# SUBJECT : MATHEMATICS

1. Algebra : Elements of Set Theory, Algebra of Real and Complex numbers including De Moivee's theorem Polynomials and polynomial Equations, Relations between Coefficients and Roots, Symmetric functions of roots.

Elements of Group Theory; Sub-Groups, Cyclic groups, permutation Groups and their elementary properties.

Rings. Integral Domains and Fields and their elementary Properties.

2. Vector Spaces and Matrice : Vector space, Linear Dependence and Independence, Sub-spaces, basis and Dimensions, Finite Dimensional Vector Spaces, Linear Transformation of a Finite dimensional Vector Spee, Matrix Representation, Singular and Non -singular Transformations, Rank and Nullity.

3. Matrices : Addition, Multiplication, Determinants of a matrix, Properties of Determinants of order n, Inverse of a Matrix, Cramer's rule.

4. Geometry and Vectors : Analytic Geometry of straight lines and conics in Certesian and Polar coordinates. Three Dimensional geometry for planes, straight lines, sphere, cone and cylinder, Addition, Substraction and Products of Vectors and Simple Applications to geometry.

5. Calculus : Functions, Sequences, Series, Limits, Continuity, Derivatives, Application of Derivatives; Rates of change, Tangents, Normals, Maxima, Minima, Rolle's Theorem, Mean value Theorems of Lagrange and Cauchy, Asymptotes, Curvature methods of finding indefinite integrals, Definite integrals, Fundamental Theorem of Integral Calculus, Application of definite integrals to area, length of a plane curve, Volume and Surfaces of revolution.

6. Ordinary Differential Equations : Order and Degree of a differential Equation, First order differential Equations, Singular solution, Geometrical interpretation, Second order equations with constant coefficients.

7. Mechanics : Concepts of particles, Lamina, Rigid body, Displacement, Force, Mass, Weight, Motion, Velocity, Speed, Acceleration, Parallelogram of forces, Parallelogram of velocity, acceleration, resultant, equilibrium of coplanar forces, moments Couple, Friction, Centre of mass, Gravity, Laws of motion, Motion of a particle in a straight line, Simple Harmonic Motion, Motion under conservative forces, Motion under gravity, Projectile, Escape velocity, Motion of artificial satellites.

8. Elements of Computer Programming : Binary system, Octal and Hexadecimal systems, Converse to and from Decimal systems, Codes Bits, Bytes and Words, Memory of Computer, Arithmetic and logical operations on numbers. Precisions, AND, OR, XOR, NOT, and Shift/Rotate operators, Algorithms and Flow Charts.