Mathamatics
POST GRADUATE DEGREE
STANDARD

I. ALGEBRA

Group - examples - subgroup - Normal subgroups - homomorphisms - Isomophism - Cayley's theorem - Cauchy's theorem - Sylow's theorem - Finite ablian groups Rings: Euclidean rings - Polynomial rings - Polynomial over the national field - Polynomial rings over Commutative rings - modules. Division rings - Frobenius theorem. Field: Finite fields - Wedderburn's theorem, Extension Fields - Roots of Polynomials. Galois theory: Elements of Galois theory, Solvability of radicals. Linear Transformations: Canonical forms, Nilpotent transformations

II REAL ANALYSIS

Limit, Continuity, types of discontinuities, infinite limits, function of bounded variation, elements of metric spaces. Reimann Integral - Fundamental theorem of calculus - mean value theorem. Reimann - stieltjes Integral, Infinite series and infinite products, sequences of functions, Fourier services and Fourier Integrals. Outer measure, measurable sets and Lebesque measures, measurable functions. Littlewoods three principles. Lebesque Integral of bounded function over a set of finite measure. Integration of a non negative function. General Lebesque Integral.

III COMPLEX ANALYSIS

Local properties of analytic functions - Removable singularities Taylor's theorem - Zeros and poles, local mapping - maximum principle - Harmonic functions - Definitions & basic properties - mean value property - Poission's formula - Schwarz's theorem - reflection principle - power series expansions - weierstrassis theorem - Taylor's series, Laurents series, partial fractions and factorisation - Infinite products - Canonical products - gamma functions, stvilling's formula, Entire functions, jensen's formula - Hadamard's theorem.

IV DIFFERENTIAL GEOMETRY

Curves, analytic representation, arc length, tangent, oscillating plane, Curvature, torsion, formula of frenet, Contact, natural equations, helics involutes & evolutes, Elementary theory of surfaces - Analytic representation first & second fundamental forms, normal - tangent form, developable surfaces, Euler's theorem, Dupin's indicatries - Conjugate directions, Triply orthogonal system of surface, Fundamental Equations: Gauss, Gauss - Weingastern, Codassi, Curvilinear, Co-ordinates in space. Geodesics on surface. Geodesic Curvature, Goodesics, Geodesic Coordinates, surfaces of constant curvature, rotation of surfaces of conotant curve.

V OPERATIONS RESEARCH

Origin & Development of operation's research, Nature & Characteristics of O.R. Models in O.R. General solution methods for O.R.models, uses and limitations of O.R.

LINEAR PROGRAMMING

Formulation of problem, graphical solutions, standard form. Definition of basic solution, degenerate solution, simplex method, Definition of artificial variable.

TRANSPORTATION PROBLEM

Definition, solutions to transportation problem - initial feasible solution - opimatil test - Degenerary - Travelling salesman problem. Sequenceing : Processing n jobs through m machines, Replacement of equipment that deterriorates or falls suddenly.

VI TOPOLOGY

Topological spaces & continuous functions, metric topology, Connectedness, compactness, countability and separation axiom, Fundamental group and covering spaces.

PAPER - II

I. MECHANICS:-

STATICS:- Equiliburium of a system of particles, work and potential energy, friction, commoniatenary principles of virtual work - stability of equilibrium of forces in three dimensions. DYNAMICS:- Rectilinear motion - motion with constant acceleration motion under gravity - motion along an included plane - motion under gravity in a resisting medium Impalsive forces & Impact, Principles of Conservation of Linear momentum, Collision of two smooth spheres - Direct Impact of sphere on a fixed plane - Projectiles - Circular motion of a particle, Central orbits, moments of enertia, motions of a rigid body about a fixed axis - K.E. of rotation - moment of momentum - motion of a circular disc - hoop or a sphere rolling down an inclined plane.

II. DIFFERENTIAL EQUATIONS:-

Linear differential equations of higher order - Linear dependence & wronskian basic theory - solutions in power series - Introduction to second order linear equations with ordinary points. Legendre equations and legendre polynomial, Second order equations with regular singular points, Bessel equations. Partial differential equations; first order, complete Integral, general Integral, singular Integral, Compatible systems of first order equation, charpit's method. Partial differential equations of second order - Linear and partial equations with constant Co-efficients Laplace equation - Elementary solutions of Laplace equation.

III. PROBABILITY & MATHEMATICSL STATISTICS: -

Probability of an event, Baye's theorem, Variables - random. Discrete & continuous distributions - Expected values & functions. Moment generating function and Charasteristic functions - Chebychev's inequality statements of uniqueness theorem & inverse theorems on charasteristics functions.

STANDARD DISTRIBUTIONS:

Binomial, poisson, normal & uniform Sampling distribution of Statistics based on normal distribution - X2, F concept of bivariate distributions, Correlation and regression, Linear prediction, rank Correlation Coefficient, Partial & multiple Correlation. Sample moments & their functions. Notion of sample - statistic - X2 - distribution, t, Fisher's Z disltribution - distribution of regression coefficients.

SIGNIFICANT TESTS:

Concepts - parametric tests for small & large samples - X2 test - test of Independance by contingency table - theory of hypothesis testing - Power function - Most powerful tests Uniformly most powerful test - unbiased tests.

IV. FLUID DYNAMICS:-

Compressible flow; effects of compressibility, Linearised theory, thermodynamical consideration, energy equation, plane shock waves, oblique shockwaves, prantle-mayer expansion - Navier stoke's equation - dissipation of energy - diffusion of vorticity condition of no slip - steady flow between concentric rotating cylinder - steady viscos flow in tubes of uniform cross section - uniqueness theorem, Reynolds number, Boundary Layer thoery.

V. GRAPH THEORY:-

Graphs and simple graphs, subgraphs, vertex degrees, paths and connection, cycles, trees cutedges and bends, cut vertices, Cayle Y's formula, connectivity the travelling salesman problem, Blocks, Euler Tours, Hamilton cycles, matching and coverings in Bipartite - Graphs, perfect matchings, Edge chrometic number, Vizing's theorem. Independent series - Ramsey's theorem, Turan's theorem, Chromatic number, Brooks theorem.

VI. FUNCTIONAL ANALYSIS:-

Fundamentals of normed Linear spaces, bounded Linear maps on Banach spaces, open mapping theorem, converse of Reimann Lebseque Lemma, spaces of bounded linear maps, weak and weak

convergence, compact linear maps, geometry of Hilbert space, Approximation and optimasation, Bounded operators of Hilbert spares, spectrum of bounded operators on Hilbert spaces.