

ACADEMIC PLANNER – XIIth – MATHEMATICS – (2025-26)

MONTH / DAYS	CONTENT	LEARNING OUTCOMES	MODE OF ASSESSMENT	ASSIGNMENT	TEACHING PEDAGOGY	INTERDISCIPLINE ASPECT / SDG	21ST CENTURY SKILLS	MATH LAB ACTIVITY
2 nd April – 15 th April (10 Days)	CH: L.P.P. 1.Introduction to Linear Programming Problem (L.P.P.) 2.Objective Function 3. Constraints 4. Optimization 5.Graphical Method of Solution (for Problems in Two Variables) 6.Feasible and Infeasible Regions (Bounded or Unbounded) 7.Feasible and Infeasible Solutions 8. Optimal Feasible Solutions (Up to Three Non-Trivial Constraints)	1.Understands the concept of Linear Programming 2.Identifies key components of an L.P.P. 3.Graphically represents L.P.P. problems in two variables 4. Determines feasible and infeasible solutions 5.Solves L.P.P. problems using the graphical method 6.Interprets real-world scenarios using L.P.P.	1. Class Assignments 2. Written examination 3. Oral Viva 4. Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1, Interactive Discussions. 2. Problem Solving Approach, 3. Graphical Demonstrations. 4. Use of GeoGebra. 5. Think-Pair-Share. 6. Peer Teaching	1. Economics 2. Business & Management 3. Engineering 4. Computer Science 5. Healthcare SDG: Quality Education, Responsible Consumption and Production	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	
16 th April – 31 st April (12 Days)	CH: MATRICES 1. Concept of Matrices 2. Notation and Order of a Matrix 3. Equality of Matrices 4. Types of Matrices 5. Zero and Identity Matrix 6. Transpose of a Matrix 7. Symmetric and Skew-Symmetric Matrices 8. Operations on Matrices - Addition of Matrices - Multiplication of Matrices - Multiplication with a Scalar 9. Properties of Matrix Operations - Addition Properties - Multiplication Properties - Scalar Multiplication Properties 10. Non-Commutativity of Matrix Multiplication 11. Existence of Non-Zero Matrices Whose Product is Zero (Order 2 Square Matrices) 12. Invertible Matrices 13. Proof of the Uniqueness of Inverse (If It Exists) 14. All Matrices Have Real Entries	1. Students will understand the concept, notation, and order of matrices. 2. They will identify different types of matrices and their properties. 3. They will perform operations on matrices, including addition, multiplication, and scalar multiplication. 4. They will apply the properties of matrix operations to simplify calculations. 5. They will demonstrate the non-commutativity of matrix multiplication. 6. They will understand the existence of non-zero matrices whose product is a zero matrix (for 2×2 matrices). 7. They will compute the transpose of a matrix and identify symmetric and skew-symmetric matrices. 8. They will determine the inverse of a matrix (if it exists) and prove its uniqueness. 9. They will solve problems involving invertible matrices.	1.Class Assignments 2.Written examination 3.Oral Viva 4.Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1, Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1. Mathematics – Fundamental concepts of matrices used in algebra and higher studies. 2. Computer Science – Application of matrices in programming, graphics, and artificial intelligence. 3. Physics – Use of matrices in quantum mechanics, optics, and transformation equations. 4. Economics – Application in input-output models and financial data analysis. 5. Engineering – Utilization in electrical circuits, structural analysis, and signal processing. SDG: Quality Education, Industry	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	

