

Lecture-0 (Motivation)

What is discrete Mathematics and why we study this subject saperately.

Discrete Mathematics is a branch of Mathematics which deals with discrete objects. An object is discrete if it is countable (or it is not continuous).

Examples of discrete objects:

1. People, Balls, Chairs, Tables.
2. The set of natural numbers \mathbb{N} , integers \mathbb{Z} , and rationals \mathbb{Q} .
3. Functions from $\{1, 2, \dots, n\}$ to $\{0, 1\}$.
4. Function $y = x^2$, where $(x, y) \in \mathbb{N} \times \mathbb{N}$.

The following objects are not discrete:

1. The real line \mathbb{R} , real plane \mathbb{R}^2 .
2. $y = x^2$ such that $(x, y) \in \mathbb{R}^2$.

Till class 12th, we have studied a part of discrete mathematics. Some topics are as follows.

1. Study of integers or natural numbers.
2. Arithmetic progression (AP), Geometric progression (GP), and Harmonic progression (HP).
3. Permutation and combination.

Now we come to the question why we study Discrete Mathematics: the answer is that discrete objects have some common characteristics and there is a set of common tools that are useful for handling discrete objects. So in discrete mathematics, we study this general set of tools. This give rise to number of subjects such as:

1. Finite set theory,
2. Combinatorics,
3. Finite group theory,
4. Discrete probability
5. Graph theory and many more.

In this course, we study the above topics in a detailed way.