SYLLABUS FOR MATHEMATICS

Matrices and determinants :-

Concept, notation, order,equality,types of matrices, transpose of matrix, complex matrix, symmetric , skew symmetric matrices, hermitian and skew hermitian matrices, addition , multiplication, scalar multiplication of matrices,concept of elementary row and coloumn operation, invertible matrices,inverse of matrix.

Determinant of square matrix,properties of determinants,minors, co-factors, adjoint of matrix,inverse of matrix, area of triangle.

Consistency ,inconsistency and number of solutions, system of linear equations, to find Rank, inverse of matrix,eigen value and eigen vector, cayley Hamilton theorem.

Complex numbers and quadratic equations:-

Solving quadratic equation having imaginary solution, definition of complex number, conjugate, modulus of complex number, argument of complex number.

Argand plane and polar representation of complex number,fundamental theorem of algebra , square root of complex number,algebra of complex number, complex plane, power series, trigonometric and hyperbolic functions.

Sets :-

Definition of sets , representation, types of sets, infinite set, finite set, subsets, power sets, venn diagram,union and intersection of sets, difference of sets, complement of a set, supremum and infimum of set, elements of a point, set theory including properties of open ,closed and compact sets, basic notation of set theory, countable and uncountable sets.

Binomial expansion :-

Statement and proof of the binomial theorem for positive integral indices, pascal's triangle, general and middle term in binomial expansion,Bolzano weierstrass theorem, Heine boral theorem.

Permutation and combination :-

Fundamental principle of counting, factorial permutation and combination, derivative of formulae and connections,simple application of Pigeon hole principle,inclusion-exclusion principle.

Algebra and number theory :-

Fundamental theorem of arithmetic, divisibility in Z, congruences, Chinese remainder theorem, Euler's function,primitive roots.

Group, subgroup , normal subgroup , Quotient group, homomorphism, cyclic group, Cayley's theorem.

Rings, ideals, prime and maximal ideals, Quotient rings, unique factorization,Domain, Principle ideal domain, Euclidean domain.

The division algorithm, the greatest common divisor, least common multiple, Euclidean algorithm, Diaphantine equation,………..prime numbers and their distribution, fundamental theorem of arithmetic.

Sequence and series :-

Sequence, series, arithmatic progression, arithmatic mean, geometric progression, geometric mean, general term of A.P. , G.P. , sum of A.P. , G.P. , arithmatic geometric series, H.P., A.M., G.M., H.M.

Trigonometric function :-

Positive and negative angles, measuring angles in radians and in degrees and conversion from one measure to another, definition of trigonometric function with the help of unit circle, trigonometric identities, signs of trigonometric functions, sketch of their graphs, general solution of trigonometric equations of the type $\sin\theta = \sin\Omega$, $\cos\theta = \cos\Omega$ and $\tan\theta = \tan\Omega$.

Straight lines :-

Shifting of origin, slope of lines and angle between two lines, various forms of equations of a line parallel to axes, one point form,two point form, slope intercept form, intercept form, normal form, general equation of a line, equation of family of lines passing through the point of intersection of two lines, distance of a point from a line, intersecting point of two lines.

Conic section :-

Section of a cone, circle, ellipse, parabola, hyperbola, a point, a straight line and pair of straight lines, generated case of conic section, normal forms,tangent forms.

Vector space :-

Vectors and scalars, magnitude and direction of a vector, directional ratios, direction cosines of a vector, types of vectors, position vector, negative of a vector, addition of two vectors, scalar product of two vectors, vector product of two vectors, scalar multiplication,scalar triple product , projection of a vector on another vector.

Three dimensional Geometry :-

Direction ratios and direction cosines of a line joining two points, Cartesian and vector equation of a line, coplanar and skew lines, shortest distance between two lines, Cartesian and vector equation of a plane, angle between two lines, angle between two planes, angle between line and plane, distance of a point from a plane.

Linear inequalities :-

Linear inequalities, algebraic solutions of linear inequalities in one variable and their representation on number line, graphical solution of linear inequalities in two variables, solution of system of linear inequalities in two variables.

LPP :-

Definition of related terminology such as constraints, objective functions ,optimization, different types of LPP, mathematical formation, graphical method in two variables,feasible solution.

Limits , Continuity and Derivative :-

Idea of limits, Lim sup., Lim inf. , definition of derivative, slope of tangent, derivative of sum, difference,product and quotient function, derivative of all functions, Meam value theorem, derivative of implicit function, inverse trigonometry , parametric form.

Application of derivative, tangents and normals, maxima and minima, Rolle's theorem, Lagrange's mean value theorem.

Integrals :-

Integration as inverse process of differentiation,integration of functions,partial function, integration by parts,definite integrals as a limit of sum, Fundamental theorem of calculus, double integration, triple integral, change of order of integration in double integrals, centre of gravity and moment of inertia.

Mechanics :

Statics and Dynamics:- Forces acting at a point , Triangle law of forces , parallelogram law of forces , polygon law of forces , friction , centre of gravity , newtons laws, momentum, moment , laws of motion , projectile , uniform and non uniform motion.