

Foundation Course

Study Material

Paper 3

Quantitative Aptitude

(Relevant for May, 2026 Examination)



BOARD OF STUDIES
THE INSTITUTE OF CHARTERED ACCOUNTANTS OF INDIA

This Study Material has been prepared by the faculty of the Board of Studies. The objective of the Study Material is to provide teaching material to the students to enable them to obtain knowledge in the subject. In case students need any clarifications or have any suggestions for further improvement of the material contained herein, they may write to the Joint Director, Board of Studies.

All care has been taken to provide interpretations and discussions in a manner useful for the students. However, the Study Material has not been specifically discussed by the Council of the Institute or any of its Committees and the views expressed herein may not be taken to necessarily represent the views of the Council or any of its Committees.

Permission of the Institute is essential for reproduction of any portion of this material.

© THE INSTITUTE OF CHARTERED ACCOUNTANTS OF INDIA

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior permission, in writing, from the publisher.

Basic draft of this publication was prepared by CA. (Dr.) Rashmi Goel.

Edition	:	August, 2024
Reprint	:	August, 2025
Committee/Department	:	Board of Studies
E-mail	:	bosnoida@icai.in
Website	:	www.icai.org
Price	:	₹ /-
ISBN No.	:	978-81-19472-33-8
Published by	:	The Publication & CDS Directorate on behalf of The Institute of Chartered Accountants of India ICAI Bhawan, Post Box No. 7100, Indraprastha Marg, New Delhi – 110002 (India)
Printed by	:	

BEFORE WE BEGIN

The contents of the study material for Foundation have been designed and developed by the Board of Studies, ICAI with an objective to synchronize the syllabus with the International Education Standards (IESs) of IFAC (International Federation of Accountants) to instill and enhance the necessary pre-requisites for becoming a well-rounded, competent and globally competitive Accounting Professional.

This study material also lays emphasis on NEP 2020 initiatives like conceptual clarity rather than rote learning and new pedagogical and curriculum restructuring based on the use of technology while teaching.

The requirements of “IES 1 Entry Level Requirements” have been kept in mind while developing the different chapters of study material.

The subject “Quantitative Aptitude” has been designed specifically for the students who are aiming pursue CA course, keeping in view the relevance of subjects after they become full-fledged professional. Mathematics and Statistics applications are very important for the students of Chartered Accountancy Course as professional work in future will demand quantitative and analytical skills. Through this section, students will be able to understand the basic mathematical and statistical tools and apply the same in business, finance and economics situations. Logical Reasoning has been included to test analytical and mental ability skills which will help them in honing their interpretative skills while pursuing and thereafter CA course.

Through these chapters of Quantitate Aptitude, students will be equipped with the knowledge to absorb various concepts of other subjects of the chartered accountancy course like accounting, auditing and assurance, financial management, cost and management accounting, strategic cost management, etc.

The Study material Quantitative Aptitude is divided into three parts, the first part of the study material (Chapters 1-8) covers basic application mathematical techniques like ratio, proportion, indices, logarithms, equations and linear inequalities, time value of money, permutations and combinations, sequence and series, sets, relations and basic applications of differential and integral calculus in economics and business. The second part of the study material (Chapters 9-12) covers Logical Reasoning and the third part (Chapters 13-18) of the basic principles of statistical techniques and measurement thereof.

The entire study material Quantitative Aptitude has been written in a simple and easy to understand language. Every concept has been explained with the help of solved examples. A number of illustrations have been incorporated in each chapter to explain various concepts and related computational techniques dealt within each chapter. The diagrams have been drawn neatly in a such way that the students have the complete understanding of the problem by perusing them. This entire paper is tested on multiple choice questions or objective type of questions pattern only. Keeping in view the examination pattern, a reasonably good question bank has been included in the study material which will help the students to prepare for the Foundation examination.

Happy Reading and Best Wishes!

SYLLABUS

PAPER – 3: QUANTITATIVE APTITUDE

(One paper – Two hours – 100 Marks)

Objectives:

- (a) To develop an understanding of the basic mathematical and statistical tools and their application in Business, Finance and Economics.
- (b) To develop logical reasoning skills and apply the same in simple problem solving.

Contents:

PART – A BUSINESS MATHEMATICS (40 MARKS)

1. Ratio and Proportion, Indices and Logarithms

Ratio and Proportion (Business Applications), Laws of Indices, Exponents and Logarithms and Anti Logarithms.

2. Equations

Simultaneous linear equations up to three variables, Quadratic and Cubic equations in one variable.

3. Linear Inequalities with Objective Functions and Optimization w r t objective function

4. Mathematics of Finance

- (i) Simple Interest
- (ii) Compound interest
- (iii) Depreciation
- (iv) Effective Rate of Interest
- (v) Present Value
- (vi) Net Present Value
- (vii) Future Value (viii) Perpetuity (ix) Annuities
- (x) Sinking Funds
- (xi) Valuation of Bonds
- (xii) Calculating of EMI

(xiii) Calculations of Returns:

- (a) Nominal Rate of Return
- (b) Effective Rate of Return
- (c) Compound Annual Growth Rate (CAGR)

5. Permutations and Combinations

Basic concepts of Permutations and Combinations: Introduction, the Factorial, Permutations, results, Circular Permutations, Permutations with restrictions, Combinations with standard results.

