Topics in Level 1 - Out Of The Box Thinking

Total number of Topics: 13
Net Lecture Duration: 20 hours

Syllabus

- **PUZZLE MATHS**

Puzzles involve two aspects: definite and suspense. The challenge is to break the suspense using definite paths. The order of using the definite paths enhances logical thinking and concentration.

The procedure for solving the puzzles is broken into small exercises which focus on the important steps in the solution. This helps in solving any complex puzzle of the same genre.
Outcomes: Concentration, Topic-specific knowledge, Problem-Solving skills, Memory, Enhancement of self-esteem.

- **CALENDAR MATH:**

Everyone is familiar with the ordered arrangement of date numbers in rows and columns of a month in a calendar. The arrangement has many interesting properties based on the repetition of the weekdays. Based on this many interesting problems and exercises are discussed.
Outcomes: Pattern recognition, Periodicity, Identifying properties thereof.

- **ODD AND EVEN:**

As in computers where binary logic is used, in arithmetic, we have "odd and even" as a powerful concept, effectively used to solve several mathematical problems. Here we focus on the simple but powerful application of the "odd and even" theory.
Outcomes: A proof technique in mathematics was introduced!

- **TUNING TECHNIQUE:**

To watch a sports event, we first switch on the TV, go to sports channels, pick the channel broadcasting the specific sports event and then finetune the brightness, and volume to make it most enjoyable.

Here we see that the required conditions conducive to our enjoyment are satisfied one by one. Similarly, certain classes of mathematics problems can be solved, by satisfying the required conditions one by one in a chosen order. Such techniques can be termed as Tuning Techniques.
Outcomes: Stepwise logical procedure, Logical flow plan.

- **NUMBER TRIP GAME**

We have a word game wherein we travel from a source word to a destination word of the same length, by changing one letter at a time with the intermediate steps being valid words. Here we have a number game where we travel from a source number to a destination number through intermediary numbers satisfying some conditions.

The travel might involve factors or multiples or some other mathematical operations, where the intermediate numbers may be condition-specific.
Outcomes: Decision-making, Familiarity and speed of Math operations.

- **DOING AND UNDOING**

It is a simple ladder technique for solving certain algebraic equations, popularized by the legendary Math Educator (late) Sri P. K. Srinivasan. From the unknown variable to the destination, the operations involved in the forward direction, have to be retraced in the reverse order, to reach the variable from the destination. Hence the name "doing and undoing".
Outcomes: Avoidance of the use of variables for solving competition questions, Developing arithmetic manipulation skills over algebra.

- **VISUAL MATHS**

Here we visualize a given problem situation and interpret in different ways to arrive at a solution. For example, think of proof without words, which effectively uses visual mediums to prove identities or solve problems. We use combinatorial ideas of counting in different ways also.
Outcomes: Visual interpretation, Counting in different ways, Pattern recognition, Dimensional enhancement, and generalization.

- **WHO AM I?**

An object, maybe a number or geometrical figure, gives its characteristics and properties, and queries who am I? The process of assessing and analysing the properties to arrive at the answer is what makes this an interesting technique.
Outcomes: Analysis of the properties and use of characteristics to aid in the solution procedure.

- **DIVISIBILITY BLOCKS**

This involves problems typically with large numbers of digits like hundreds and thousands of digits. We solve for such numbers with certain required properties. This is typically solved, by using blocks of a small number of digits and manipulating the blocks, to arrive at the properties required in the large number. The manipulations used, depend on the properties required.
Outcomes: Arithmetic properties, Divisibility rules, suitable blocking.

- **MISSING DIGITS**

Numbers with some digits missing or hidden will be given. Need to solve so that the completed number satisfies the properties required. Known rules of arithmetic must be used to arrive at the solution.
Outcomes: Arithmetic properties, Divisibility rules.

- **FOLLOW THE SEQUENCE**

A sequence of numbers is provided, which is generated following certain rules which are given. We emphasise the generating rule, as a given finite sequence can be extended in many different ways. This helps in learning many problem-solving techniques by using arithmetic translation, scaling etc. Further general properties of the terms can also be studied.

Outcomes: Pattern recognition leads to arithmetic translation and scaling, recognising inherent properties in the sequence.

- **MASK MATH**

This is also called alphamatics. Here alphabets take the place of digits, where different digits are represented by different alphabets. Here properties of addition, carryover, and multiplication are used intelligently.

Outcomes: Arithmetic skills development, Quick Analysis.

- **COW GRASS THEORY**

This can be effectively used in Geometric length inequalities, like polygonal inequalities. What is the shortest route for a cow to reach grass?

Outcomes: Geometric visualization, Estimating ability