Syllabus | **Mathematics Essentials** Course & Online Test

Topics	Contents
Sets and Algebra	Sets and their representations; Empty set; Finite and Infinite sets; intersection, complement, difference and symmetric difference of sets; De-Morgan's laws; Cartesian product of sets.
	Principle of Mathematical Induction; Complex numbers and Quadratic equations; Linear inequalities; Basics of Permutations and Combinations; Binomial Theorem; Logarithms and their properties; Arithmetic and Geometric progression.
Analytical Geometry and Matrices	2D Cartesian coordinates, distance between two points, section formulae, shift of origin. Equation of a straight line, angle between two lines, distance of a point from a line. Equation of a circle, equations of tangent, normal and chord. Equations of a parabola and ellipse.
	Matrices as a rectangular array of real numbers; addition and product of matrices; transpose of a matrix; elementary row and column transformations; Determinant of a square matrix; Adjoint of a matrix; Inverse of a square matrix.
Probability and Statistics	Random experiment; Sample space; Types of events; addition and multiplication rules of probability; Conditional probability, independence of events, total probability; Bayes Theorem.
	Measure of central tendency and dispersion; mean, median, mode, mean deviation, standard deviation and variance of grouped and ungrouped data; random variable, mean and variance of the random variable.
Differential and Integral Calculus	Limit and continuity of a function, limit and continuity of the sum, difference, product and quotient of two functions, L'Hospital's rule; Derivative of a function, derivative of the sum, difference, product and quotient of two functions, chain rule; Rolle's theorem and Lagrange's mean value theorem.
	Integration as the inverse process of differentiation; indefinite integrals of standard functions; definite integral and their properties; fundamental theorem of integral calculus; ordinary differential equations.