Odisha Board Class 12 Maths Syllabus

Note: No chapter wise weightage, care to be taken to cover chapters in books.

Books Recommended:

Bureau's Higher Secondary (+2) Geography, Part-I & II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

SYLLABUS

MATHEMATICS (+2 2nd year)
Course Structure

Unit	Topic	Marks	
I	Relations and Functions & Linear Programming	20	45
II	Algebra and Probability	20	45
III	Differential Calculus	20	45
IV	Integral Calculus	20	45
V	Vector 3-D Geometry	20	45
	Total	**100**	**220**

No. of Periods

General Imstructions :

1. All questions are compulsory in Group A, which are very short answer type questions. All questions in the group are to be answered in one word, one sentences or as per exact requirement of the

    question.   (1x10=10 Marks)

2.   Group-B contain 5(five) questions and each question have 5 bits, out of which only 3 bits are to be
      answered (Each bit caries 4 Marks)   (**4 x15**=60 Marks)

3.   Group-C contains 5(five) questions and each question contains 2/3 bits, out of which only 1(one) bit
      is to be answered. Each bit caries 6(six) Mark   (**6x5 =**30 Marks)

UNIT - I : Relations and Functions

1.   Relations and Functions

Types of relations ; reflexive, symmetric, transitive and equivalence relations. One to one and
onto functions, composite functions, inverse of function. Binary operations.

2.   Inverse Trigonometric Functions

Definition, range, domain, principle value branch. Graphs of inverse trigonometric functions.
Elementary properties of inverse trigonometric functions.

3.   Linear Programming

Introduction, related terminology such as constraints, objective function, optimization, different
types of linear programming (L.P.) problems, mathematical formulation of L.P. problems, graphical
method of solution for problems in two variables, feasible and infeasible regions (bounded and
unbounded), feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial
constraints).

UNIT - II : Algebra

1.   Matrices

Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a
matrix, symmetric and skew symmetric matrices. Operation on matrices; Addition and
multiplication and multiplication with a scalar. Simple properties of addition, multiplication and
scalar multiplication. Non commutativity of multiplication of matrices and existence of non-zero
matrices whose product is the zero matrix (restrict to square matrices of order 2). concept of
elementary row and column operations. Invertible matrices and proof of the uniqueness of inverse,
if it exists; (Here all matrices will have real entries).

2.   Determinants

Determinant of a square matrix (up to 3×3 matrices), properties of determinants, minors, co-
factors and applications of determinants in finding the area of a triangle, Adjoint and inverse of a
square matrix. Consistency, inconsistency and number of solutions of system of linear equations
by examples, solving system of linear equations in two or three variables (having unique solution)
using inverse of a matrix.

3.   Probability

Conditional probability, multiplication theorem on probability. Independent events, total probability,
Baye's theorem, Random variable and its probability distribution, mean and variance of random
variable. Independent (Bernoulli) trials and Binomial distribution.

UNIT-III : Differential Calculus

1.   **Continuity and Differentiability**

Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit functions. Concept of exponential and logarithmic functions.

Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms. Second order derivatives. Rolle's and Lagrange's Mean Value Theorems (without proof) and their geometric interpretation.

2.   **Applications of Derivatives**

Applications of derivatives : rate of change of bodies, increasing and decreasing functions, tangents and normals, use of derivatives in approximation, maxima and minima (first derivative test motivate geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

UNIT-IV Integral Calculus

1.   **Integrals**

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, Evaluation of simple integrals of the following types and problems based on them.

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{ax^2 + bx + c}$$

$$\int \frac{dx}{\sqrt{ax^2 + bx + c}}, \int \frac{px + q}{ax^2 + bx + c} dx,$$

$$\int \frac{px + q}{\sqrt{ax^2 + bx + c}} dx, \int \sqrt{a^2 \pm x^2} dx,$$

$$\int \sqrt{x^2 - a^2} dx,$$

$$\int \sqrt{ax^2 + bx + c} \ dx, \int (px + q)\sqrt{ax^2 + bx + c} \ dx$$

Definite integrals as a limit of a sum, Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

2.   **Applications of the Integrals**

Applications in finding the area under simple curves, especially lines, circles/parabolas/ ellipses (in standard form only). Area between any of the two above said curves (the region should be clearly identifiable).

3.   **Differential Equations.**

Definition, order and degree, general and particular solutions of a differential equation. Formation of differential equation whose general solution is given. Solution of differential equations by method of separation of variables, solutions of homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type :

$\frac{dy}{dx} + py = q$, where p and q are functions of x or constants.

$\dfrac{dx}{dy} + px = q$, where p and q are functions of y or constants.

UNIT - V : Vectors and Three-Dimensional Geometry

1. **Vectors**

   Vectors and scalars, magnitude and direction of a vector. Direction cosines and direction ratios of a vector. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Definition, Geometrical Interpretation, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors, scalar triple product of vectors, Coplanarity of three vectors.

2. **Three - dimensional Geometry**

   Direction cosines and direction ratios of a line joining two points. Cartesian equation and vector equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines, (ii) two planes, (iii) a line and a plane. Distance of a point from a plane.

Books Recommended:

Bureau's Higher Secondary (+2) Elements of Mathematics, Part-II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.