SCHOOL OF MATHEMATICAL SCIENCES
NISER, BHUBANESWAR

INTEGRATED M.SC. - PH.D. WRITTEN TEST / INTERVIEW SYLLABUS

ALGEBRA

Groups, Abelian Groups, Cyclic Groups, Permutation Groups, Normal Subgroups, Quotient Groups, Lagrange's Theorem, Group Homomorphisms, First Isomorphism Theorem of Groups.

Rings, Subrings, Ideals, Quotient Rings, Prime and Maximal Ideals, Ring Homomorphisms, First Isomorphism Theorem of Rings.

Vector Spaces, Bases, Dimension, Linear Transformation, Matrix Representation of a Linear Transformation, Rank-Nullity Theorem, Eigenvales and Eigenvectors.

ANALYSIS

Closed set, Open set, Limit point of a set, Bolzano-Weierstrass Theorem, Sequence, Convergence of Sequence, Monotone subsequence, Cauchy sequence, Series, Convergence of series, Absolute convergence, Riemann rearrangement theorem, Limit and Continuity of a function, Continuity of a function on an Interval, Uniform Continuity, Differentiation, Rolle' theorem, Mean Value Theorem, Maxima-Minima, Riemann Integration, Fundamental Theorem of Calculus.

Double and Triple Integrals, Change of order of Integration, calculating Surface areas and Volumes using Double Integrals, calculating Volumes using Triple Integrals.

Bernoulli's equation, exact differential equations, integrating factors, orthogonal trajectories, homogeneous differential equations, method of separation of variables, linear differential equations of second order with constant coefficients, method of variation of parameters, Cauchy-Euler equation.