MATHEMATICS
Entrance Exam Syllabus

1. Natural numbers. Properties of divisible by 2, 5, 10, 3 and 9. Prime numbers and factors, including greatest common factors and least common multiples.

2. Basic manipulation of simple algebraic expressions involving factorization and expansion. Formulae: $a^2 - b^2$; $(a \pm b)^2$. Rearrangement, evaluation and combination of simple formulae.

3. Definition of absolute value (modulus). Distance between two points on the straight line and in the Cartesian plane. Coordinates of mid-point of a line segment.

4. Integers exponents and operations with them. Square and cubic roots. Simplification of expressions involving roots, surds or radicals. Expression of numbers in standard form (scientific notation).

5. The linear function and its graph, gradient, parallel and perpendicular lines. Solution of simultaneous linear equations in two variables.
   Quadratic function, its graph, properties. Factorization of quadratic expression. Solutions of quadratic equations and inequalities. Solution of simultaneous equations in two variables with one non-linear equation.
   Solution of equations and inequalities of algebraic fractions. Interval method. Solution of system of non-linear inequalities.

6. Functions of $f(x) = \dfrac{k}{x}$, $f(x) = ax^3$, $f(x) = \sqrt{x}$, $f(x) = \sqrt[3]{x}$ and their graphs. Graph of $y = |f(x)|$.
   Transformations of graphs.

7. Applications of ratio, percentage and proportion. Compound interest.

8. Triangle. Properties of equilateral and isosceles triangles. Property of medians. Pythagoras' theorem and its converse. Properties of equal and similar triangles. Properties of halfway line of triangle and trapezium.

9. Similar plane figures. Ratio of their perimeters and areas.

10. Quadrilaterals. Parallelograms, rhombuses, rectangles, square and trapeziums; compound shapes. Their properties, perimeters and areas.

11. The circle, its centre and radius, area and circumference. Equation of circle. Length of arc, area of sector. Chord, tangent and segment, their properties. Property of inscribed angle. Described and inscribed circles, their properties.

12. Trigonometry in right triangle. Sine and cosine rules. Solution of triangles.

13. Parallel and perpendicular straight lines. Angles between straight lines and planes, between planes.

14. Cube, parallelepiped. Their surface area and volume.

15. Regular pyramid. Its surface area and volume.

16. Volumes and surface area of revolutions: cone and cylinder.

17. Counting principles, additional and multiplication rules. Probability of event. Complementary events.

18. Descriptive statistics: collection of raw data, display of data in pictorial and diagrammatic forms. Calculation of simple statistics from discrete data, including mean, median and mode.