

## MATHEMATICS (CODE NO. 07)

### 1. Trigonometry and Polynomial Equations

Demoiver's theorem and it's application, Direct and Inverse, Circular and hyperbolic function. Logarithm of complex quantities. Expansion of trigonometric functions. Relation between roots and coefficient of polynomial equations. Transformation of equations. Descarte's rule of sign.

### 2. Matrices and Determinants

Definition of matrices & determinants, addition, multiplication of matrices, elementary operation on matrices. Adjoint of matrices, inverse and rank of matrices, application of matrices to system of linear equations, Cramer's rule.

### 3. Differential Calculus

Limit, continuity & differentiability of function of one variable, differentiation of functions, Application of differentiation on maxima & minima. Tangents & Normals. Expansion of functions. Mean value theorem, Taylor's theorem, Taylor and Maclaurin series. Successive differentiation. Lebnitze's Theorem.

### 4. Integral Calculus

Definition of Integration as a sum. Various methods of integration. Integration by substitution & by parts. Definite Integrals. Beta and Gamma functions, Double & triple integration. Change of order of integration of Double integrals. Rectification and Quadrature.

### 5. Differential Equations

Differential Equations of first order and first degree, variable separable, exact, homogenous forms. Linear differential equations. Linear Differential Equations of higher order with constant coefficients.

### 6. Abstract Algebra

Definition of Group with examples & proprieties. Sub-groups, cyclic group, Coset - decomposition. Lagrange's theorem. Normal sub group. Quotient Group. Homomorphism and isomorphism of groups. Permutation Group, Introduction to Rings, Subrings and ideals,

Integral domain & field. Definition of Vector space, subspace, and properties of Vector spaces.

### **7. Vector Analysis & Geometry**

Scalar and vector product of two, three & four vectors. Reciprocal vectors, vector differentiation. Gradient, divergence & curl. Equation of straight lines in Cartesian & polar coordinates. Circle, parabola and ellipse and their tangent & normal in two dimensions.

### **8. Mechanics**

Law of parallelogram of forces. Triangle of forces. Lami's theorem & its applications. Newton's laws of motion. Motion in a straight line - motion under gravity.