

NATIONAL EDUCATION POLICY-2020

Skill Enhancement Course

in

Quantitative Aptitude and Logical Reasoning



Sridev Suman Uttarakhand University

Badshahi Thaul (Tehri Garhwal) Uttarakhand -249199

(State University of Uttarakhand)

2023

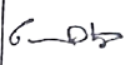

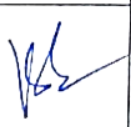
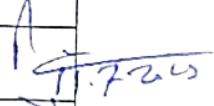


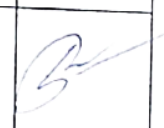
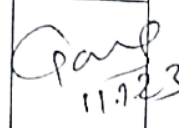

Curriculum Design Committee, Uttarakhand

S. No.	Name & Designation	
1.	Prof. N.K. Joshi Vice-Chancellor, Sridev Suman Uttarakhand University, Badshahi Thaul, Tehri Garhwal, Uttarakhand	Chairman
2.	Prof. Manmohan Singh Chauhan Vice-Chancellor, Kumaon University, Nainital, Uttarakhand	Member
3.	Prof. O.P.S. Negi Vice-Chancellor, Uttarakhand Open University	Member
4.	Prof. Jagat Singh Bisht, Vice-Chancellor, Soban Singh Jeena University, Almora	Member
5.	Prof Surekha Dangwal Vice-Chancellor, Doon University, Dehradun	Member
6.	Prof. M.S.M. Rawat Advisor, Rashtriya Uchchatar Shiksha Abhiyan, Uttarakhand	Member
7.	Prof. K.D. Purohit Advisor Rashtriya Uchchatar Shiksha Abhiyan, Uttarakhand	Member

Sridev Suman Uttarakhand University
Badshahi Thaul, Tehri Garhwal (Uttarakhand)

Department of Mathematics

Members of Board of Studies

S.N.	Name	Designation	Department	Board of Studies	Signature
1.	Prof. G. K. Dhingra	Dean Faculty of Science Pt. L.M.S. Campus Sridev Suman Uttarakhand University Rishikesh	Faculty of Science	Chairman	
2.	Director	Uttarakhand Science Education and Research Council	USERC	Member	
3.	Prof. K.S. Rawat	Professor and Head Department of Mathematics H.N.B. Garhwal Central University S.R.T. Campus, Tehri Garhwal, Uttarakhand	Mathematics	Member (External Expert)	
4.	Prof. Pushpa Negi	Principal Govt. P.G.College New Tehri	Higher Education	Member	
5.	Prof. Pankaj Pant	Principal, Govt. P.G.College Nagnath Pokhari	Higher Education	Member	
4.	Prof. Kuldeep Singh Negi	Principal, Govt. P.G. College, Khanpur(Haridwar)	Higher Education	Member	
5.	Prof. Anita Tomar	Professor & Head, Department of Mathematics Pt. L.M.S. Campus, Sridev Suman Uttarakhand University Rishikesh	Mathematics	Member	
6.	Prof. Dipa Sharma	Professor Department of Mathematics Pt. L.M.S. Campus, Sridev Suman Uttarakhand University Rishikesh	Mathematics	Member	
7.	Dr. Gaurav Varshney	Associate Professor, Department of Mathematics Pt. L.M.S. Campus, Sridev Suman Uttarakhand University Rishikesh	Mathematics	Member	
8.	Dr. Dharendra Singh	Assistant Professor, Department of Mathematics Pt. L.M.S. Campus, Sridev Suman Uttarakhand University Rishikesh	Mathematics	Member	

