SYLLABUS FOR ENTRANCE TEST FOR PH.D(MATHEMATICS) UNDER SIKKIM MANIAPAL UNIVERSITY

General Instruction:
Questions will be of MCQ type .
Maximum Marks : 50

Real Analysis: Basic Topology, Continuity and Differentiability, Integration, Special function. Lebesgue measure, Lebesgue integral.

Modern Algebra: Groups-subgroups, cosets, Sylows theorem. Rings.

Linear Algebra: Vector spaces, basis – dimension, Linear transformations, Inner product spaces.

Topology: Subspace topology, Homeomorphisms, Quotient topology, Metric topology, Separation axioms, Connectedness, Countability axioms, Compactness, nets and filters.

Functional Analysis: Banach spaces and duals, Hilbert space and operator theory.

Complex analysis:. Complex Differentiation. Complex Integration, Liouville's theorem, Maximum modulus principle, Schwarz lemma, Open mapping theorem. Taylor series, Laurent series, calculus of residues. Conformal mappings, Mobius transformations.

Ordinary Differential Equations: Linear equations with constant coefficients, variable coefficients, Wronskians. Strum Liouville's problem. Lipschtitz' condition , existence and uniqueness of solution.

Partial Differential Equations: Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs. Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Laplace, Heat and Wave equations.

Numerical Analysis: Interpolation, Solution of algebraic and transcendental equations , Numerical differentiation and integration, Solution of system of equations, Numerical solutions of ordinary differential equations.

Probability Theory: Axioms, Conditional probability, Random variables of one and two dimensions, expectations, Moment generating functions, Law of large numbers, Limit theorems, moment inequalities.

Classical Mechanics: Generalized coordinates, Lagrange's equations, Hamilton's canonical equations, Hamilton's Principle of least action, Two-dimensional motion of rigid bodies, Euler's dynamical equations for the motion of a rigid body about an axis, theory of small oscillations.

Linear programming: Basic feasible solutions, Simplex methods, Two phase methods, Transportation problems, Integer programming, Sensitivity analysis.