Syllabus
Subject: Mathematics

1- Algebra

Theory of equations, A.P., G.P. and H.P., sum of squares and cubes of natural numbers, permutation and combination, binomial theorem, exponential and logarithmic series.

Algebra of sets, relation and function, types of relations, equivalence relation, types of functions, composition of functions, inverse of a function, binary operations on a set, group, subgroup, normal subgroup, quotient group, cyclic group, order of an element in a group, permutation group, even and odd permutations, Lagrange's theorem and its consequences, group homomorphism. Determinants, types of matrices, algebraic operations on matrices, symmetric and skew symmetric matrices, Hermitian and skew Hermitian matrices, inverse of a matrix, rank of a matrix, application of matrix in solving system of linear equations, eigen values, eigen vectors of a matrix, Cayley-Hamilton's theorem and its applications.

2- Real Analysis

Sequence of real numbers, bounded and monotonic sequences, convergent sequences, convergence of series of positive terms, comparison test, Cauchy's nth root test, ratio test, Raabe's test, logarithmic test, De Morgan and Bertrand test. alternating series and Leibnitz test.

3- Vector Analysis

Operations with vectors, scalar and vector product of two and three vectors and its applications, vector differentiation, gradient, divergence and curl,

4- Complex Analysis

Complex numbers, functions of a complex variable, De-Moivre's theorem and its applications, n^{th} roots of unity, exponential, direct and inverse trigonometric, hyperbolic and logarithmic functions of a complex Variable. Continuity and differentiability of complex functions, Cauchy-Riemann equation, analytic functions, harmonic functions.

5. Calculus

Limit of a function, continuity and differentiability, Rolle's theorem, Langrange's mean value theorem, L'Hospital rule, successive differentiation, tangent and normal, maxima and minima, Increasing and decreasing functions. Limit, continuity and differentiability of function of two variables, partial differentiation. Methods of integration, definite integrals, application of integration to find area bounded by curves, length of a curve, surface area and volumes of solids of revolution.

Solutions of differential equations of first order and of first degree.

6- Geometry

General equation of second degree and its classification as pair of straight lines, circle, parabola, ellipse and hyperbola, Asymptotes of hyperbola, Transferring of origin and rotation of axis.

Direction cosines and direction ratio's of a line, Cartesian and Vector equation of a plane, Cartesian and vector equation of a line, coplanar and skew lines, shortest distance between two lines, angle between two planes, two lines, a line and a plane, distance of a point from a plane, sphere, cone and cylinder.

7- Statistics and Probability

Frequency distribution, Graphical representation of statistical data, Measures of central tendency - Mean, median and mode of grouped and ungrouped data. Theorems on addition and Multiplication of probability.