation of a complex number in a plane.	15
Unit II	Complex Numbers: modulus and argument of a complex number, algebra of complex numbers, cube root of unity.	15
Unit III	Three dimensional Geometry: Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points. Direction cosines and direction ratios of a line.	15
Unit IV	Elementary properties of straight line and Plane.	15
Reference and Reading Books:		
1.Mathematics by NCERT		
2. Mathematics by R.D.Sharma		
3. Three Dimensional Geometry – Gokhroo & Saini		


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