

## TIFR SYLLABUS [MATHEMATICAL SCIENCE]

### TIFR

The screening test is mainly based on mathematics covered in a reasonable B.Sc. course. The interview need not be confined to this.

**Algebra:** Definitions and examples of groups (finite and infinite, commutative and non-commutative), cyclic groups, subgroups, homo-morphisms, quotients. Definitions and examples of rings and fields. Basic facts about finite dimensional vector spaces, matrices, determinants, and ranks of linear transformations. Integers and their basic properties. Polynomials with real or complex coefficients in 1 variable.

**Analysis:** Basic facts about real and complex numbers, convergence of sequences and series of real and complex numbers, continuity, differentiability and Riemann integration of real valued functions defined on an interval (finite or infinite), elementary functions (Polynomial functions, rational functions, exponential and log, trigonometric functions).

**Geometry / Topology:** Elementary geometric properties of common shapes and figures in 2 and 3 dimensional Euclidean spaces (e.g. triangles, circles, discs, spheres, etc.), Plane analytic geometry (= coordinate geometry) and trigonometry. Definition and basic properties of metric spaces, examples of subsets of Euclidean spaces (of any dimension), connectedness, compactness. Convergence in metric spaces, continuity of functions between metric spaces.

**General:** Pigeon-hole principle (box principle), induction, elementary properties of divisibility, elementary combinatorics (permutations and combinations, binomial coefficients), elementary reasoning with graphs.