## 1. Definitions.

A set is a well-defined class or collection of objects. By a well-defined collection we mean that there exists a rule with the help of which it is possible to tell whether a given object belongs or does not belong to the given collection. The objects in sets may be anything, numbers, people, mountains, rivers etc. The objects constituting the set are called elements or members of the set. A set is often described in the following two ways.
(1) Roster method or Listing method:In this method a set is described by listing elements, separated by commas, within braces $\}$. The set of vowels of English alphabet may be described as $\{\mathrm{a}, \mathrm{e}, \mathrm{i}, \mathrm{o}, \mathrm{u}\}$.
The set of even natural numbers can be described as $\{2,4,6 \ldots \ldots . . .$.$\} . Here the dots stand for 'and$ so on'.

Note:The order in which the elements are written in a set makes no difference. Thus $\{\mathrm{a}, \mathrm{e}, \mathrm{i}, \mathrm{o}, \mathrm{u}\}$ and $\{e, a, i, o, u\}$ denote the same set. Also the repetition of an element has no effect. For example, $\{1,2,3$, and $2\}$ is the same set as $\{1,2$ and 3$\}$
(2) Set-builder method or Rule method: In this method, a set is described by a characterizing property $P(x)$ of its elements $x$. In such a case the set is described by $\{x: P(x)$ holds $\}$ or $\{x \mid P(x)$ holds\}, which is read as 'the set of all $x$ such that $P(x)$ holds'. The symbol ' $\mid$ ' or ':' is read as 'such that'.
The set E of all even natural numbers can be written as

$$
E=\{x \mid x \text { is natural number and } x=2 n \text { for } n \in N\}
$$

or $\quad E=\{x \mid x \in N, x=2 n, n \in N\}$
or $\quad E=\{x \in N \mid x=2 n, n \in N\}$
The set $A=\{0,1,4,9,16, \ldots$.$\} can be written as A=\left\{x^{2} \mid x \in Z\right\}$

Note: Symbols

| Symbol | Meaning |
| :--- | :--- |
| $\Rightarrow$ | Implies |
| $\in$ | Belongs to |
| $A \subset B$ | $A$ is a subset of $B$ |
| $\Leftrightarrow$ | Implies and is implied by |
| $\notin$ | Does not belong to |


| s.t. | Such that |
| :--- | :--- |
| $\forall$ | For every |
| $\exists$ | There exists |
| Symbol | Meaning |
| iff | If and only if |
| \& | And |
| a \| b | a is a divisor of b |
| N | Set of natural numbers |
| I or Z | Set of integers |
| R | Set of real numbers |
| C | Set of complex numbers |
| Q | Set of rational numbers |