6. Sequence and Series

Introduction Sequences, Series, Arithmetic and Geometric progression, Relationship between AM and GM and Sum of n terms of special series.

7. Sets, Relations and Functions and Basics of Limits and Continuity functions

8. Basic applications of Differential and Integral calculus in Business and Economics (Excluding the trigonometric applications)

PART – B: LOGICAL REASONING (20 MARKS)

- 1. Number series, Coding and Decoding and odd man out**
- 2. Direction Tests**
- 3. Seating Arrangements**
- 4. Blood Relations**

PART – C: STATISTICS (40 MARKS)**1. Unit: I Statistical Description of Data**

Statistical Representation of Data, Diagrammatic representation of data, Frequency distribution, Graphical representation of Frequency Distribution – Histogram, Frequency Polygon, Ogive, Pie-chart.

Unit: II Sampling: Basic principles of sampling theory, comparison between sample survey and complete enumeration, some important terms associated sampling types of sampling, sampling and non-sampling errors.

2. Measures of Central tendency and Dispersion

Measures of Central Tendency and Dispersion: Mean Median, Mode, Mean Deviation, Quartiles and Quartile Deviation, Standard Deviation, Co-efficient of Variation, Coefficient of Quartile Deviation.

3. Probability

Probability: Independent and dependent events; mutually exclusive events Total and Compound Probability and Mathematical Expectation.

4. Theoretical Distributions

Theoretical Distributions: Binomial Distribution, Poisson distribution – Basic application and Normal Distribution – Basic applications.

5. Correlation and Regression

Correlation and Regression: Scatter diagram, Karl Pearson's Coefficient of Correlation Rank Correlation Regression lines, Regression equations, Regression coefficients.

6. Index Numbers

Uses of Index Numbers, Problems involved in construction of Index Numbers, Methods of construction of Index Numbers. BSE SENSEX and NSE.

CONTENTS

PART – A : BUSINESS MATHEMATICS

Chapter-1: Ratio and Proportion, Indices, Logarithms

1.1	Unit 1 – Ratio	1.1
1.2	Unit 2 – Proportion	1.8
1.3	Unit 3 – Indices	1.15
1.3	Unit 4 – Logarithm	1.23
Additional Question Bank		1.35

Chapter-2: Equations

2.1	Introduction.....	2.2
2.2	Simple Equation.....	2.2
2.3	Simultaneous Linear Equations in two unknowns.....	2.6
2.4	Method of Solution.....	2.6
2.5	Method of Solving Simultaneous Linear Equation with three variables	2.7
2.6	Problems Leading to Simultaneous Equations	2.12
2.7	Quadratic Equation	2.14
2.8	How to Construct a Quadratic Equation.....	2.15
2.9	Nature of the Roots.....	2.16
2.10	Problems on Quadratic Equation	2.23
2.11	Solution of Cubic Equation	2.25
Additional Question Bank		2.29

Chapter -3: Linear Inequalities

3.1	Overview	3.1
3.2	Linear Inequalities in one variable and the Solution space	3.2
Additional Question Bank		3.22

Chapter-4: Mathematics of Finance

4.1	Introduction.....	4.2
4.2	Why is Interest Paid?.....	4.2

4.3	Definition of Interest and some other Related Terms.....	4.3
4.4	Simple Interest and Compound Interest.....	4.3
4.5	Effective Rate of Interest.....	4.17
4.6	Annuity	4.21
4.7	Future Value	4.23
4.8	Present Value.....	4.27
4.9	Sinking Fund	4.33
4.10	Applications	4.34
4.11	Perpetuity	4.36
4.12	Net Present value	4.37
4.13	Nominal and Real Rate of Return	4.39
4.14	Compound Annual Growth Rate (CAGR).....	4.40
	Additional Question Bank.....	4.45

Chapter-5: Basic Concepts of Permutations and Combinations

5.1	Introduction	5.2
5.2	The Factorial	5.2
5.3	Permutations	5.3
5.4	Results	5.4
5.5	Circular Permutations	5.9
5.6	Permutation with Restrictions	5.10
5.7	Combinations	5.15
5.8	Standard Results.....	5.21
	Additional Question Bank.....	5.31

Chapter-6: Sequence and Series - Arithmetic and Geometric Progressions

6.1	Sequence.....	6.2
6.2	Series.....	6.3
6.3	Arithmetic Progression (A P).....	6.3

6.4	Geometric Progression (G P).....	6.9
6.5	Geometric Mean.....	6.11
	Additional Question Bank	6.20

Chapter-7: Sets, Relations and Functions, Basics of Limits and Continuity functions

7.1	Sets	7.2
7.2	Venn Diagrams.....	7.5
7.3	Product Sets	7.8
7.4	Relations and Functions.....	7.9
7.5	Domain & Range of a Function	7.9
7.6	Various Types of Function.....	7.10
7.7	Concept of Limit	7.23
7.8	Useful rules on Limits.....	7.24
7.9	Continuity	7.29
	Additional Question Bank	7.31