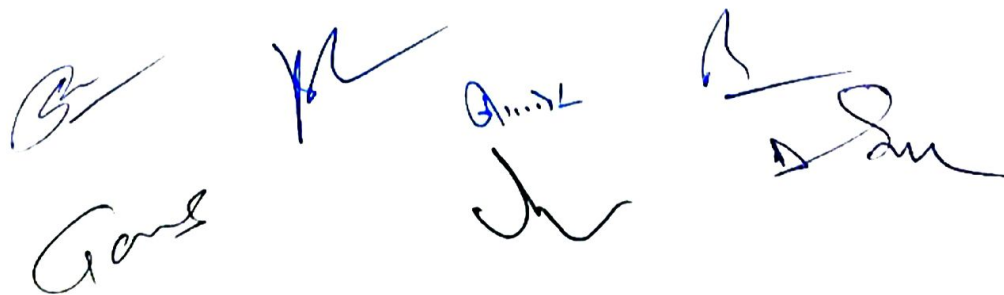
Syllabus Preparation Committee

S.No.	Name	Designation	Affiliation
1.	Prof. Anita Tomar	Professor and Head	Department of Mathematics Pt. L. M. S. Campus, Sridev Suman Uttarakhand University Campus, Rishikesh
2.	Dr. Gaurav Varshney	Associate Professor	Department of Mathematics Pt. L. M. S. Campus, Sridev Suman Uttarakhand University Campus, Rishikesh
3.	Dr. Deepak Singh	Assistant Professor	Department of Mathematics B.L.J. Govt. (P.G.) College Purola, Uttarkashi
4	Dr. Priyanka Sangal	Assistant Professor	Department of Mathematics Ram Chandra Uniyal Govt. P.G. College Uttarkashi

Course Description

S.No.	Course Code	Course	Semester	Credit
1.	QA101	Quantitative Aptitude and Logical Reasoning -I	First	3
2.	QA201	Quantitative Aptitude and Logical Reasoning -II	Second	3
3.	QA301	Quantitative Aptitude and Logical Reasoning -III	Third	3
4.	QA401	Quantitative Aptitude and Logical Reasoning -IV	Fourth	3

This course will help the students to develop their numerical abilities and logical thinking. The course will be extremely useful for all kinds of competitive exams like CUET, CAT, MAT, GMAT, IBPS Exam, CSAT, CLAT, Bank Competitive Exams, UPSC, Competitive exams, SSC competitive exams etc.



QA101

Course Title: Quantitative Aptitude and Logical Reasoning -I

Credits: 3

Objective: The objective of this course is to provide students with a thorough understanding of various quantitative aptitude and logical reasoning concepts. The course aims to help students develop their problem-solving and analytical skills by solving problems from different areas.

Course Outcome: Upon completion of the course, students will be able to:

- Develop a strong foundation in the number system, percentages, and ratios and proportions.
- Understand and apply the concepts of blood relations, coding-decoding, and number series.
- Solve problems related to averages, mixtures, and allegations.
- Solve problems related to calendars and clocks.
- Enhance their logical reasoning and analytical skills.

Unit	Contents	No. of Lectures
1	Number System: Simplification, Speed Math, Squaring and Cubing Techniques, Multiplication Tricks, Divisibility Rules, HCF of numbers, LCM of numbers, Divisibility by Numbers of the form $[10n-1]$ or $[10n+1]$, Factors / Divisors of a Given Composite Number, Number of Divisors, Number of Even & Odd Divisors, Sum of Divisors, Product of Divisors, Number of ways of expressing a given number as a product of two factors, Number of ways of expressing a given number as a product of two Co-Primes, Number of sets of factors which are Co-Prime to each other.	10
2	Number Series- What are series, Types of Series: Number Series - Missing numbers, incomplete series - odd-even series, primes, Fibonacci series, arithmetic progression, geometric progression, harmonic progression, squares and cubes and operations on them, operations on digits, exponential series, increasing multiplication, hybrid series. Alphabetical Series- Missing alphabets, incomplete letter series - series of words, series of letters, arrangement of words/letters, letters marked with corresponding numbers sequence, positions of letters, ranking of the word in dictionary; Mixed Series - Missing numbers and words/letters, complete the series	10
3	Percentage- Concept Explanation, Quick Calculation of Percentages, Conversion of Fraction to Percentage Table, Successive Percentage, Concept of 'By' & 'To', Percentage Change, Percentage Point Change, Product Constancy, Increased Value & Increase in Value, Percentage Changes in Numerator & Denominator, Successive Percentage.	8
4	Ratio and Proportions- Concept Explanation, Duplicate Ratio, Triplicate Ratio, Direct Proportion, Indirect Proportion, Double rule of three or compound proportion, Ratio in investment or partnership.	7
5	Clocks- Angles between the hands, Minute and hour spaces, Time based on coincidence and supplementary angles, Number of times an angle is formed, Duration of rings, Gain or loss of time, Actual time v/s given time, Angle covered for given condition. Calendars- Leap and non-leap years, Odd/Extra day concept, odd days table, counting of odd days, Centennial year and non-centennial years, Date to day calculations, Last day of a year, Forward and backward counting of days, Repetition of a calendar year or month.	10

Reference Books:

1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal.
2. "Logical Reasoning" by S. Chand.
3. "How to Prepare for Logical Reasoning for CAT" by Arun Sharma.
4. "Magical Book on Quicker Maths" by M. Tyra.

