ENTRANCE TEST SYLLABUS FOR PG PROGRAMME IN MATHEMATICS

UNIT-I

Analysis: Supremum, infimum of the subsets of R, Sequence, Bounded, Monotonic, Convergent and Cauchy sequences, subsequence, Limit, Continuity, differentiability of function of single variable, Riemann integral, Analytic functions, Complex integration, Residues, Metric Space, Continuity, Compactness, Connectedness in a metric Space.
Algebra: Group, Cyclic groups, Lagrange's theorem, Normal subgroups, Rings, Fields, quotient rings, Homomorphism and isomorphism, Vector spaces, Basis and Dimension, Linear transformations.

UNIT-II

Calculus and Geometry: Successive differentiation, Leibnitz theorem, Maclaurin's and Taylor's series, Partial differentiation and Euler's theorem, Jacobians, Asymptotes, Curvature, Beta and Gamma functions, Multiple integrals, Gradient, Divergence, Curl, Gauss, Green, Stokes theorems, Direction cosines and direction ratios, Plane, Straight line in three dimensions, Sphere, Cone, Cylinder.
Numerical Analysis: Error in numerical computations, Calculus of finite differences, interpolation, solutions of algebraic and transcendental equations, Numerical differentiation and integration, Numerical solution of ordinary differential equation.

UNIT-III

Differential Equations: First order and first degree differential Equations, first order and higher degree differential equations, Orthogonal Trajectories, Linear differential equation with constant coefficients, second order linear differential equations, Total differential equation.
Mechanics: Central axis, Conjugate lines, conjugate forces, catenary, velocity and acceleration along radial and transverse direction, velocity and acceleration along tangential and normal directions, Moments and products of inertia, Central orbits.

UNIT-IV

Tensor Analysis and Differential Geometry: Tensors, Riemannian Metric, Christoffel symbols, covariant differentiation, Riemannian curvature tensor, Einstein space, Einstein tensor, length of a curve, tangent to curve, osculating plane, curvature, torsion, first and second fundamental form of surface, Normal curvature, Mean curvature, Gaussian Curvature, Minimal surface.
Matrices: Rank of a Matrix, Hermitian matrix, Skew-Hermitian matrix, Unitary matrix, Consistency and Inconsistency of a system of linear equations, Linear Dependence and Independence of vectors, Eigen values, Eigen vectors, Caley-Hamilton theorem , Diagonalisation of square matrix.

UNIT-V

Mathematical Methods: Limit and Continuity of functions of two variables, Taylor's theorem for functions of two variables, Maxima and minima for functions of two variables, Laplace transform and inverse laplace transform, Fourier transforms, Fourier series and calculus of variations.
Operations Research: Linear programming problem, Simplex method, Big-M and Two-Phase method, Concept of duality, Convex sets, Convex and concave functions, Transportation and Assignment problem, Game Theory.