

the limit of a function, fundamental theorem on limits, algebra of limits – standard limits, without proof, limits at infinity – concepts, simple problems.

8. Differentiation

Definition : derivative, derivative at a point, geometrical significance of derivative, physical significance (velocity as a rate of change of displacement), derivatives from first principle - of trigonometric functions, logarithmic functions, algebraic functions, exponential functions, rules of differentiation – derivative of sum, difference, product and quotient.

9. Integration

Definition of integration as antiderivative, geometrical interpretation of indefinite integrals, algebra of integrals – integrals of some standard functions, rules of integration.

10. Statistics

Measures of dispersion – range, quartile & quartile deviation (for grouped and ungrouped data), comparison of two frequency distributions with same mean, mean deviation about mean, mean deviation about median (for grouped & ungrouped data), variance, standard deviation, effect of change of origin and scale on variance and standard deviation, combined variance and standard deviation, co-efficient of variation.

11. Probability

Revision, types of events – events and algebra of events, axiomatic definition of probability, mutually exclusive and exhaustive events, mutually exclusive events, addition theorem – for any two events A and B, Result on complementary

events. Conditional probability – definition, multiplication theorem, independent events, Baye's theorem, odds in favour and against.

List of Practicals: XI

1. Problems on locus.
2. Family of lines.
3. Tracing of Conics I.
4. Tracing of Conics II.
5. Applications of vectors (Dot and cross product).
6. Linear inequation.
7. Applications of determinants.
8. Algebra of matrices.
9. Tracing of graphs of functions.
10. Numerical problems using laws of logarithms.
11. Power and square root of a complex number, cube root of unity.
12. Examples on special series.
13. Permutations and combinations.
14. Mathematical induction.
15. Binomial theorem.
16. Limits.
17. Differentiation.
18. Integration.
19. Measures of dispersion.
20. Probability.

Std. XII : PART – 1

1. Mathematical Logic

Statements - Introduction, sentences and statement, truth value of statement, open sentences, compound statement, quantifier and quantified statements, logical connectives : conjunction, disjunction, negation, implication/ conditional,



biconditional, truth tables of compound statements, examples related to real life and mathematics, statement patterns and logical equivalence - tautology, contradiction, contingency, duality, negation of compound statement, contrapositive, converse, inverse, algebra of statements-idempotent law, associative law, commutative law, distributive law, identity law, complement law, involution law, DeMorgan's laws, difference between converse, contrapositive, contradiction, application-introduction to switching circuits (simple examples).

2. Matrices

Elementary transformation of a matrix-revision of cofactor and minor, elementary row transformation, elementary column transformation, inverse of a matrix-existence and uniqueness of inverse of a matrix, inverse by elementary transformation, adjoint method, application-solution of system of linear equations by – reduction method, inversion method.

3. Trigonometric functions

Trigonometric equations-general solution of trigonometric equation of the type : $\sin\theta = 0$, $\cos\theta = 0$, $\tan\theta = 0$, $\sin\theta = \sin\alpha$, $\cos\theta = \cos\alpha$, $\tan\theta = \tan\alpha$, $\sin^2\theta = \sin^2\alpha$, $\cos^2\theta = \cos^2\alpha$, $\tan^2\theta = \tan^2\alpha$, $a\cos\theta + b\sin\theta = C$ solution of a triangle : polar coordinates, sine rule, cosine rule, projection rule, area of a triangle, application, Hero's formula, Napier Analogues, inverse trigonometric functions-definitions, domain, range, principle values, graphs of inverse

trigonometric function, properties of inverse functions.

4. Pair of straight lines

Pair of lines passing through origin-combined equation, homogenous equation, theorem-the joint equation of a pair of lines passing through origin and its converse, acute angle between the lines represented by $ax^2+2hxy+by^2=0$, condition for parallel lines, condition for perpendicular lines, pair of lines not passing through origin-combined equation of any two lines, condition that the equation $ax^2+2hxy+by^2+2gx+2fy+c=0$ should represent a pair of lines (without proof), acute angle between the lines (without proof), condition of parallel and perpendicular lines, point of intersection of two lines.

5. Circle

Tangent of a circle-equation of a tangent at a point to 1) standard circle,2) general circle, condition of tangency only for line $y = mx + c$ to the circle $x^2 + y^2 = a^2$, tangents to a circle from a point outside the circle, director circle, length of tangent segments, normal to a circle-equation of normal at a point.

6. Conics

Tangents and normals-equations of tangent and normal at a point for parabola, ellipse, hyperbola; condition of tangency for parabola; ellipse, hyperbola; tangents in terms of slope for parabola, ellipse, hyperbola, tangents from a point outside conics, locus of points from which two tangents are mutually perpendicular, properties of tangents and normals to conics (without proof).



7. Vectors

Revision, Collinearity and coplanarity of vectors : linear combination of vectors, condition of collinearity of two vectors, conditions of coplanarity of three vectors, section formula : section formula for internal and external division, midpoint formula, centroid formula, scalar triple product : definition, formula, properties, geometrical interpretation of scalar triple product, application of vectors to geometry- medians of a triangle are concurrent, altitudes of a triangle are concurrent, angle bisectors of a triangle are concurrent, diagonals of a parallelogram bisect each other and converse, median of trapezium is parallel to the parallel sides and its length is half the sum of parallel sides, angle subtended on a semicircle is right angle.