QA201**Course Title: Quantitative Aptitude and Logical Reasoning -II****Credits: 3**

Objective: The objective of this course is to provide the students with a solid foundation of quantitative aptitude and logical reasoning concepts. This course aims to help students develop their analytical and problem-solving skills, which are essential for success in various competitive exams and real-life situations.

Course Outcome: Upon completion of the course, students will be able to:

- Understand the basic concepts of quantitative aptitude and logical reasoning.
- Apply quantitative techniques in solving real-world problems related to profit & loss, SI & CI etc.
- Apply logical reasoning skills to analyze and solve complex problems work and time, time and distance etc.
- Interpret and analyze data using various mathematical and statistical techniques.

Unit	Contents	No. of Lectures
1	Profit and Loss- Concept Explanation, Profit, Loss, Cost Price, Selling Price, Marked Price, Formula, Examples, Tricks.	5
2	Commercial Mathematics- Simple Interest, Compound Interest, basic formulas, equal annual installment, Difference between simple interest & compound interest, Application of digital sum in SI & CI, Successive percentages in SI & CI, Population formula, growth rate, Offering Loan on a Discount, Shortcut methods.	8
3	Average, Mixture & Alligation - Concept Explanation, Average Formula to calculate the Mean, Median, Mode, Average formula for An AP Series, Mixtures & Alligation, Rule of weighted averages, Rule of alligation, Alligation cross, Alligation line, Successive replacement.	10
4	Work and Time- Unit Work, Combined Work, basic formulas, Efficiency Vs Time taken, Chain Rule Concept, 8 rules of Time and Work, Pipes and Cisterns, 4 Rules of Pipes and Cistern.	10
5	Time Speed Distance- Basic formulas, Basic relationships, Concept of average speed, Average speed when Distance is constant, Average speed when Time is constant, Average speed when Speed is constant, Acceleration & deceleration, Concept of relative speed, Concept of resultant speed. Applications- Application of relative speed in train problems, boats & streams problems, basic formulas, shortcut methods, 4 rules of boats & streams, The escalator problems, circular motion tips, concept of races.	12

Reference Books:

1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal.
2. "Logical Reasoning" by S. Chand.
3. "How to Prepare for Logical Reasoning for CAT" by Arun Sharma.
4. "Magical Book on Quicker Maths" by M. Tyra.

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QA301**Course Title: Quantitative Aptitude and Logical Reasoning -III****Credits: 3**

Objective: This course aims to develop the students' skills in quantitative aptitude and logical reasoning. It covers various topics such as set theory, Venn diagram, odd one out, arrangements, input-output, direction sense, combinatorics, and probability. This course will enable the students to analyze and solve complex problems by applying mathematical concepts and logical reasoning skills.

Course Outcome: Upon completion of the course, students will be able to:

- Solve problems related to set theory and Venn diagram.
- Identify the odd one out from a given set of objects.
- Solve problems related to arrangements.
- Solve problems related to direction sense.
- Solve problems related to combinatorics.
- Apply probability concepts to solve problems.
- Analyze and solve complex problems using mathematical concepts and logical reasoning.

