

**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		CW\$	MTE	ETE
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

### 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
<b>Total Lecture hour 30</b>		<b>Hours</b>
<b>Unit I</b>	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.	<b>9</b>
<b>Unit II</b>	Determinants: Definition, Minors and Cofactors, Properties of determinants, Area of a Triangle, Adjoint and the inverse of a Matrix, Solution of system of equation.	<b>7</b>
<b>Unit III</b>	Quadratic equation, Solution of quadratic equation: factorization method and Shridharacharya's formula, Nature of roots, formation of quadratic equation from given roots	<b>9</b>
<b>Unit IV</b>	Coordinate geometry: Cartesian coordinate system, locus, Equation of straight line: Intercept form, Slope intercept form, point-slope form, two-points form, condition for parallel and perpendicular lines.	<b>5</b>
<b>Suggestive Readings:</b>		
<b>1</b>	"Mathematics for Class XI and XII" by R. D. Sharma	
<b>2</b>	"Higher Algebra" by Hall and Knight (Indian Edition)	
<b>3</b>	"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: 24BMS5201M
<b>Total Lecture hour 30</b>		<b>Hours</b>
<b>Unit I</b>	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	<b>8</b>
<b>Unit II</b>	Relations: Cartesian product of sets, Definition of relation, properties of relations: Reflexive Relation Symmetric Relation Transitive Relation, antisymmetric Relation, Equivalence Relation	<b>8</b>
<b>Unit III</b>	Functions: Definition, domain range, Types Of Functions: constant, identity, polynomial, exponential, logarithmic, trigonometric, modulus, greatest integer functions with their graphs.	<b>7</b>
<b>Unit IV</b>	One-One and Onto Function, bijection, composition of functions, inverse function. binary operations, types of binary operations	<b>7</b>
<b>Suggestive Readings:</b>		
<b>1</b>	"Mathematics for Class XI and XII" by R. D. Sharma	
<b>2</b>	"Fundamentals of Mathematics" by S. K. Singh	
<b>3</b>	"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**

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
<b>Total Lecture Hours 60</b>		<b>Hours</b>
<b>Unit I</b>	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]	<b>14</b>
<b>Unit II</b>	Differentiability: Definition of derivative, derivatives of some standard functions, differentiation of product and quotient of two functions, chain rule.	<b>14</b>
<b>Unit III</b>	Application of derivatives: Tangent, normal, rate of change, increasing and decreasing functions, Maxima and Minima of Functions of one Variable	<b>16</b>
<b>Unit IV</b>	Partial differentiation: Definition and concept of partial derivatives, Chain Rules for One or Two Independent Variables, Euler theorem on homogeneous functions	<b>16</b>
<b>Suggestive Readings:</b>		
<b>1</b>	"Higher Engineering Mathematics" by B. S. Grewal	
<b>2</b>	"Calculus" by S. C. Gupta and S. Kumar	
<b>3</b>	"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
<b>Total Lecture Hours 60</b>		<b>Hours</b>
<b>Unit I</b>	Frequency distribution, Measures of central tendency: Arithmetic Mean, Mode, Median, Geometric Mean, Harmonic Mean Measures of dispersion: Mean deviation, Standard Deviation, Variance, Coefficient of variation	<b>15</b>
<b>Unit II</b>	Correlation Analysis: Definition, Types of correlation, Karl Pearson Method, Regression analysis: Regression Coefficients and Equation of Regression lines	<b>15</b>

<b>Unit III</b>	Factorial, Permutation and Combination, Inclusion-Exclusion principle	<b>15</b>
<b>Unit IV</b>	Basic probability, Conditional Probability, Bayes Theorem	<b>15</b>
<b>Suggestive Readings:</b>		
<b>1</b>	"Fundamentals of Statistics" by S. C. Gupta and V. K. Kapoor	
<b>2</b>	Statistics: Theory, Methods & Application <u>D. C. Sancheti, V. K. Kapoor</u>	
<b>3</b>	"A Textbook of Probability and Statistics" by A. G. K. Bhat	
<b>4</b>	"Introduction to Probability and Statistics" by William Mendenhall, Robert J. Beaver, and Barbara Beaver	