RELIANCE COLLEGE JR. ESTD-2003 GOLAGHAT

MATHEMATICS

SYLLABUS FOR HIGHER SECONDARY COURSE

The Syllabus in the subject of Mathematics has undergone changes from time to time in accordance with growth of the subject and emerging needs of the society. Senior Secondary stage is a launching stage from where the students go either for higher academic education in Mathematics or for professional courses like engineering, physical and Bioscience, commerce or computer applications. The present revised syllabus has been designed in accordance with National Curriculum Frame work 2005 and as per guidelines given in Focus Group on Teaching of Mathematics 2005 which is to meet the emerging needs of all categories of students. Motivating the topics from real life situations and other subject areas, greater emphasis has been laid on application of various concepts.

Objectives

The broad objectives of teaching Mathematics at senior school stage intend to help the pupil:

- To acquire knowledge and critical understanding, particularly by way of motivation and visualization, of basic concepts,terms, principles, symbols and mastery of underlying processes and skills.
- To feel the flow of reasons while proving a result or solving a problem.
- To apply the knowledge and skills acquired to solve problems and wherever possible, by more than one method.
- To develop positive attitude to think, analyze and articulate logically.
- To develop interest in the subject by participating in related competitions.
- To acquaint students with different aspects of mathematics used in daily life.
- To develop an interest in students to study mathematics as a discipline.
- To develop awareness of the need for national integration, protection of environment, observance of small family norms, removal of social barriers, elimination of sex biases.
- To develop reverence and respect towards great Mathematicians for their contributions to the field of Mathematics.

MATHEMATICS

SYLLABUS FOR HIGHER SECONDARY FINAL YEAR COURSE

One Paper **Time : Three Hours** **Marks 100**

Unitwise Distribution of Marks and Periods :

Unit No.	Title	Marks	Periods
Unit-I	Relations and Functions	10	28
Unit-II	Algebra	13	40
Unit-III	Calculus	44	72
Unit-IV	Vectors Algebra and Three-Dimensional Geometry	17	25
Unit-V	Linear Programming	06	15
Unit-VI	Probability	10	20
	Total	100	200

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APPENDIX :

1. **Proofs in Mathematics :**
2. **Mathematical Modelling :**

Unitwise Distribution of Course contents :

Unit-I RELATIONS AND FUNCTIONS

(i) *Relations :*

Types of relations : (Empty, universal, identity, reflexive, symmetric, antisymmetric and transitive relations in a set) Equivalence relation and equivalence class in a set.

(ii) *Functions :*

Types of functions : (injective, surjective and bijective functions) Composition of functions Invertible function Binary operation.

(iii) *Inverse Trigonometrical functions Basic concepts :*

(domain, co-domain, range (principal value branches) and graphs of inverse trigonometric functions) Properties of inverse trigonometric functions.

Unit-II ALGEBRA

(i) *Matrices*

Concept of a matrix and its notation and order :

Types of matrices (row, column, square, diagonal, scalar identity and zero matrices) Equality of matrices, Operation on matrices (addition of matrices, multiplication of a matrix by a scalar, multiplication of matrices)

Properties of matrix addition, scalar multiplication of a matrix and multiplication of matrices Transpose of a matrix symmetric and skew symmetric matrices. Elementary row and column operations of a matrix. Invertible matrices.

(ii) *Determinants :*

Determinant of a square matrix (up to 3×3 matrices), properties of determinants, Area of a trianglee, Minors and co-factors, Adjoint and inverse of a matrix. Applications of Determinants and matrices.

Unit-III CALCULUS

(i) *Continuity and Differentiability :*

Continuity, differentiability, derivative of composite functions, (chain rule), Derivatives of implicit function, Exponential and logarithmic functions and its differentiation, Logarithmic differentiation, derivatives of functions in parametric forms, second order, derivative, Roll's and Lagrange's mean value theorem (without proof) and their geometrical interpretations.

(ii) *Application of Derivatives :*

Rate of Change of quantities, increasing and decreasing functions, tangents and normals, approximation, maxima and minima.

(iii) *Integrals :*

Integration as an inverse process of differentiation. Integration by substitution, Integration using trigonometric identies. Integration by partial fractions and integration by parts. Evaluation of the integrals of the type–

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

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

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$\int \sqrt{a^2 \pm x^2}\, dx$, and $\int \sqrt{x^2 - a^2}\, dx$ to be evaluated.

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

(iv) *Applications of the Integrals :*

Area under simple curves

Area between two curves.

(v) *Differential Equations :*

Concepts of differential equation, concept of order and degree of a differential equation. General and particular solutions of a differential equation. Formation of a differential equation whose premitive is given. Solution of differential equation with variables separable, solution 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 constants or functions of x only.

Unit-IV VECTOR ALGEBRA AND THREE-DIMENSIONAL GEOMETRY

1. *Vector Algebra :*

Vectors and scalars, magnitude and direction of a vector. Direction cosines/ ratios of vectors. 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. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors.

2. *Three-dimensional Geometry :*

Direction cosines/ ratios of a line joining two points. Cartesian and vectors 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.

Unit-V 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, feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).

Unit-VI 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.

Appendix

1. *Proofs in Mathematics :*

Through a variety of examples related to mathematics and already familiar to the learner, bring out different kinds of proofs : direct, contrapositive, by contradiction, by counter-example.

2. *Mathematical Modelling :*

Modelling real-life problems where many constraints may really need to be ignored (continuing from Class XI). However, now the models concerned would use techniques/ results of matrices, calculus and linear programming.

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