8. Three dimensional geometry

Direction cosines and direction ratios: direction angles, direction cosines, direction ratios, relation between direction ratio and direction cosines, angle between two lines, condition of perpendicular lines.

9. Line

Equation of line passing through given point and parallel to given vector, equation of line passing through two given points, distance of a point from a line, distance between two skew lines, distance between two parallel lines (vector approach).

10. Plane

Equation of plane in normal form, equation of plane passing through the given point and perpendicular to given vector, equation of plane passing through the given point

and parallel to two given vectors, equation of plane passing through three non-collinear points, equation of plane passing through the intersection of two given planes, angle between two planes, angle between line and plane, condition for the coplanarity of two lines, distance of a point from a plane (vector approach)

11 Linear programming problems

Introduction of L.P.P. definition of constraints, objective function, optimization, constraint equations, non-negativity restrictions, feasible and infeasible region, feasible solutions, Mathematical formulation-mathematical formulation of L.P.P. different types of L.P.P. problems, graphical solutions for problem in two variables, optimum feasible solution.

Std. XII - PART – 2**1. Continuity**

Continuity of a function at a point : left hand limit, right hand limit, definition of continuity of a function at a point, discontinuity of a function, types of discontinuity, algebra of continuous functions, continuity in interval-definition, continuity of some standard functions-polynomial, rational, trigonometric, exponential and logarithmic function.

2. Differentiation

Revision- revision of derivative, relationship between continuity and differentiability-left hand derivative and right hand derivative (need and concept), every differentiable function is continuous but converse is not true, Derivative of



composite function-chain rule, derivative of inverse function, derivative of inverse trigonometric function : Derivative of implicit function definition and examples, derivative of parametric function – definition of parametric function , exponential and logarithmic function-derivative of functions which are expressed in one of the following form a) product of functions, b) quotient of functions, c) higher order derivative, second order derivative d) $[f_{(x)}]^{[g(x)]}$

3. Applications of derivative

Geometrical application-tangent and normal at a point, Rolle's theorem, and Mean value theorem and their geometrical interpretation (without proof), derivative as a rate measure-introduction, increasing and decreasing function, approximation (without proof), Maxima and minima-introduction of extrema and extreme values, maxima and minima in a closed interval, first derivative test, second derivative test.

4. Integration

Indefinite integrals-methods of integration, substitution method, integrals of the various types, integration by parts (reduction formulae are not expected), integration by partial fraction-factors involving repeated and non-repeated linear factors, non-repeated quadratic factors, definite integral-definite integral as a limit of sum, fundamental theorem of integral calculus (without proof), evaluation of definite integral 1) by substitution, 2) integration by parts, properties of definite integrals.

5. Applications of definite integral

Area under the curve : area bounded by curve and axis (simple problems), area bounded by two curves, volume of solid of revolution-volume of solid obtained by revolving the area under the curve about the axis (simple problems).

6. Differential equation

Definition-differential equation, order, degree, general solution, particular solution of differential equation, formation of differential equation-formation of differential equation by eliminating arbitrary constants (at most two constants), solution of first order and first degree differential equation-variable separable method, homogeneous differential equation (equation reducible to homogeneous form are not expected), Linear differential equation, applications : population growth, bacterial colony growth, surface area, Newton's laws of cooling, radioactive decay.

7. Statistics

Bivariate frequency distribution - bivariate data, tabulation of bivariate data, scatter diagram, covariance of ungrouped data, covariance for bivariate frequency distribution, Karl Pearson's coefficient of correlation.

8. Probability distribution

Probability distribution of a random variable-definition of a random variable, discrete and continuous random variable, probability mass function (p.m.f.), probability distribution of a discrete random variable, cumulative probability distribution of a discrete random variable,



expected value, variance and standard deviation of a discrete random variable, probability density function (p.d.f.), distribution function of a continuous random variable.

9. Bernoulli trials and Binomial distribution

Definition of Bernoulli trial, conditions for Binomial distribution, binomial distribution (p.m.f.), mean, variance and standard deviation, calculation of probabilities (without proof), Normal distribution : p.d.f., mean, variance and standard deviation, standard normal variable, simple problems (without proof).

List of Practicals : XII

1. Applications of logic.
2. Inverse of a matrix by adjoint method and hence solution of system of linear equations.
3. Inverse of a matrix by elementary transformation and hence solution of system of linear equations.
4. Solutions of a triangle.
5. Tracing of tangents and normals for circle and parabola.
6. Tracing of tangents and normals for ellipse and hyperbola.
7. Applications of scalar triple product of vectors.
8. Three dimensional geometry - line.
9. Three dimensional geometry - plane.
10. Formations and solutions of LPP.
11. Applications of derivatives (Geometric applications).
12. Applications of derivatives – Rate measure.
13. Applications of derivatives - Maxima and minima
14. Applications of definite integrals - Limit of a sum.
15. Applications of definite integrals - Area.
16. Applications of definite integrals - volume.
17. Applications of differential equations.
18. Bivariate frequency distribution.
19. Expected value, variance and S.D of a random variable.
20. Binomial distribution.

