

MATHEMATICS

CLASS- 12



**BOARD OF SECONDARY EDUCATION, RAJASTHAN
AJMER**

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MATHEMATICS

Class - XII

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PREFACE

This book has been written in accordance with the new syllabus for class XII prescribed by the Board of Secondary Education, Rajasthan Ajmer. In presenting the book the basic object of the syllabus has been fully kept in mind and an attempt has been made to acquaint the students with the contribution of Indian Mathematician towards the development of scientific traditions. The contribution of Indian Mathematician have been mentioned at appropriate places. Every effort has been made to present the subject in simple and lucid manner Important principal have been explained in detail.

In the interest of the students sufficient number the illustrative examples have been given. At the end of each chapter a summary of the chapter is given in the form of important points, which will help the students in revision. In each chapter objective, short and essay type questions have been given in sufficient number in the miscellaneous exercise.

We hope the book will be useful to students. Students, teachers and reviewers are requested to send their comments, suggestions and to point out any shortcoming in the book, so that the desired improvement in the book can be made in the subsequent edition.

Authors

SYLLABUS

MATHEMATICS

Class-XII

Question paper	Marks for question paper	Sessional Marks	Max. Marks
Single	80	20	100

Time- 3.15 hours

Max. Marks - 80

S.N.	Name of Unit	Marks
1.	Composite Function	7
2.	Algebra	10
3.	Calculus	38
4.	Vector and Three-Dimensional Geometry	14
5.	Linear Programming	4
6.	Probability	7

Details of the Syllabus

Unit I. Composite Function

7

1. Function

Introduction and previous learning, properties of composite function, Inverse function, Domain of a inverse function, Range, Properties of inverse function, binary operation, modulo system.

2. Inverse Circular function

Definition, range, domain, principal value, general value, graph of inverse circular functions, relation and properties between inverse circular functions.

Unit II. Algebra

10

1. Matrix

Concept of matrix, notation, order, equality, type of matrices, null matrix, a tranpose of matrix, symmetric and skew-symmetric matrix, Addition of matrices, properties of addition operations, multiplication, properties of multiplication operation and properties of scalar product. Existence of non-zero matrices whose multiplication is a null matrix (the limitation of square matrices upto 2 order). (Here the elements of these matrices are real numbers).

2. Determination

Determinant of a square matrix (upto 3 x 3 square matrices) properties of determinants, minor, co-factor and expansion of determinants, elementary operations, multiplication of determinants.

3. Inverse Matrix and Linear Equations

Introduction, Non-singular matrix, singular matrix, Adjoint of a square matrix, inverse of a matrix, some important theorems, application of determinants - area of triangle, condition of co-linearity of three points, equation of a line passing through two points, solution of system of linear equations - (1) by Cremer's rule (2) help of matrix principal.

Unit III. Calculus

38

1. Continuity and differentiability, Derivative of composite functions, chain rule, inverse trigometrical functions, Derivative implicit functions, concept and derivative of exponential and logarithmic functions, derivative of parametric functions, second order derivatives, Roll's and Lagrange's mean value theorem (without proof) and geometrical meaning of these theorems.

2. Application of derivatives

Application of derivatives : rate of change of quantities, increasing and decreasing functions, Tangents and normals, Approximations from the derivatives, methods to find maximum and minimum values. Simple applications of maxima and minima. (which shows the basic concepts of the subject and related to the real life)

3. Integration

Integration is the inverse process of the differentiation, integration of the different type of functions - by substitution, integration by resolving into partial fractions and integration by parts. To evaluate the integrations as follows :-

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}$$
$$\int \frac{px + q}{ax^2 + bx + c} dx, \int \frac{px + q}{\sqrt{ax^2 + bx + c}} dx, \int \sqrt{a^2 \pm x^2} dx \quad \text{and} \quad \int \sqrt{x^2 - a^2} dx$$
$$\int \sqrt{ax^2 + bx + c} dx, \int e^{ax} \sin bx dx, \int e^{ax} \cos bx dx$$

Definite integral as a limit of sum, fundamental theorem of calculus (without proof), basic properties of definite integral, to evaluate the definite integrals.

4. Application of integral :

Application : Area under simple curves, specially lines, area of circle / parabolas / ellipses (those in standard forms only), Area between two curves (those areas which can be recognize easily).

5. Differential equations :

Definition, order and degree, formation of differential equations, general and particular solution of differential equations, solution of first order and first degree differential equations, variable separation form, solution of homogenous equations, linear differential equation solution of differential equations reducible to linear differential equations.

Unit IV. Vector and Three-Dimensional Geometry

14

1. Vector

Vector and scalar, magnitude and direction of a vector, types of vector (equal, magnitude, null, parallel and collinear vector), position vector of a point, negative vector, components of a vector. Addition of vectors, multiplication of a vector by a scalar. Vector joining two points, section

formula. Position vector of a point divided by section formula. Product of two vectors and its properties, scalar (dot) product and its properties vector, product of three vector, scalar product of three vectors.

2. Three-Dimensional Geometry

Direction ratio and direction cosine of a line passes through two points, equation of a line in cartesian form and vector form. Angle between two lines, intersection of two lines, perpendicular distance of a point from a line, coplanar and skew lines. The shortest distance between two skew lines, distance between two parallel lines cartesian and vector equation of a plane. (1) Angle between two planes, (2) Angle between a plane and a line, distance of a point from a plane.

Unit V. Linear Programming

4

Introduction, Linear programming problem and its mathematical formulation, the definition of various steps for example : constraints, objective functions, optimal solution, feasible solutions, various types of linear programming problems. Different type of application of linear programming problems.

Unit VI. Probability and probability distribution

7

Conditional probability, multiplication rule of probability, independent events, total probability, Baye's theorem, random variables and its probability distribution, mean and variance of a random variable. Bernoulli's trials and Binomial distribution.

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