Maharashtra Board Syllabus for Class 12 Math

MATHEMATICS AND STATISTICS STD. XII
PART – I

1. Mathematical Logic :

Statements - Introduction, sentences and statement, truth value of statement, open sentences and truth sets, compound statement, quantifier and quantified statements, logical connective-conjunction, disjunction, negation, implication/ conditional, biconditional, there exists, truth tables of compound statements, examples related to real life and mathematics, statement patterns and logical equivalence-tautology, contradiction, contingency, logical equivalence, logical equivalence, 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, solution of Trigonometric equations, sine rule, cosine rule, projection rule, area of a triangle, application, Hero‟s formula, Napier Analogues, inverse trigonometric functionsdefinitions, 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, angle between the lines represented by $ax^2+2hxy+by2=0$, 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 ax2+2hxy+by2+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, Collinearly and coplanerity of vectors-linear combination of vectors, condition of collinearity of two vectors, conditions of coplanerity ofthree 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 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, dist. 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 coplanerity 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 – II

1. Continuity :

Continuity of a function at a point-left hand limit, right hand limit, definition of a 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

3. Application of derivative :

Geometrical application-tangent and normal at a point, Rolls theorem, and Mean value theorem and their geometrical interpretation (without proof), derivative as rate measure-introduction, increasing and decreasing function, approximation (without proof),
Maxima and minima-introduction of extreme 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 type, integration by parts-integration by parts, integrals of type (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 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, homogenous differential equation (equation reducible to homogenous 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 or ungrouped data, covariance for bivariate frequency distribution, Karl Pearson‟s co-efficient 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).