MT-100   INTRODUCTION TO MATHEMATICS

Algebra:
Complex Number: Properties of complex numbers, conjugates and modules. Geometrical representation of complex numbers a+ ib.

Quadratic Equations:
Roots of a quadratic equation (real, distinct, equal and imaginary roots). Formation of quadratic equation when the roots are given.

Cube Roots of Unity:
Properties of cube root of unity.

Matrices:
Properties, sum, difference and multiplication of matrices. Cramer's rule, solution of linear equations of three unknowns.

Determinants:
Properties, addition, subtraction and multiplication of determinants, sequence and series, arithmetic progression, standard forms of an A. P.; arithmetic means. Geometric progression, standard forms of a G. P., sum of Infinite geometric series, geometric means. Harmonic progression, harmonic means. Relation between H.M.,A.M. and G.M.

Permutation and Combination:
Recognition between permutation and combination cases, factorial n!, 0! = 1 etc.

Binomial Expression:
Expansion of type for positive integer of 'n'. Use of the general term and determine the middle term or terms of the expansion.

Partial Fraction:
Resolve into partial fractions, proper fraction, improper fraction, when all factors of denominator are linear but some are repeated. When denominator has repeated irreducible quadratic factors.

Functions:
One-one function, onto function, even function, odd function, exponential function, trigonometric function and logarithmic function.

Circular Measure:
Understand the definition of radians and use the relationship between radians and degrees.

Trigonometric Functions:
Basic functions e.g. sine, cosine, tangent etc. relation between them. Trigonometric identities sum and difference formulae, multiple angle formulae. Express type $\{a(\sin?) + b(\cos?)\}$ in $R\sin(? \pm f)$ etc. Inverse functions.

Differential Calculus:

Limits: Basic concepts; limit of form $\{(\sin x)/ x\} = \text{I}$; when x tends to zero. Exponent functions and type a^x etc.

Differentiation:
Differentiation of ^{n} product and quotient formula, trigonometric functions, exponents and logarithmic functions. Differentiations, minima and maxima, tangent and normal, velocity and acceleration, rate of reaction etc.

Integral Calculus:
Basic Integration: Integrals of sum powers of ", trigonometric functions, exponent functions and logarithmic functions.

Integration by parts: e.g sin, e and log etc.

Substitution method; understanding of integration form $\{f(\ )/f(\ )\}$ and $[f(\ )]^n f(\ )$ etc. Standard Application of integration: Area, volume, velocity and acceleration.

Coordinate Geometry:
Lines: Find length, mid-point, gradient of line segment, given the coordinates of end points. Different forms of equation of a line. Angle between two lines, distance of a point from a line.

Conic Sections:
Circle: Equation of circle using radius and coordinate of center. Tangents and normal.
Parabola: Equation of parabola, focus, vertex, directrix and intersection of parabola.
Ellipse: Equation of ellipse, eccentricity, foci, latus rectum, major and minor axes.
Hyperbola: Equation of hyperbola, foci, directrices, eccentricity and latus rectum etc.