

SYLLABUS

GOLAGHAT COMMERCE COLLEGE (AUTONOMOUS)
FOUR YEARS UNDER GRADUATE PROGRAMME (FYUGP)
[AS PER NEP 2020]



MATHEMATICAL SCIENCE

[Recommended by B.O.S. in Mathematical Science, Golaghat Commerce College (Autonomous)
in its meetings held on 29.11.2024]

**FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICAL SCIENCE
DETAILED SYLLABUS OF 1st SEMESTER**

Title of the Course : Classical Algebra and Calculus
Course Code : MATHMAJ1
Nature of the Course : MAJOR
Total Credits : 04 (L=3, T=1, P=0)
Distribution of Marks : 60 (End Sem) + 40 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I (11 Marks)	Polar representation of complex number, De Moivre's theorem (both integral and rational index), Roots of complex numbers, n^{th} roots of unity, Application of De Moivre's Theorem, Exponential and logarithmic functions of complex numbers, Hyperbolic functions.	09	03	-	12
II (16 Marks)	Matrix Algebra, Addition, Transposition, Symmetry, Multiplication of matrices and their properties, Matrix inversion and properties, Systems of linear equations, row reduction and echelon forms, vector equations, rank of a matrix, the matrix equation $Ax=b$, solution sets of linear systems, applications of linear systems, linear independence. Subspaces of R^n , dimension of subspaces of R^n	09	03	-	12
III (11 Marks)	Composite and invertible functions, well ordering property of positive integers, Division algorithm, Divisibility & Euclidean algorithm, Congruence relation between integers, Statement of the Fundamental Theorem of Arithmetic.	09	03	-	12
IV (11 Marks)	Limits and continuity of a function including different approaches, Properties of continuous functions including Intermediate value theorem. Differentiability Higher order derivatives, Leibniz rule and its applications L'Hopitals rule; Applications in business, economics and life sciences.	09	03	-	12
V (11 Marks)	Reduction Formulae of the types $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \tan^n x dx$, $\int (\log x)^n dx$ and $\int \sin^m x \cos^n x dx$ and their derivations. Rectification, volume and surface area of revolution of a curve.	09	03	-	12
Total		45	15	-	60

Where, **L: Lectures** **T: Tutorials** **P: Practicals**

MODES OF IN-SEMESTER ASSESSMENT:

(40 Marks)

- One Internal Examination - **20 Marks**
- Others (any two or more) - **20 Marks**

- Seminar presentation on any of the relevant topics
- Assignment
- Group Discussion
- Quiz
- Viva-Voce

Text Books:

1. Mappa, S.K., Higher Algebra (Classical), Revised 8th Edition, 2011, Levant Books.
2. Meyer, Carl D. (2000). Matrix Analysis and Applied Linear Algebra. Society for Industrial and Applied Mathematics (Siam).
- [3] Anton, Howard, Bivens, Irl, & Davis, Stephen (2013). Calculus (10th ed.). John Wiley & Sons Singapore Pte. Ltd. Reprint (2016) by Wiley India Pvt. Ltd. Delhi
- [4] Shanti Narayan and P.K. Mittal, Differential Calculus, S. Chand, 2005
- [5] Shanti Narayan and P.K. Mittal, Integral Calculus, S. Chand, 2007.
- [6] A.R. Vasishtha ; A.K. Vasishtha (1991), Krishna Prakashan Media (P) Ltd. Merrut

Reference Books:

1. Dickson, Leonard Eugene (2009). First Course in The Theory of Equations. The Project Gutenberg eBook (<http://www.gutenberg.org/ebooks/29785>)
2. Gilbert, William J., & Vanstone, Scott A. (1993). Classical Algebra (3rd ed.). Waterloo Mathematics Foundation, Canada.
3. Titu Andreescu and Dorin Andrica, Complex Numbers from A to Z, Birkhauser,2006.
4. Thomas, Jr. George B., Weir, Maurice D., & Hass, Joel (2014). Thomas' Calculus (13th ed). Pearson Education, Delhi. Indian Reprint 2017.

FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICAL SCIENCE
DETAILED SYLLABUS OF 1st SEMESTER

Title of the Course : **Classical Algebra and Calculus**
Course Code : **MATHMIN1**
Nature of the Course : **MINOR**
Total Credits : **04 (L=3, T=1, P=0)**
Distribution of Marks : **60 (End Sem) + 40 (In-Sem)**

UNITS	CONTENTS	L	T	P	Total Hours
I (11 Marks)	Polar representation of complex number, De Moivre's theorem (both integral and rational index), Roots of complex numbers, n^{th} roots of unity, Application of De Moivre's Theorem, Exponential and logarithmic functions of complex numbers, Hyperbolic functions.	09	03	-	12
II (16 Marks)	Matrix Algebra, Addition, Transposition, Symmetry, Multiplication of matrices and their properties, Matrix inversion and properties, Systems of linear equations, row reduction and echelon forms, vector equations, rank of a matrix, the matrix equation $Ax=b$, solution sets of linear systems, applications of linear systems, linear independence. Subspaces of R^n , dimension of subspaces of R^n	09	03	-	12
III (11 Marks)	Composite and invertible functions, well ordering property of positive integers, Division algorithm, Divisibility & Euclidean algorithm, Congruence relation between integers, Statement of the Fundamental Theorem of Arithmetic.	09	03	-	12
IV (11 Marks)	Limits and continuity of a function including different approaches, Properties of continuous functions including Intermediate value theorem. Differentiability Higher order derivatives, Leibniz rule and its applications L'Hopitals rule; Applications in business, economics and life sciences.	09	03	-	12
V (11 Marks)	Reduction Formulae of the types $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \tan^n x dx$, $\int (\log x)^n dx$ and $\int \sin^m x \cos^n x dx$ and their derivations. Rectification, volume and surface area of revolution of a curve.	09	03	-	12
Total		45	15	-	60

Where, **L: Lectures** **T: Tutorials** **P: Practicals**

MODES OF IN-SEMESTER ASSESSMENT: **(40 Marks)**

- One Internal Examination **20 Marks**
- Others (any two or more) **20 Marks**
 - Seminar presentation on any of the relevant topics
 - Assignment
 - Group Discussion

- Quiz
- Viva-Voce

Text Books:

- 1 Mappa, S.K., Higher Algebra (Classical), Revised 8th Edition, 2011, Levant Books.
2. Meyer, Carl D. (2000). Matrix Analysis and Applied Linear Algebra. Society for Industrial and Applied Mathematics (Siam).
3. Anton, Howard, Bivens, Irl, & Davis, Stephen (2013). Calculus (10th ed.). John Wiley & Sons Singapore Pte. Ltd. Reprint (2016) by Wiley India Pvt. Ltd. Delhi
4. Shanti Narayan and P.K. Mittal, Differential Calculus, S. Chand, 2005
5. Shanti Narayan and P.K. Mittal, Integral Calculus, S. Chand, 2007.
6. A.R. Vasishtha ; A.K. Vasishtha (1991), Krishna Prakashan Media (P) Ltd. Merrut

Reference Books:

1. Dickson, Leonard Eugene (2009). First Course in The Theory of Equations. The Project Gutenberg eBook (<http://www.gutenberg.org/ebooks/29785>)
2. Gilbert, William J., & Vanstone, Scott A. (1993). Classical Algebra (3rd ed.). Waterloo Mathematics Foundation, Canada.
3. Titu Andreescu and Dorin Andrica, Complex Numbers from A to Z, Birkhauser,2006.
4. Thomas, Jr. George B., Weir, Maurice D., & Hass, Joel (2014). Thomas' Calculus (13th ed). Pearson Education, Delhi. Indian Reprint 2017.

**FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICAL SCIENCE
DETAILED SYLLABUS OF 1st SEMESTER**

Title of the Course: Statistical Method -1

Code: MATHGEC1

Nature of the Course: Generic Elective

Total Credits: 03

Distribution of Marks: 45 (35T + 10P) (End Sem) + 30 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I (8 Marks)	<p>Basic Statistics: Definition and scope of Statistics, Limitations of Statistics, concepts of statistical population and sample.</p> <p>Statistical investigation and Types of Data: Planning and execution stages, quantitative and qualitative data, primary and secondary data, Schedules and Questionnaire, Census Vs Sampling and their merits and demerits.</p> <p>Tabulation and Presentation of Data: Tabulation and graphical representation (Pie Chart, Histogram, Frequency Polygon, Frequency Curve , Ogives)</p>	05	01	-	06
II (10 Marks)	<p>Measures of Central Tendency: Mathematical averages including arithmetic mean, geometric mean, harmonic mean, Properties and applications.</p> <p>Positional averages: Median, Mode (other partition values including quartiles, deciles and percentiles)</p>	08	02	-	10
III (10 Marks)	<p>Measures of Dispersion: Range, quartile deviation, mean deviation, standard deviation, Properties of standard deviation/ variance, coefficient of variation.</p>	07	02		09
IV (7 Marks)	<p>Simple Correlation and Regression Analysis:</p> <p>Correlation Analysis: Meaning of Correlation: simple, multiple, partial, linear, non-linear, scatter diagram, interpretation of r and rank correlation.</p> <p>Regression analysis: Simple linear regression, Principles of least squares and regression lines, Regression equations and estimation, properties of regression coefficients, Relation between correlation and regression.</p>	08	02		10
V (10 Marks)	<p>List of Practical: (both calculator and computer based)</p> <ol style="list-style-type: none"> 1. Graphical representation of data. 2. Problems on measures of central tendency. 3. Problems based on measures of dispersion. 4. Problems based on combined mean 			05	10

	and variance and coefficient of variation. 5. Karl Pearson correlation coefficient. 6. Spearman rank correlation 7. Problems based on Fitting of Regression lines.				
	Total	28	7	5	45

Where,

L: Lectures

T: Tutorials

P: Practical

MODES OF IN-SEMESTER ASSESSMENT: (30 Marks)

- One Internal Examination
- Others (any two or more)
 - Seminar presentation on any of the relevant topics
 - Assignment
 - Group Discussion
 - Quiz
 - Viva-Voce

SUGGESTED READINGS:

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edition. The World Press, Kolkata.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edition), Pearson Education, Asia.
3. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rd Edition, (Reprint), Tata McGraw-Hill Pub. Co. Ltd.
4. Barman. M. P., Hazarika. J, Bora. T (2021): Statistical Methods, Mahaveer Pub, Dibrugarh.
5. Elhance, D. N., Elhance, V., and Aggarwal, B. M. (1958). Fundamentals of Statistics, Allahabad. Kitab Mahal.
6. S.C. Gupta, V.K. Kapoor (2017): Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
7. J. Medhi (2024): Statistical Methods: An Introductory Text, New Age International Publisher.

FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICAL SCIENCE
DETAILED SYLLABUS OF 1st SEMESTER

Title of the Course : **Mathematical Aptitude and Reasoning -I**
Nature of the Course : **Skill Enhancement Course**
Total Credits : **03 (L=2, T=1, P=0)**
Distribution of Marks : **45 (End Sem) + 30 (In-Sem)**

Course Description:

The course on Aptitude and Reasoning aims to provide students with a solid foundation of Mathematical and Logical Reasoning and to acquaint them with frequently asked patterns in quantitative aptitude and logical reasoning.

