

 UPKAR'S

# CDS

COMBINED DEFENCE SERVICES

# MATHEMATICS

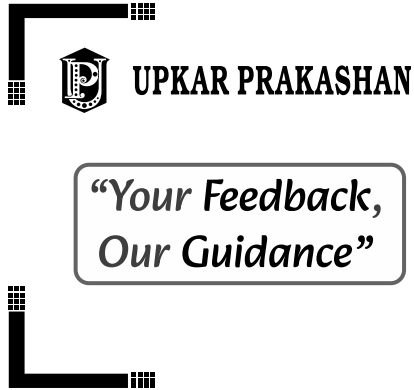


By

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# Preface

*Although students study Mathematics from their elementary classes onward, special preparation is required to excel in competitive examinations. Numerous books are available in the market; however, some are too concise to explain concepts effectively, while others are excessively detailed, causing students to spend valuable time on a single subject at the expense of their overall preparation.*

*Keeping these challenges in mind, we felt the need to prepare a book that would combine clarity, comprehensiveness, and efficiency, enabling students to benefit from our knowledge and experience.*

*Every effort has been made to ensure that aspirants gain maximum benefit in minimum time. The book has been prepared in accordance with the latest syllabus and is specifically designed for candidates appearing for the UPSC Combined Defence Services (CDS) Examination. Recent examination questions have been incorporated at appropriate places throughout the book, and concise study material has been provided at the beginning of each chapter to strengthen conceptual understanding.*

*We express our sincere gratitude to UPKAR PRAKASHAN for bringing this book to readers. We are also thankful to Mrs. Indra Srivastava for her constant support and encouragement.*

*We hope that this book proves to be a useful and reliable guide for aspirants. Suggestions and constructive feedback for further improvement will always be welcome.*

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# Syllabus

## ARITHMETIC

**Number System**—Natural numbers, Integers, Rational and Real numbers. Fundamental operations—Addition, Subtraction, Multiplication, Division, Square Roots, Decimal Fractions, Unitary Method, Time and Distance, Time and Work, Percentages—Applications to Simple and Compound Interest, Profit and Loss, Ratio and Proportion Variation.

**Elementary Number Theory**—Division algorithm, Prime and Composite numbers, Tests of divisibility by 2, 3, 4, 5, 9 and 11 Multiples and Factors, Factorisation Theorem, H.C.F. and L.C.M., Euclidean Algorithm. Logarithms to base 10 Laws of Logarithms, use of Logarithmic Tables.

## MENSURATION

Areas of Squares, Rectangles, Parallelograms, Triangle and Circle. Areas of figures which can be split up into these figures (Field Book), Surface area and Volume of cuboids, Lateral Surface and Volume of right Circular Cones and Cylinders, Surface area and Volume of Spheres.

## ALGEBRA

Basic Operations, Simple factors, Remainder Theorem, H.C.F., L.C.M. Theory of Polynomials, Solutions of Quadratic Equations & relation between its Roots and Coefficient (Only real roots to be considered). Simultaneous Linear Equations in two unknowns—analytical and graphical

solutions. Simultaneous Linear Inequations in two variables and their solutions. Practical problems leading to two simultaneous linear equations or inequations in two variables or quadratic equations in one variable and their solutions. Set language and set notation, Rational expressions and conditional identities Laws of indices.

## **TRIGONOMETRY**

Sine  $x$ , Cosine  $x$ , Tangent  $x$  when  $0^\circ \leq x \leq 90^\circ$ .

Values of  $\sin x$ ,  $\cos x$  and  $\tan x$ , for  $x = 0^\circ, 30^\circ, 45^\circ, 60^\circ$  and  $90^\circ$ .

Simple Trigonometric Identities.

Use of Trigonometric Tables.

Simple cases of Heights and Distances.

## **GEOMETRY**

Lines and Angles, Plane and Plane figures, Theorems on (i) Properties of angles at a point, (ii) Parallel lines, (iii) Sides and Angles of a triangle, (iv) Congruency of triangles, (v) Similar triangles, (vi) Concurrence of medians and altitudes, (vii) Properties of angles, sides and diagonals of a parallelogram rectangle and square, (viii) Circles and its properties including tangents and normals, (ix) Loci.

## **STATISTICS**

Collection and Tabulation of statistical data, Graphical representation, frequency polygons, Histograms, Bar charts, Pie charts etc. Measures of central tendency.

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