Topics of Mathematics in Final Examination
Oral Part

I.   Cognitive and Thinking Methods; Sets; Logic; Combinatorics; Graphs

1. Set Theory   Basic notions,
                         Set operations, properties of operations,
                         Applications of sets and set operations in different fields of mathematics
                         (number theory, geometry, etc.).

2. Logic   Negation, conjunction, disjunction and equivalence and their applications.

3. Notions, definitions and theorems
                         Interpretation of simple texts of mathematics,
                         Exact formulation of definitions and theorems,
                         Proper application of necessary and sufficient conditions.

4. Combinatorics   Solution of problems.

5. Graphs   Basic notions, demonstration of graphs,
                         Simple applications.

II.   Number Theory; Algebra

1. Numbers   Real numbers,
                         Different forms of real numbers,
                         Basic operations and their properties,
                         Exact value and approximate value, accuracy of calculations and results,
                         proper rounding,
                         Number systems, 'digits' and their meanings.

2. Number Theory   Divisor, multiple, prime number, composite number,
                         Fundamental Theorem of Number Theory,
                         Decomposition of numbers to product of prime factors,
                         Greatest common divisor, Lowest common multiple,
                         Simple exercises of divisibility.

3. Algebraic expressions and operations
                         Operations with algebraic expressions,
                         Special binomial products and their applications.

4. Powers, roots, logarithms
                         Definitions, identities, operations of powers,
                         Concept of logarithm, definition, consequences,
                         Identities of logarithm and their applications in solution of problems.

5. Equations, inequalities

Solution of linear and quadratic equations, inequalities,
Linear and Quadratic problems,
Irrational/radical, absolute value equations, inequalities,
Exponential, logarithmic and trigonometric equations,
Simultaneous equations,
Systems of inequalities.

III. Functions

1. Functions, Graphs of functions, transformations of functions

Concept of function, different notations,
Basic functions: direct proportion, linear, quadratic, radical functions,
inverse proportion, rational, absolute value functions,
exponential, logarithmic and trigonometric functions,
Simple transformations of basic functions: $f(x) + c, f(x + c), c \cdot f(x), f(c \cdot x)$.

2. Characterisation of functions

Domain, range, zeroes, y-intercept, extremes, monotonicity,
periodicity, parity.

3. Sequences   Arithmetic and geometric progressions,
Arithmetic mean and geometric mean,
Compound interest.

IV. Geometry; Analytical Geometry; Trigonometry

1. Basic notions, different sets of points

Angle types, angle pairs, measures of angles,
Locus, special point sets,
Distance in space,
Angle of inclination of geometric elements in space.

2. Transformations   Properties of transformations,
Congruent transformations, congruency of figures,
Basic cases of congruency of triangles,
Central dilation, similarity,
Properties of similar figures,
Application of congruency and similarity in solution of simple problems.

3. Shapes of planar geometry
a) Triangles   Classification of triangles,
Definitions of parts of triangles,
Theorems involving sides, angles and
special points and lines of triangles,
Application of theorems and definitions in solution of
calculation or construction problems.

b) Quadrilaterals	Types of quadrilaterals and their properties.
c) Polygons	Equilateral, equiangular and regular polygons,
	Sum of diagonals, sum of interior angles, sum of exterior angles,
	Inscribed and circumscribed circles of regular polygons.
d) Circle	The circle and its parts,
	Mutual positions of lines and circles.

4. Spatial objects	Polyhedra (e.g.: cube, cuboid, tetrahedron, prism, pyramid,
	truncated pyramid),
	Cylinder, cone, frustum, sphere, hemisphere.

5. Perimeter, area and volume calculations

Perimeter and area formulae of simple planar figures; calculations,
Area and volume calculations of solids,
Ratio of perimeter, area and volume of similar planar figures and solids.

6. Vectors	Concept of vector,
	Operations with vectors (sum, difference, multiplication by a scalar,
	dot product, linear combination),
	Properties of operations,
	Application of vectors.

7. Trigonometry	General definitions of trigonometry functions,
	Simple relations between trigonometry functions and values,
	Law of sines, law of cosines.

8. Analytic Geometry

Vectors in the coordinate plane, operations with vectors (sum, difference,
multiplication by a scalar, linear combination),
Dot product of vectors,
Different types of equations of lines and circles,
Mutual positions of lines and circles.

V. Probability; Statistics

1. Descriptive statistics

Collection, organisation and representation of data,
Frequency, relative frequency,
Measures of central tendency: arithmetic mean, weighted average,
median, mode,
Variance and standard deviation.

2. Probability	Definition of probability,
	Classic model of probability,
	Sampling with replacement.