SYLLABUS FOR THE ENTRANCE TEST IN MATHEMATICS, JOINT DEGREES, AND COMPUTER SCIENCE

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- **Algebra**: Simple simultaneous equations in one or two variables. Solution of simple inequalities. Binomial Theorem with positive whole exponent. Combinations and binomial probabilities.
- **Integration**: Indefinite integration as the reverse of differentiation. Definite integrals and the signed areas they represent. Integration of $x^a$ (where $a \neq -1$) and sums thereof.
- **Graphs**: The graphs of quadratics and cubics. Graphs of $\sin x, \cos x, \tan x, \sqrt{x}, a^x, \log_a x$. Solving equations and inequalities with graphs.
- **Logarithms and powers**: Laws of logarithms and exponentials. Solution of the equation $a^x = b$.
- **Transformations**: The relations between the graphs

  \[ y = f(ax), \quad y = af(x), \quad y = f(x - a), \quad y = f(x) + a \]

  and the graph of $y = f(x)$.
- **Geometry**: Co-ordinate geometry and vectors in the plane. The equations of straight lines and circles. Basic properties of circles. Lengths of arcs of circles.
- **Trigonometry**: Solution of simple trigonometric equations. The identities

  \[ \tan x = \frac{\sin x}{\cos x}, \quad \sin^2 x + \cos^2 x = 1, \quad \sin(90^\circ - x) = \cos x. \]

  Periodicity of sine, cosine and tangent. Sine and cosine rules for triangles.
- **Sequences and series**: Sequences defined iteratively and by formulae. Arithmetic and geometric progressions*. Their sums*. Convergence condition for infinite geometric progressions*.

* Part of full A-level Mathematics syllabus.