I.I.Sc. Banglore
SYLLABUS [MATHEMATICAL SCIENCE]

Real Analysis: Real valued functions of a real variable: Continuity and differentiability, sequences and series of real numbers and functions, uniform convergence, Riemann integration, fundamental theorem of integral calculus. Topology if R^n, Compactnes and connectedness.

Complex Analysis: Continuity and differentiability, analytic functions, Cauchy's theorem, Cauchy's integral formula, Taylor and Maclaurin expansions, Laurent's series, singularities, theory of residues and contour integral, conformal mappings.

Linear Algebra: Vector Spaces: Linear independence, basis, dimension, linear transformations, matrices, systems of linear equations, rank and nullity, characteristic values and characteristic vectors, Cayley-Hamilton characteristic and minimal polynomials, diagona-lizability, Jordan canonical form.

Abstract Algebra: Groups: subgroups, Lagrange's theorem, normal subgroup, quotient group, homomorphism, permutation groups, Cayley's theorem, Sylow theorems, Rings, Ideals Fields.

Ordinary Differential Equations : First order ODEs and their solutions, singular solutions, experience and uniqueness of initial value problems for first order ODE. Gewneral theory of homogeneous and homomor-geneous linear differential equations. Variation of parameters. Types of singular points in the phase plane of an autonomous system of two equations.

Partial Differential Equations: Elements of first order PDE. Second order linear PDE: Classification, wave Laplace and Heat equations. Basic properties and important solutions of classical initial and boundary value problems.

Elements of Numerical Analysis: Interpolation: Lagrange and Newton's forms, error in interpolation. Solution of nonlinear equations by iteration, various iterative methods including Newton. Raphson method, fixed point iteration. Convergence, integration: trapezoidal rule, Simpson's rule, Gaussian rule, expressions for the error terms. Solution of ordinary differential equations: simple difference equations, series method, Euler's method, Runge Kutta methods, predictor- corrector methods, error estimates.