		10. They will apply matrix concepts in solving real-world problems and mathematical applications.				Innovation and Infrastructure.		
1st May – 15th May (11 Days)	CH: Determinants 1. Determinant of a square matrix (up to 3×3 matrices) 2. Minors and co-factors 3. Applications of determinants in finding the area of a triangle 4. Adjoint of a square matrix 5. Inverse of a square matrix 6. Consistency and inconsistency of a system of linear equations 7. Number of solutions of a system of linear equations with examples 8. Solving a system of linear equations in two or three variables (having a unique solution) using the inverse of a matrix	1. Students will understand the concept of determinants for square matrices (up to 3×3). 2. They will compute minors and co-factors of a matrix. 3. They will apply determinants to find the area of a triangle. 4. They will determine the adjoint and inverse of a square matrix. 5. They will analyse the consistency and inconsistency of a system of linear equations. 6. They will identify the number of solutions of a system of linear equations. 7. They will solve a system of linear equations in two or three variables using the inverse of a matrix. 8. They will apply matrix methods to real-world problem-solving.	1. Class Assignments 2. Written examination 3. Oral Viva 4. Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1. Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1. Physics 2. Computer Science 3. Engineering– Structural analysis, robotics, and control systems rely on matrix computations. 4. Economics– Application in economic modelling, input-output analysis, and optimization problems. SDG: Quality Education, Industry Innovation and Infrastructure	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	
16 th May– 25 th May (8 Days)	CH: Inverse trigonometric functions. 1. Definition of Inverse Trigonometric Functions 2. Range and Domain of Inverse Trigonometric Functions 3. Principal Value Branch of Inverse Trigonometric Functions 4. Graphs of Inverse Trigonometric Functions	1. Learner will be able to understand the definition of inverse trigonometric functions. 2. Learner will be able to determine the range and domain of inverse trigonometric functions. 3. Learner will be able to identify the principal value branch of inverse trigonometric functions. 4. Learner will be able to sketch and analyse the graphs of inverse trigonometric functions.	1. Class Assignments 2. Written examination 3. Oral Viva 4. Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1. Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1. Physics – Analysing angles and wave functions. 2. Engineering – Signal processing and control systems. 3. Computer Science – Algorithms for angle calculation in graphics. 4. Navigation – Calculating bearings and angles.	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	To draw the graph of $\sin^{-1} x$ – , using the graph of $\sin x$ and demonstrate the concept of mirror reflection (about the line $y = x$).
1 st July – 15 th July (12 Days)	CH: Continuity and Differentiability 1. Continuity and differentiability 2. Chain rule for differentiation 3. Derivative of composite functions 4. Derivatives of inverse trigonometric functions: $\sin^{-1}x$, $\cos^{-1}x$, and $\tan^{-1}x$ 5. Derivative of implicit functions 6. Concept of exponential and logarithmic functions 7. Derivatives of logarithmic and exponential functions	1. Students will understand the concepts of continuity and differentiability. 2. They will apply the chain rule to differentiate composite functions. 3. They will compute derivatives of inverse trigonometric functions such as $\sin^{-1}x$, $\cos^{-1}x$, and $\tan^{-1}x$. 4. They will differentiate implicit functions.	1. Class Assignments 2. Written examination 3. Oral Viva 4. Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1. Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1. Mathematics– Core concepts of calculus used in higher studies and problem-solving. 2. Physics– Application in kinematics, motion, and rate of change in physical systems. 3. Computer Science– Fundamental in machine learning, data	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration &	To find analytically the limit of a function $f(x)$ at $x = c$ and to check the continuity of the function at that point.

	8. Logarithmic differentiation 9. Derivative of functions expressed in parametric forms 10. Second-order derivatives	5. They will explore exponential and logarithmic functions and their derivatives. 6. They will perform logarithmic differentiation to simplify complex functions. 7. They will differentiate functions expressed in parametric form. 8. They will calculate second-order derivatives and analyse their significance. 9. They will apply differentiation techniques to solve real-world mathematical problems.				science, and algorithm development. 4. Economics– Applied in marginal analysis, growth models, and financial calculations. SDG: Quality Education, Industry Innovation and Infrastructure	Communication	
16 th July – 31 st July (14 Days)	CH: Applications of Derivatives 1. Rate of change of quantities 2. Increasing and decreasing functions 3. Maxima and minima 4. First derivative test (motivated geometrically) 5. Second derivative test (as a provable tool) 6. Simple problems illustrating basic principles 7. Real-life applications of derivatives	1. Students will understand the concept of the rate of change of quantities and its applications. 2. They will analyse increasing and decreasing functions using derivatives. 3. They will apply the first derivative test to determine local maxima and minima. 4. They will use the second derivative test as a provable tool for finding extrema. 5. They will solve problems involving maxima and minima in real-life scenarios. 6. They will develop problem-solving skills through practical applications of derivatives. 7. They will interpret and apply derivatives in various fields such as physics, economics, and engineering.	1. Class Assignments 2. Written examination 3. Oral Viva 4. Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1. Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1. Mathematics – Fundamental in calculus for analysing function behaviour and optimization. 2. Physics – Used in motion analysis, velocity, acceleration, and rate of change in physical systems. 3. Economics – Application in cost functions, revenue optimization, and marginal analysis. 4. Engineering – Essential for structural design, optimization, and control systems. SDG: Quality Education, Industry Innovation and Infrastructure	1. Critical Thinking 2. Problem-Solving Skills 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	1. To understand the concepts of decreasing and increasing functions. 2. To understand the concepts of absolute maximum and minimum values of a function in a given closed interval through its graph. 3. To construct an open box of maximum volume from a given rectangular sheet by cutting equal squares from each corner.

