Course Title: Aptitude and Reasoning Development - BEGINNER. (ARDB)			
Course Code : P18HU39	Semester : III	L-T-P-H : 2-0-0-2	Credits: NA
Contact Period: Lecture: 32 Hr. Exam: 3 Hr	Weightage :CIE:100% - [P/NP]		

Prerequisites: Basics of mathematics.

Course Learning Objectives (CLOs)

This course aims to

1. Solve the mathematical calculations easily and quickly using the methods of vedic mathematics.
2. Illustrate different examples to learn about percentages effectively.
3. Compare the different types of series.
4. Explain the logic behind solving problems under series such as A.P.,G.P.,H.P.
5. Explain divisibility rules, properties of different types of numbers.
6. Explain methods to find the number of factors and sum of factors.
7. Analyze the concept of power cycle, and find last digit and last two digits.
8. Solve problems involving simple equations and inequalities.
9. Explain Componendo, Dividendo, Invertendo, Alternendo and other terms related to ratio and proportion.
10. Explain the concepts behind the logical reasoning modules such as arrangement, blood relations and directions

Relevance of the course:

3rd Semester is considered as the right time to build a base to a student's analytical and logical ability. This course connects the basics of maths learnt in school into the present problem solving techniques. It creates an awareness towards the importance and significance of an individual's logical abilities.

Course Content
Unit-1

Sharpen your axe!!

Vedic mathematics:

Viniculum and de- viniculum, subtractions using viniculum .Nikhilum multiplication: For numbers close to base values, multiplication of any two digit numbers or three digits number using criss cross method. Finding the square, square root, cubes , cube root of two digit and three digit numbers quickly. Approximation in multiplication and division. Checking the answer using digital sum method

SSC- Get hands on multiplication tables, increasing the speed in basic arithmetic operations. Classification of numbers.

Percentage calculations and ratio comparison:

Percentage calculations: Percentage rule for calculating, percentage values through additions, percentage– fraction table, approximation in calculating percentages. Application based problems

Ratio comparison: calculations method for ratio compressions: 1. the cross multiplication method, 2. percentage value compression method 3. Numerator and denominator percentage change method. Method for calculating the value of percentage change in the ratio.

Application based problems.

SSC- Thorough with fractions and decimal values. Applications of tabulated fractions. Product of means and extremes.

8 Hours

Unit-2

Analytical Reasoning 1: series
Number series: Standard patterns of number series, pure series: perfect square, square cube, prime, combination of this series. Difference series, ratio series, mixed series, geometric series, two-tier arithmetic series, three-tier arithmetic series, change in the order for difference series, change in the order for ratio series, sample company questions.
Letter series: Alphabet and Alphanumeric series, finding the missing term based on logic learnt in number series module, continuous pattern series, correspondence series. sample company questions.
Picture series : image analysis, addition deletion rotation or modification of lines or shapes. Understanding the symmetry of the image. Mirror image analysis. sample company questions.
SSC- Basic knowledge of letter positions, Different number series for example – even, odd, prime, composite etc.

6 Hours

Unit-3

Number system:
Introduction, **Integers:** Remainder zero concept, Odd and Even Integers, Negative and positive integers, power number a^x, properties of a perfect square number. **Prime number:** General method to identify the prime number, properties of prime numbers. Euler's number.
Factorial number: Wilson's theorem, important results on factorial. **Divisor:** number of divisors, sum of divisors, number expressed as the product of two factors.
Divisibility rules: divisibility of a whole number by a whole number, divisibility of an expression by an expression. **Modulus concept:** divisibility rules in modulus, rules of operations in modulus. **Finding one remainder:** One divisor, remainder of $(a^n - b^n)$, remainder for more than one divisor.
UNIT digit: Concept of power cycle, finding last two digits**.** Number of trailing zeroes.
SSC-Basic arithmetic operations, knowledge about quotient and remainders, multiples and factors.

6 Hours

Unit-4

Simple equations, Ratio Proportions and Variations:
Simple equations: Linear equations-Linear equations in one variable, linear equation in two variables, Different methods of solving linear equations in two variables– Method of elimination, Method of substitution, Method of cross multiplication. Format of equations that can be converted to linear equations, Linear equations of three variables, Inequalities and its properties. Advanced problems on Simple equations. Age problems.
Ratio Proportions and Variations: Understanding the meaning and difference between ratio, proportion and variation. Properties of ratio, Comparison of more than two quantities, Proportion, Properties of proportion - Componendo, Dividendo, Invertendo, Alternendo. Continued proportion, Mean proportion. Variation - Direct variation, Indirect variation, Joint variation, Short cut methods to solve problems on variation.
SSC-Knowledge about factors, types of factors. Splitting the middle term rule, formula rule.

6 Hours

Unit-5
Building the fundamentals of logical reasoning:
Arrangement:
Approach to tackle questions, Different types of arrangement– Linear arrangement, Circular arrangement. Selection, Double line map. Possible ways of arrangement– Words or numbers, left side only, right side only, left right alternate, increasing or decreasing order, interchange vs push, Strategy for solutions– some tips for quick answers, general strategy.
Directions:
Basics. Pythagorean theorem, Pythagorean triplets, Solving problems for practice.
Blood relations:
Some typical relations that we come across, family tree, Structuring the given problem step by step. Suggested methods– Backtracking, drawing family tree. Problems on blood relations and professions.
SSC-Basic knowledge of directions, Pythagoras theorem. Logical reasoning skills, Relations, Family tree.

6 Hours

Reference Books:
1. The Trachtenberg speed system of basic mathematics, published by Rupa publications.
2. CAT Mathematics by AbhijithGuha. Published by PHI learning private limited.
3. Quantitative aptitude by Dr. R. S Agarwal published by S.Chand private limited.
4. Verbal reasoning by Dr. R. S Agarwal , published by S. Chand private limited.
5. Quantitative aptitude for CAT by Arun Sharma, published by McGraw Hill publication.
6. Analytical reasoning by M.K Pandey BSC PUBLISHING.CO.PVT.LTD

Course Outcomes
After learning all the UNITs of the course, the student is able to:
1. Solve mathematical calculations in less duration compared to the conventional method. L2
2. Give examples for AP, GP and HP and differentiate between them. L1
3. Apply divisibility rules, power cycle method and evaluate the significance of the number system module. L2
4. Point out the errors in the problems concerning inequalities and solve simple equations and problems based on ratio, proportion and variation. L5
5. Solve the problems based on blood relations, directions and arrangement. L4