Course Objectives:

- Understand the basic concepts of quantitative ability
- Understand the basic concepts of logical reasoning Skills
- Acquire satisfactory competency in use of reasoning
- To develop the ability to apply logical reasoning to solve complex problems in mathematics and computer science, enhancing their analytical and critical thinking skills through exercises and real-world applications.
- To be proficient in formal logical reasoning and prepared to engage in further study or professional work that involves mathematical logic.

UNITS	CONTENTS	L	T	P	Total Hours
I (15 Marks)	Analogy, Classification, Logical Alphabet and Number sequence, Coding Decoding, Series, Logical arrangement of words, Logical Number, Letter and Symbol series, Logical Matching, Missing Numbers, Odd Man out in series, Mathematical Operation, Blood Relations. Clock, Calendar, Sitting arrangement	12	02	-	10
II (10 Marks)	Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Standard set operations. Classes of sets. Power set of a set.	08	01	-	10
III (10 Marks)	Number system, Factors and Multiples, LCM and HCF, average, Fraction, Decimal, Percentage, profit and Loss, ratio and Proportion	10	01	-	10
IV (10 Marks)	Data Interpretation: Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart	10	01		
	Total	40	05	-	45

Where, **L: Lectures** **T: Tutorials** **P: Practicals**

MODES OF IN-SEMESTER ASSESSMENT: **(30 Marks)**

- One Internal Examination
- Others (any two or more)
 - Seminar presentation on any of the relevant topics
 - Assignment
 - Group Discussion
 - Quiz
 - Viva-Voce

Reference Books:

1. A Modern Approach To Verbal & Non Verbal Reasoning By R S Agarwal
2. Analytical and Logical reasoning By Sijwali B S
3. Quantitative aptitude for Competitive examination By R S Agarwal
4. Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4th edition

**FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICAL SCIENCE
DETAILED SYLLABUS OF 2nd SEMESTER**

Title of the Course : **Real Analysis and Differential Equations**
Course Code : **MATHMAJ2**
Nature of the Course : **MAJOR**
Total Credits : **04 (L=3, T=1, P=0)**
Distribution of Marks : **60 (End Sem) + 40 (In-Sem)**

UNITS	CONTENTS	L	T	P	Total Hours
	(A) Real Analysis				
I (10 Marks)	Algebraic and order properties of \mathbb{R} , absolute value and real line, bounded sets, supremum and infimum, completeness property of \mathbb{R} , the Archimedean property, the density theorem, intervals, nested interval theorem, uncountability of \mathbb{R} .	10	03	-	13
II (10 Marks)	Real sequences, limit of a sequence, convergent sequence, bounded sequence, limit theorems, monotone sequences, monotone convergence theorem, subsequences, monotone subsequence theorem, Bolzano Weierstrass theorem for sequences, Cauchy sequences, Cauchy's convergence criterion, properties of divergence sequences.	10	03	-	13
III (10 Marks)	Infinite series, convergence and divergence of infinite series, Cauchy criterion, Tests for convergence: comparison test, limit comparison test, ratio test, root test, integral test, Raabes's test, Absolute convergence, rearrangement theorem, alternating series, Leibniz test, conditional (non-absolute) convergence.	06	03		09
	(B) Differential Equations				
III (11 Marks)	Concepts and definition of General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.	09	03	-	12
IV (19 Marks)	General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation, method of undetermined coefficients, method of variation of parameters.	10	03	-	13
	Total	45	15	-	60

Where, **L: Lectures**

T: Tutorials

P: Practicals

MODES OF IN-SEMESTER ASSESSMENT: (40 Marks)

- One Internal Examination - **20 Marks**
- Others (any two or more) - **20 Marks**
 - Seminar presentation on any of the relevant topics
 - Assignment
 - Group Discussion
 - Quiz
 - Viva-Voce

TEXTBOOKS:

1. Bartle R.G. & Sherbert D.R., Introduction to Real Analysis, 3rd Ed., John Wiley and Sons(Asia) Pvt. Ltd., Singapore,2002.
2. Kumar A.& Kumarasen S., A Basic Course in Real Analysis, CRC Press, Reprint 2021.
3. Ross S.L., Differential Equations, 3rdEd., John Wiley and Sons, India,2004.
4. Kreyszig, Erwin (2011). Advanced Engineering Mathematics(10th ed.).John Wiley & Sons, Inc. Wiley India Edition 2015.

**FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICAL
SCIENCE DETAILED SYLLABUS OF 2nd SEMESTER**

Title of the Course : **Real Analysis and Differential Equations**
Code : **MATHMIN2**
Nature of the Course : **MINOR**
Total Credits : **04 (L=3, T=1, P=0)**
Distribution of Marks : **60 (End Sem) + 40 (In-Sem)**

UNITS	CONTENTS	L	T	P	Total Hours
	(A) Real Analysis				
I (10 Marks)	Algebraic and order properties of \mathbb{R} , absolute value and real line, bounded sets, supremum and infimum, completeness property of \mathbb{R} , the Archimedean property, the density theorem, intervals, nested interval theorem, uncountability of \mathbb{R} .	10	03	-	13
II (10 Marks)	Real sequences, limit of a sequence, convergent sequence, bounded sequence, limit theorems, monotone sequences, monotone convergence theorem, subsequences, monotone subsequence theorem, Bolzano Weierstrass theorem for sequences, Cauchy sequences, Cauchy's convergence criterion, properties of divergence sequences.	10	03	-	13
III (10 Marks)	Infinite series, convergence and divergence of infinite series, Cauchy criterion, Tests for convergence: comparison test, limit comparison test, ratio test, root test, integral test, Raabes's test, Absolute convergence, rearrangement theorem, alternating series, Leibniz test, conditional (non-absolute) convergence.	06	03		09
	(B) Differential Equations				
III (11 Marks)	Concepts and definition of General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.	09	03	-	12
IV (19 Marks)	General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation, method of undetermined coefficients, method of variation of parameters.	10	03	-	13
	Total	45	15	-	60

Where,

L: Lectures

T: Tutorials

P: Practicals

MODES OF IN-SEMESTER ASSESSMENT:

(40 Marks)

- One Internal Examination - **(20 Marks)**
- Others (any two or more) - **(20 Marks)**
 - Seminar presentation on any of the relevant topics
 - Assignment
 - Group Discussion
 - Quiz
 - Viva-Voce

Textbooks:

1. Bartle R.G. & Sherbert D.R., Introduction to Real Analysis, 3rd Ed., John Wiley and Sons(Asia) Pvt. Ltd., Singapore,2002.
2. Kumar A.& Kumarasen S., A Basic Course in Real Analysis, CRC Press, Reprint 2021.
3. Ross S.L., Differential Equations, 3rdEd., John Wiley and Sons, India,2004.
4. Kreyszig, Erwin (2011). Advanced Engineering Mathematics(10th ed.).John Wiley & Sons, Inc. Wiley India Edition 2015.

**FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICAL SCIENCE
DETAILED SYLLABUS OF 2nd SEMESTER**

Title of the Course: Business Mathematics -II

Code: MATHGEC2

Nature of the Course: Generic Elective

Total Credits: 03

Distribution of Marks: 45 (35T + 10P) (End Sem) + 30 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I (8 Marks)	Sets and Logic Sets, subsets, types of set, operations on sets, Classes of sets Cartesian product, Venn diagram, Power of a set, difference and symmetric difference of two sets, Set identities Statements, truth values and truth table, negation, conjunction and disjunction, Statements with quantifiers, compound statements.	05	03	-	8
II (10 Marks)	Relation and Functions Relation and functions, types of relation, Equivalence relation with examples. Functions, types of functions. graphs of functions, compositions of functions and invertible function.	08	03	-	11
III (10 Marks)	Matrices and Determinants Algebra of Matrices, Matrix Operations, Determinant of a square Matrix, Evaluation of determinants upto order 3 (properties of determinants to be excluded), Adjoint of a Matrix, inverse of a matrix, Solution of system of linear equations (having unique solution and involving not more than 3 variables) using matrix inversion method and Cramer's rule	08			08
IV (7 Marks)	Probability Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability. Baye's Theorem	05	03		08
V (10 Marks)	List of Practical: (both calculator and computer based) 1. Problem based on Venn-Diagram 2. Problem based on Cramer's Rule and matrix method 3. Problem based on Conditional Probability 4. Graph of a function			05	10
	Total	26	09	05	45

Where,

L: Lectures

T: Tutorials

P: Practical

MODES OF IN-SEMESTER ASSESSMENT:**(30 Marks)**

- One Internal Examination
- Others (any two or more)
 - Seminar presentation on any of the relevant topics
 - Assignment
 - Group Discussion
 - Quiz
 - Viva-Voce

SUGGESTED READINGS:

1. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): Probability and Statistical Inference, 17th edition, Pearson Education, New Delhi.
2. Ross, S. M. (2014). Introduction to probability models. Academic Press Inc.
3. Johnson, R. A., Miller, I., and Freund, J. E. (2000). Probability and statistics for engineers. 6th Edition, Pearson Education India.
4. Rohatgi, V. K., Saleh, A. K. M. E. (2011). An Introduction to Probability and Statistics, Germany, Wiley.
5. Kumar A., Kumaresan S., & Sarma, B.K., A Foundation Course in Mathematics, Narosa Publishing House, 2018.
6. Stewart I., Tall D., The Foundations of Mathematics. Oxford University Press, 2nd Ed., 2015.
7. Vohra N.D., Business Mathematics and Statistics, McGraw Hill Education (India) Pvt. Ltd, 2012.
8. Singh J. K., Business Mathematics, Himalaya Publishing House, 2021.

FOUR YEARS UNDER GRADUATE PROGRAMME IN MATHEMATICAL SCIENCE

DETAILED SYLLABUS OF 2nd SEMESTER

Title of the Course	:	Mathematical Aptitude and Reasoning -II
Nature of the Course	:	Skill Enhancement Course
Total Credits	:	03 (L=2, T=1, P=0)
Distribution of Marks	:	45 (End Sem) + 30 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I (15 Marks)	Direction and distance, Sitting Arrangement, Decision making, Completion of series, Completion of figures, Cubes, Dice, Formation of figures, Mirror image, Water Image, Statement and Arguments	12	02	-	10
II (10 Marks)	Time, Speed and Distance problem, Problems on Age, Time, Work and Wage, Boat and Stream, Perimeter, Surface Area, Volume of Solid, Mixtures and Allegation, Simple Interest and Compound Interest	08	01	-	10
III (10 Marks)	Quadratic Equation , Surds and Indices, logarithm, Functions and Graphs	10	01	-	10
IV (10 Marks)	Measures of Central Tendency : Arithmetic Mean, Median, Mode, Quartiles, Deciles, Percentiles, Graphical method for determination of Median and Mode , Probability- Classical Definition of Probability, Empirical Definition of Probability, Axiomatic definition of Probability.	10	01		
	Total	40	05	-	45

Where, **L: Lectures** **T: Tutorials** **P: Practicals**

MODES OF IN-SEMESTER ASSESSMENT: (30 Marks)

- One Internal Examination
- Others (any two or more)
 - Seminar presentation on any of the relevant topics
 - Assignment
 - Group Discussion
 - Quiz
 - Viva-Voce

Reference Books:

1. A Modern Approach To Verbal & Non Verbal Reasoning By R S Agarwal
2. Analytical and Logical reasoning By Sijwali B S
3. Quantitative aptitude for Competitive examination By R S Agarwal
4. Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4th Edition.