1 st Aug – 15 th Aug (11 Days)	CH: Integration 1. Integration as inverse process of differentiation 2. Integration of a variety of functions by substitution, by partial fractions, and by parts 3. Evaluation of simple integrals of the following types and problems based on them: $\int dx / (x^2 \pm a^2)$, $\int dx / \sqrt{x^2 \pm a^2}$, $\int dx / \sqrt{a^2 - x^2}$, $\int dx / (ax^2 + bx + c)$, $\int dx / \sqrt{ax^2 + bx + c}$, $\int (px + q) / (ax^2 + bx + c) dx$, $\int (px + q) / \sqrt{ax^2 + bx + c} dx$, $\int \sqrt{a^2 \pm x^2} dx$, $\int \sqrt{x^2 - a^2} dx$, $\int \sqrt{ax^2 + bx + c} dx$ 4. Fundamental Theorem of Calculus (without proof) 5. Basic properties of definite integrals and evaluation of definite integrals	1. The learner will understand integration as the inverse process of differentiation. 2. The learner will apply various techniques of integration, including substitution, partial fractions, and integration by parts. 3. The learner will evaluate integrals of standard forms. 4. The learner will understand the Fundamental Theorem of Calculus (without proof). 5. The learner will explore and apply the basic properties of definite integrals. 6. The learner will accurately evaluate definite integrals using fundamental properties. 7. The learner will develop problem-solving skills in integration through practical applications.	1. Class Assignments 2. Written examination 3. Oral Viva 4. Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1. Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1. Physics – Kinematics, work done, field variations. 2. Engineering – Structural design, stress-strain, system optimization. 3. Economics – Cost, revenue, profit, market equilibrium. 4. Biology & Medicine – Medical imaging, blood flow, drug absorption. 5. Computer Science – Numerical integration, simulations, graphics/SDG: Quality Education, Industry Innovation and Infrastructure	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	
16 th Aug – 31 st Aug (12 Days)	CH: Application of integration: Applications in finding the area under simple curves, especially lines, circles/parabolas/ellipses (in standard form only)	1. The learner will understand the concept of finding the area under a curve using integration. 2. The learner will apply definite integrals to determine areas bounded by curves and coordinate axes. 3. The learner will compute areas under simple curves such as: Linear functions (straight lines), Quadratic functions (parabolas), Circular functions (circles in standard form), Elliptical functions (ellipses in standard form).	1. Class Assignments 2. Written examination 3. Oral Viva 4. Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1. Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1. Physics – Motion, thermodynamics, optics. 2. Economics – Demand-supply, revenue-cost, market equilibrium. SDG: Quality Education, Industry Innovation and Infrastructure	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	To evaluate the definite integral $\int_a^b \sqrt{1-x^2} dx$ as the limit of a sum and verify it by actual integration.
1 st Sep – 15 th Sep (11 Days)	CH: Differential Equations: 1. Definition of a Differential Equation 2. Order and Degree of a Differential Equation 3. General and Particular Solutions of a Differential Equation 4. Solution by Separation of Variables Method 5. Solution of Homogeneous Differential Equations (First Order, First Degree)	1. Learner will understand the definition of a differential equation. 2. Learner will identify the order and degree of a differential equation. 3. Learner will differentiate between general and particular solutions. 4. Learner will solve differential equations using the separation of variables method.	1. Class Assignments 2. Written examination 3. Oral Viva 4. Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1. Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1. Physics – Differential equations model motion, thermodynamics, and optics. 2. Economics – Used for demand-supply, revenue-cost, and market equilibrium analysis.	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	

