

*Sets*

*The idea of a set is the basis of Mathematics. Set theory is very popular in economics business and other social science. In this chapter, we will explain some basic principles of set theory*

*1.The set of rooms to a house.*

*2.The set of stars in universe*

# SET

Def. A set is a collection of well defined objects which are distinct from each other. By “we defined” we object that given any object, we can find whether it is an element of the set or not an element of the set. Each object of the set is called an element of the set

NOTATION. Usually the capital letters  $A, B, C, D, \dots, X, Y$  are used to represent the set and small letters  $a, b, c, \dots, x, y, \dots$  etc. To denote the object or elements of the set.

The collection of good students in a class is not a set, since the term “good student” is vague and it is not well defined. But collection of students in a college is a set.

**Note. Every set is a collection of objects but every collection of objects is not a set .**

## **Some standard sets**

**N = set of all natural numbers 1,2,3,4, .....**

**Z or I = set of integers ....., -3,-2,-1,0,1,2, .....**

**w = set of all whole numbers 0,1,2,3, .....**

**Q = set of all rational numbers**

**R = set of all real numbers**

## **Methods of expressing a set**

There are two Methods of expressing a set:

**1. Roster method or Tabular method.** In this method, we write down all the elements of a set in a row, Separating every two elements by a comma and enclose them by curly brackets. For example, the set A of natural numbers 1,3,5,7,9,11 is written as

$$A = \{ 1,3,5,7,9,11 \}.$$

**Note. (i) The order of writing the elements of a set is immaterial. For example**

**$\{ 2,4,6\}$  ,  $\{4,6,2\}$  or  $\{6,2,4\}$  all denote the same set.**

**(ii) An element of a set is not written more than once. Thus the set**

**$\{ 2,2,4,6,6,8\}$  can be written as  $\{ 2,4,6,8\}$ .**

**(ii) Defining property or set builder method.** In this method, we write down a property which gives all the elements of the set. For example, A is the set of all those odd positive integers which are less than 12, gives us the same data in (I) , only expressed in a different way . This is written as

$$A = \{ x : x \text{ is a positive odd integer and } x < 12 \}.$$

The dot , ':' is read as ' such that '

The forms mentioned above are something convertible to each other.

For example:

(i)  $A = \{x : x \text{ is odd positive integer}\}$  can be written as

$$A = \{ 1, 3, 5, 7, 9, \dots \}.$$

(ii)  $A = \{ x : x \text{ is positive integer and } 3x + 1 = 10 \}$  can be written as

$$A = \{ 3 \}$$

(iii)  $A = \{ x : x \text{ is a vowel in the word ' Mathematics ' } \}$  can be written as

$$A = \{ a, e, i \}$$

In a set, the order in which the elements are written within the bracket is immaterial. Thus  $\{3, 5, 7, 10\}$  ,  $\{5, 7, 3, 10\}$  ,  $\{10, 5, 3, 7\}$  etc. All denote the same set.