Unit	Contents	No. of Lectures
1	Set Theory & Venn Diagram: What are sets, Set notations, Cardinality of a set, Types of sets, Operations on sets, What are Venn Diagrams, Universal Set, Relationships using Venn Diagrams - Union of sets using Venn diagram, Difference of sets using Venn diagram, Disjoint Sets, Intersection of sets using Venn diagram, Venn diagram in case of two elements, Venn diagrams in case of three elements, Venn Diagrams in case of four elements, Problem Solving using Venn Diagrams.	10
2	Odd One Out: Odd number/Even number/Prime numbers, Perfect squares/Cubes, Numbers in A.P./G.P., Difference or sum of numbers, Cumulative series, Power series, Classification: Alphabet Classification, Word Classification, Number Classification. Direction Sense: Four Main Directions, Four Cardinal Directions, Distance, displacement, Starting and ending points, Referential directions, Directions of shadows, Actual and conditional directions.	7
3	Arrangements: Introduction and assumptions, method/approach of solving, Types - Linear arrangement, Circular arrangement, Vertical arrangement, Seating arrangement in a photograph, Square Arrangement, Tabular arrangement, Hexagonal Seating Arrangement, Complex arrangement, Miscellaneous arrangements.	8
4	Combinatorics: Counting Technique, Factorial, Permutations, Combinations, Stocks and Shares	10
5	Probability: Experiments, Event and sample space, Independent Events, Conditional Probability, Problems on dice and cards.	10

Reference Books:

1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal
2. "A Modern Approach to Logical Reasoning" by R.S. Aggarwal
3. "How to Prepare for Logical Reasoning for the CAT" by Arun Sharma
4. "Set Theory for Beginners" by J.L. Krivine and T. Lévy-Véhel.

QA401

Course Title: Quantitative Aptitude and Logical Reasoning -IV

Credits: 3

Objective: This course is designed to achieve several objectives aimed at improving the students' quantitative aptitude and logical reasoning skills. One of the primary objectives is to enhance the students' problem-solving abilities by teaching them various techniques and approaches for solving complex problems. By the end of this course, students will have a solid grasp of various topics such as blood relations, coding-decoding, theory of equations, geometry, mensuration, data interpretation, and reasoning, and they will be equipped with the skills necessary to apply these concepts in their personal and professional lives.

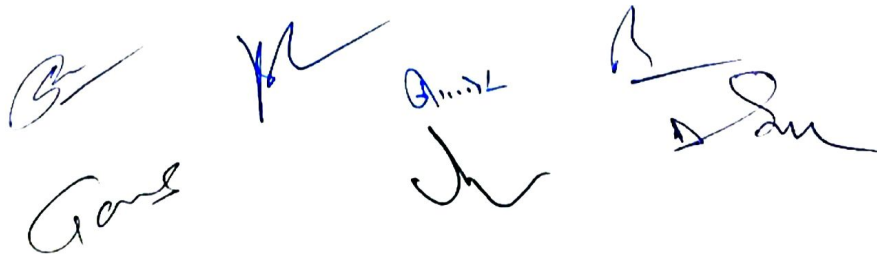
Course Outcome: Upon completion of the course, students will be able to:

- Understand and apply the concepts of blood relations and coding-decoding in problem-solving.
- Solve problems related to theory of equations and geometry.
- Calculate the area and volume of various geometrical figures in mensuration.
- Interpret and analyze data using various data interpretation and reasoning techniques.
- Develop logical reasoning skills for solving problems in various competitive exams.

Unit	Contents	No. of Lectures
1	Blood Relations: Relations defined, Generation Verticals, Family Tree, Single Person Blood Relations, Mixed/Chain Blood Relations, Symbol based Blood Relation. Coding Decoding: Coding based on order: Letter to Letter Mapping, Letter to number mapping, Letter to digit mapping, Re-ordering sequences; Word sequencing, Match the word to code, Symbol Coding.	10
2	Theory of Equations: Linear equation is one, two and three variables, Methods of solving linear equations. Methods of solving quadratic equations.	7
3	Geometry: Concepts of Angles, Different polygons like triangles, rectangle, square, right-angle triangle, Pythagorean Theorem, Perimeter and Area of Triangle, Rectangle, and circles.	10
4	Mensuration- Area, Volume and Surface Area, Pipe and Cisterns.	8
5	Data Interpretation and Reasoning: Raw and group data, Tabulation, Bar Graphs, Pie Charts, Mean median and Mode, Analytical reasoning, Mirror Images	10

Reference Books:

1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal.
2. "Logical Reasoning" by S. Chand.
3. "How to Prepare for Logical Reasoning for CAT" by Arun Sharma.
4. "Magical Book on Quicker Maths" by M. Tyra.



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