	6. Solution of Linear Differential Equations: $\frac{dy}{dx} + py = q$, $\frac{dx}{dy} + px = q$ (where p and q are functions of x or constants) (where p and q are functions of y or constants)	5. Learner will solve homogeneous differential equations of the first order and first degree. 6. Learner will solve linear differential equations.				SDG: Quality Education – Industry, Innovation, and Infrastructure	Communication	
16 th Sep – 30 th Sep (12 Days)	HALF YEARLY EXAMINATIONS. SYLLABUS – ALL THE ABOVE CHAPTERS							
1 st Oct – 15 th Oct (Days)	CH: Vectors 1.Vectors and Scalars 2.Magnitude and Direction of a Vector 3.Direction Cosines and Direction Ratios of a Vector 4.Types of Vectors: Equal, Unit, Zero, Parallel, and Collinear Vectors 5.Position Vector of a Point 6.Negative of a Vector 7.Components of a Vector 8.Addition of Vectors 9.Multiplication of a Vector by a Scalar 10. Position Vector of a Point Dividing a Line Segment in a Given Ratio 11.Definition, Geometrical Interpretation, Properties, and Application of Scalar (Dot) Product of Vectors 12.Vector (Cross) Product of Vectors	1.Learner will be able to differentiate between vectors and scalars, and calculate the magnitude, direction, direction cosines, and direction ratios. 2.Learner will be able to identify and work with types of vectors: equal, unit, zero, parallel, and collinear. 3.Learner will be able to understand the position vector of a point, its negative, and components of a vector. 4.Learner will be able to perform vector addition and multiplication by a scalar and find the position vector dividing a line segment. 5.Learner will be able to explore the scalar (dot) and vector (cross) products, including their definitions, properties, and applications.	1.Class Assignments 2.Written examination 3.Oral Viva 4.Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1, Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1.Physics – Vectors represent forces, motion, and fields. 2.Engineering – Used in structural analysis, dynamics, and fluid mechanics. 3.Computer Science – Vectors in graphics, simulations, and AI algorithms. 4.Geography – Vectors for mapping, navigation, and geographical modelling. equilibrium analysis. SDG: Quality Education – SDG: Industry, Innovation, and Infrastructure	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	To verify that angle in a semi-circle is a right angle, using vector method.
16 th Oct – 31 st Oct (10 Days)	CH: Three-Dimensional Geometry. 1. Direction Cosines and Direction Ratios of a Line Joining Two Points 2. Cartesian Equation of a Line 3. Vector Equation of a Line 4. Skew Lines 5. Shortest Distance Between Two Lines 6. Angle Between Two Lines	1. Learner will calculate direction cosines and direction ratios of a line. 2. Learner will derive the Cartesian equation of a line. 3. Learner will understand and form the vector equation of a line. 4. Learner will identify and analyse skew lines. 5. Learner will calculate the shortest distance between two lines. 6. Learner will find the angle between two lines.	1.Class Assignments 2.Written examination 3.Oral Viva 4.Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1, Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1.Physics – Used in motion analysis, force direction, and field lines. 2.Computer Science – Used in 3D graphics, simulations, and AI modelling. 3.Architecture – Used in perspective design and spatial planning. equilibrium analysis.	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	To locate the points to given coordinates in space, measure the distance between two points in space and then to verify the distance using distance formula.

						SDG: Industry, Innovation, and Infrastructure		
1 st Nov – 15 th Nov (11 Days)	CH: Probability 1. Conditional Probability 2. Multiplication Theorem on Probability 3. Independent Events 4. Total Probability Theorem 5. Bayes' Theorem	1.Learner will be able to apply conditional probability. 2.Learner will be able to use the multiplication theorem. 3.Learner will be able to identify independent events. 4.Learner will be able to apply the total probability theorem. 5.Learner will be able to use Bayes' theorem.	1.Class Assignments 2.Written examination 3.Oral Viva 4.Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1, Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1.Data Science – Used in predictive modelling. 2.AI – Applied in machine learning. 3.Finance – Helps in risk assessment. 4.Medicine – Used in diagnostics. 5.Engineering – Ensures system reliability. SDG: Industry, Innovation, and Infrastructure	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy 5. Collaboration & Communication	
16 th Nov – 31 st Nov (11 Days)	CH: Relations & Functions. 1.Types of Relations: Reflexive, Symmetric, Transitive, and Equivalence Relations 2.One-to-One (Injective) Functions 3.Onto (Surjective) Functions	1.Learner will be able to identify types of relations: reflexive, symmetric, transitive, equivalence. 2.Learner will be able to determine one-to-one (injective) functions. 3.Learner will be able to analyse onto (surjective) functions.	1.Class Assignments 2.Written examination 3.Oral Viva 4.Practical Demonstration.	Questions form NCERT & PYQs (Previous Years Question Papers)	1, Interactive Discussions. 2. Problem Solving Approach, 3. Role Play 4. Think-Pair-Share. 5. Peer Teaching	1.Computer Science – Database relations and function mappings. 2.Mathematics – Set theory and logic. 3.Economics – Market models and demand functions. SDG: Quality Education	1. Critical Thinking 2. Problem-Solving 3. Analytical Skills 4. Digital Literacy	To verify that the relation R in the set L of all lines in a plane, defined by $R = \{(l, m) : l \perp m\}$ is symmetric but neither reflexive nor transitive.
16 th Nov – 31 st Nov (11 Days)	REVISION							
1 st Dec onwards	PRE-BOARD EXAMINATIONS – FULL SYLLABUS							