Sets

Sets – Collection of objects in a domain. Domain is represented as D.
A = {1,2,3,4,5}

- **Universal Set (U)** – Set which contains every element in D.
  W = {0,1,2,3, …,N} (Set of all whole numbers)
- **Null Set (∅)** – Contains no element. { }
- **Proper Subset** – Contains some but not all elements of D.
  A = {1,2,3,4,5} , A ⊂ W
- **Equal Sets** – Sets having the same elements.
  A = {1,2,3,4,5}, B = {2,1,4,5,3}
- **Equivalent Sets** – Sets having the same number of elements.
  A = {1,2,3,4,5}, B = {a,b,c,d,e}

Elements of Set:

The different objects that form a set are called the elements of a set. The elements of the set are written in any order and are not repeated. Elements are denoted by small letters.

Notation of a Set:

A set is usually denoted by capital letters and elements are denoted by small letters

If x is an element of set A, then we say $x \in A$. [x belongs to A]

If x is not an element of set A, then we say $x \notin A$. [x does not belong to A]

Representation of a Set

1. Statement form:

In this, well-defined description of the elements of the set is given and the same are enclosed in curly brackets.

2. Roster form or tabular form:

In this, elements of the set are listed within the pair of brackets { } and are separated by commas.

The set of all letters in the word MATHEMATICS.

Therefore, Z = {M, A, T, H, E, I, C, S}

3. Set builder form:

In this, a rule, or the formula or the statement is written within the pair of brackets so that the set is well defined. In the set builder form, all the elements of the set, must possess a single property to become the member of that set.

E.G. Ex 1: {2, 3, 5 and 7} is written in set-builder form as P = {x:x is a prime number, x < 10}.

Types of Sets

Null Set:

A set which does not contain any element is called an empty set, or the null set or the void set and it is denoted by ∅ and is read as phi. In roster form, ∅ is denoted by {}. An empty set is a finite set, since the number of elements in an empty set is finite, i.e., 0.

Singleton Set:

A set which contains only one element is called a singleton set.

Finite Set:

A set which contains a definite number of elements is called a finite set. Empty set is also called a finite set.

Infinite Set:

The set whose elements cannot be listed, i.e., set containing never-ending elements is called an infinite set

Cardinal Number of a Set:

The number of distinct elements in a given set A is called the cardinal number of A. It is denoted by n(A).

Equivalent Sets:

Two sets A and B are said to be equivalent if their cardinal number is same, i.e., n(A) = n(B). The symbol for denoting an equivalent set is '↔'.

Equal sets:

Two sets A and B are said to be equal if they contain the same elements. Every element of A is an element of B and every element of B is an element of A.