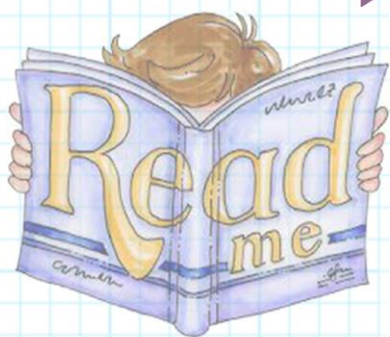


# Syllabus



Course Syllabus



C.B.S.E- i

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## **Preface**

The present syllabus reinforces the ideas introduced in the lower classes while the students learn new concepts besides getting an exposure to contemporary areas of the subject. The syllabus also aims at emphasizing on the underlying principles that are common to both animals and plants as well as highlighting the relationship of biology with other areas of knowledge.

The format of the syllabus allows a simple, clear, consequential flow of concepts without any jarring jumps. The syllabus also stresses on the connection of the study of Biology to real life problems, use of biological discoveries/innovations in everyday life - in environment, industry, health and agriculture. The updated syllabus also focuses on reducing the curriculum load while ensuring that ample opportunities and scope for learning and appreciating basic concepts of the subject continue to be available within its framework.

The prescribed syllabus is expected to

- Promote understanding of basic principles of mathematics
- Encourage learning of emerging knowledge and its relevance to individual and society
- Promote rational/specific attitude to issues related to population, environment and Development
- Enhance awareness about environmental issues and problems and the appropriate solutions
- Create awareness amongst the learners about variations amongst the living, and developing respect for the diversities and to appreciate that the most complex biological phenomena are also built on essentially simple processes.

It is expected that the students would get an exposure to various branches

## **Class XII**

**One Paper Time: 3 Hours, Marks: 70**

Unit	Topics
I	Inverse Trigonometric Function
II	Matrices
III	Determinants
IV	Adjoint and Inverse of a Matrix
V	Differentiability
VI	Application of Derivatives
VII	Indefinite Integrals
VIII	Definite Integrals
IX	Application of Integrals
X	Differential Equations
XI	Annuities
XII	Application of Calculus in Commerce and Economics
XIII	Probability
XIV	Linear Programming

## **UNIT I: Inverse Trigonometric Function**

Definition of inverse trigonometric function in a unit circles, range, domain principal value branches. Graphs of inverse trigonometric functions, Elementary properties of inverse trigonometric functions.

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## UNIT II: Matrices

Concept, notation, order, equality, types of matrices: zero matrix, transpose of matrix, symmetric and skew symmetric matrices, Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication, Noncommutativity of multiplication of matrix and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of orders). 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)

## UNIT III: Determinants

Determinant of a square matrix (upto 3x3 matrices) properties of determinants, minors, cofactors and applications of determinants in finding the area of a triangle, collinearity of points. 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 Cramer's Rule and its applications on word problems.

## UNIT IV: Adjoint and Inverse of a Matrix

Adjoint of a square matrix of order 2x2 and 3x3. Properties of adjoint of a matrix. Inverse of a square matrix. Consistency, inconsistency and number of solutions of a system of linear equations by examples. Solving the system of linear equations in two and three variables by matrix method and its application in word problem.

## UNIT V: Differentiability

Differentiability, Derivative introduced as rate of change of distance function and its Geometric meaning, Definition of derivative relate it to slope of tangent of the curve, derivative of sum, difference, product and quotient of function, Derivative of polynomials and trigonometric function. Derivative of composite functions, chain rule, derivatives of inverse trigonometric functions derivative of implicit functions. Derivatives of logarithmic and exponential functions. Logarithmic differentiation derivative of functions expressed in parametric form second order derivatives.

## UNIT VI: Application of Derivatives

Applications of derivatives rate of change increasing/decreasing functions, maxima and minima (first derivative test Local Maxima /Local Minima and second derivative test Absolute Maxima / Absolute Minima). Simple problems (that illustrate basic principles and understanding to the subject as well as real-life situations).

## UNIT VII: Indefinite Integrals

Integration as inverse process of differentiation, integration of a variety of functions by substitution;

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

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Integration by parts, integration by partial fractions

### ***UNIT VIII: Definite Integrals***

Fundamental theorem of calculus (without proof), Definite integral by substitution, Basic properties of definite integrals and evaluation of definite integrals, Definite integrals as a limit of sum

### ***UNIT IX: Application of Integrals***

Applications in finding the area bounded by a curve and a line. Area bounded between lines. Areas bounded between two curves.

### ***UNIT X: 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, homogeneous differential equations of first order and first degree solutions of linear differential equation of the type:

$$\frac{dy}{dx} + py = q \text{ where } p \text{ and } q \text{ are functions of } x \text{ and}$$

$$\frac{dx}{dy} + px = q \text{ where } p \text{ and } q \text{ are functions of } y$$

### ***UNIT XI: Annuities***

Meaning of an annuity, Types of annuity- ordinary annuity, annuity due, deferred annuity. Amount and present value of an ordinary annuity, annuity due and deferred annuity

### ***UNIT XII: Application of Calculus in Commerce and Economics***

Basic functions - Cost function, demand function, revenue function and profit function. Average and Marginal functions, Maximization and Minimization, Applications of integration to commerce and economics. Determination of cost and average cost function

### ***UNIT XIII: Probability***

Multiplication theorem on probability. Conditional probability, independent events Total probability. Baye's theorem, Random variable and its probability distribution, mean and variance of random variable. Repeated independent (Bernoulli) trials and Binomial distribution, Poisson distribution.

### ***UNIT XIV: Linear Programming***

Introduction, definition of related terminology such as constraints, objective function, optimization, different types of linear programming problems, mathematical formulation of linear programming problems, graphical method of solution for problem in two variables, corner point method and iso-cost line, feasible regions, feasible solutions, optimal feasible solutions (up to three non-trivial constraints), transportation problem.