Chapter-8: Basic applications of Differential and Integral calculus in Business and Economics (A) Differential Calculus

8.A.1	Introduction.....	8.2
8.A.2	Derivative or Differential Coefficient.....	8.2
8.A.3	Some Standard Results (Formulas).....	8.5
8.A.4	Derivative of a Function of Function	8.8
8.A.5	Implicit Functions	8.8
8.A.6	Parametric Equation.....	8.9
8.A.7	Logarithmic Differentiation	8.9
8.A.8	Some More Examples.....	8.10
8.A.9	Basic Idea about Higher Order Differentiation	8.12
8.A.10	Geometric Interpretation of the Derivative.....	8.13
	Applications of Differential calculus in Economics	8.14

(B) Integral Calculus

8.B.1	Integration Calculus	8.24
8.B.2	Basic Formulas	8.24
8.B.3	Method of Substitution (change of variable)	8.27
8.B.4	Integration by Parts	8.28
8.B.5	Method of Partial Fraction.....	8.30
8.B.6	Definite Integration	8.32
8.B.7	Important Properties	8.33
8.C.1	Applications of integral calculus in Commerce and Economics	8.41

PART – B : LOGICAL REASONING**Chapter-9: Number Series, Coding and Decoding and Odd Man Out**

9.1	Number Series.....	9.1
9.2	Coding and Decoding	9.2
9.3	Odd man out	9.4
	Exercise	9.5

Chapter-10: Direction Tests

10.1	Introduction.....	10.1
	Exercise	10.5

Chapter -11: Seating Arrangements

11.1	Introduction.....	11.1
	Exercise	11.9

Chapter- 12: Blood Relations

12.1	Introduction.....	12.1
	Exercise	12.6

PART – C : STATISTICS**Chapter- 13: Unit 1 : Statistical Representation of Data**

13.1.1	Introduction of Statistics.....	13.2
13.1.2	Collection of Data	13.3

13.1.3 Presentation of Data	13.6
13.1.4 Frequency Distribution	13.14
13.1.5 Graphical representation of Frequency Distribution	13.19
Additional Question Bank	13.37

Unit: II Sampling

13.2.1 Introduction	13.43
13.2.2 Basic Principles of Survey	13.43
13.2.3 Comparison between Sample survey and Complete Enumeration	13.44
13.2.4 Errors in Sampling	13.45
13.2.5 Some Important terms associated with sampling	13.46
13.2.6 Types of sampling	13.52
Exercise	13.54

Chapter-14: Measures of Central Tendency and Dispersion

Unit I : Measures of Central Tendency

14.1.1 Definition of Central Tendency	14.2
14.1.2 Criteria for an ideal measure of Central Tendency	14.2
14.1.3 Arithmetic Mean	14.2
14.1.4 Median – Partition Values	14.7
14.1.5 Mode	14.14
14.1.5 Geometric Mean and Harmonic Mean	14.15
Exercise	14.24

Unit II: Dispersion

14.2.1 Definition of Dispersion	14.30
14.2.2 Range	14.31
14.2.3 Mean Deviation	14.33
14.2.4 Standard Deviation	14.38
14.2.5 Quartile Deviation	14.47
Exercise	14.55

Additional Question Bank	14.61
--------------------------------	-------

Chapter-15 : Probability

15.1 Introduction.....	15.2
15.2 Random Experiment	15.2
15.3 Classical Definition of Probability.....	15.3
15.4 Statistical Definition of Probability	15.8
15.5 Operations on Events: Set Theoretic Approach to Probability	15.10
15.6 Axiomatic or Modern Definition of Probability	15.13
15.7 Addition Theorems	15.14
15.8 Conditional Probability and Compound Theorem of Probability	15.17
15.9 Random Variable- Probability Distribution.....	15.26
15.10 Expected Value of a Random Variable.....	15.28
Additional Question Bank	15.52

Chapter-16: Theoretical Distributions

16.1 Introduction.....	16.1
16.2 Binomial Distribution	16.2
16.3 Poisson Distribution	16.10
16.4 Normal Distribution or Gaussian Distribution	16.19
Additional Question Bank	16.48

Chapter-17: Correlation and Regression

17.1 Introduction.....	17.2
17.2 Bivariate Data	17.2
17.3 Correlation Analysis.....	17.5
17.4 Measures of Correlation	17.6
17.5 Regression Analysis.....	17.25
17.6 Properties of Regression Lines.....	17.34
17.7 Review of Correlation and Regression Analysis.....	17.37
Additional Question Bank	17.53

Chapter- 18: Index Numbers

18.1	Introduction	18.2
18.2	Issues Involved	18.2
18.3	Construction of Index Number	18.3
18.4	Usefulness of Index Numbers.....	18.10
18.5	Deflating Time Series using Index Numbers.....	18.10
18.6	Shifting and Splicing of Index Numbers.....	18.11
18.7	Test of Adequacy.....	18.12
	Additional Question Bank	18.21
	Appendices	

