ISI Admission Test 2023 (M. Math.)

Format and Syllabus
Test Codes: PMA (Forenoon) and PMB (Afternoon)

Format

Forenoon

Test code: PMA

Format: There will be 30 multiple-choice questions. For each question, there will be four suggested answers of which only one will be correct.

Afternoon

Test code: PMB

Format: Descriptive type questions.

Syllabus

Note: The syllabus given here is indicative only.

1. **Basic algebra**

   Arithmetic, Geometric and Harmonic Progressions. Continued fractions. Permutations and Combinations. Binomial theorem. Theory of equations. Inequalities involving arithmetic mean and geometric mean, Cauchy-Schwarz inequality. Complex numbers and De Moivre's theorem. Elementary Number Theory: divisibility, congruence, primality.

2. **Coordinate geometry**

   Straight lines. Conic sections: Circles, Parabolas, Ellipses and Hyperbolas.

3. **Calculus, Trigonometric functions and identities.**

4. **Analysis and metric spaces**

   - Countable and uncountable sets;
   - Equivalence relations and partitions;
   - Convergence and divergence of sequences and series;
   - Cauchy sequence and completeness;
   - Bolzano–Weierstrass theorem;
   - Continuity, uniform continuity, differentiability, Taylor expansion;
   - Partial and directional derivatives, Jacobians;
   - Sequences and series of functions;
   - Ordinary differential equations;

- Integral calculus of one variable–existence of Riemann integral;
- Fundamental theorem of calculus, change of variable, improper integrals;
- Elementary topological notions for metric spaces: open, closed and compact sets, continuous functions, completeness of metric spaces.

5. **Linear algebra and abstract algebra**

- Vector spaces, subspaces, basis, dimension, direct sum;
- Matrices, systems of linear equations, determinants;
- Linear transformations and their representation as matrices;
- Diagonalization, triangular forms;
- Inner product spaces, Gram-Schmidt orthogonalisation;
- Groups, subgroups, quotient groups, homomorphisms, products;
- Lagrange's theorem;
- Rings, ideals, maximal ideals, prime ideals, quotient rings;
- Integral domains, Chinese remainder theorem, polynomial rings, fields.

6. **Elementary probability theory**

- Combinatorial probability, events, conditional probability, Bayes theorem and applications, random variables, independence, expectation and variance.

Sample Papers:

For PMA, see PMA papers from 2022 and 2020 and also MMA papers of the past few years.

For PMB, see PMB papers of the past few years.

Note: The sample papers are indicative only. The difficulty level and the number of questions may vary from year to year.