Syllabus of Mathematics I

1. Set Theory - Number system, Sets and their operations, Relations and functions - Relations and their types, Functions and their types

2. Rectangular coordinate system, Straight Lines- Slope of a line, Parallel and perpendicular lines, Representations of a Line, General equations of a line, Straight-line fit

3. Quadratic Functions - Quadratic functions, Minima, maxima, vertex, and slope, Quadratic Equations

4. Algebra of Polynomials - Addition, subtraction, multiplication, and division, Algorithms, Graphs of Polynomials - X-intercepts, multiplicities, end behavior, and turning points, Graphing & polynomial creation

5. Functions - Horizontal and vertical line tests, Exponential functions, Composite functions, Inverse functions

6. Logarithmic Functions - Properties, Graphs, Exponential equations, Logarithmic equations

7. Sequence and Limits- Function of One variable - • Function of one variable • Graphs and Tangents • Limits for sequences • Limits for function of one variable • Limits and Continuity

8. Derivatives, Tangents and Critical points - • Differentiability and the derivative • Computing derivatives and L'Hˆopital's rule • Derivatives, tangents and linear approximation • Critical points: local maxima and minima

9. Integral of a function of one variable - • Computing areas, Computing areas under a curve, The integral of a function of one variable • Derivatives and integrals for functions of one variable

10	Graph Theory - Representation of graphs, Breadth-first search, Depth-first search, Applications of BFS and DFS Directed Acyclic Graphs - Complexity of BFS and DFS, Topological sorting
11	Longest path, Transitive closure, Matrix multiplication Graph theory Algorithms - Single-source shortest paths, Dijkstra's algorithm, Bellman-Ford algorithm, All-pairs shortest paths, Floyd–Warshall algorithm, Minimum cost spanning trees, Prim's algorithm, Kruskal's algorithm