

SET LANGUAGE

2.1. KINDS OF SETS:

Set: A collection of well defined objects is called a set.

Notations: 1. Roster form (Tabular form), 2. Set builder form.

Null set: A set which contains no element is called the null set or empty set.

Finite set: A set with a finite number of elements is called a finite set.

Infinite set: A set containing infinite number of elements is called an infinite set.

Singleton set: A set which has only one element is called a singleton set.

Disjoint sets: Two sets are disjoint, if they have no element in common.

Overlapping sets: Two sets are overlapping sets, if they have some element in common.

Equal sets: Two sets are said to be equal if they contain the same element.

Equivalent sets: Two sets are said to be equivalent if, they contain the same number of elements.

Universal set: Universal set is a set which contains all the elements of all the sets under consideration.

Complement of a set: The complement of a set A is the set of all elements of universal set that are not in A .

Subset: A set B is called a subset of A if every element of B is in A .

Set Operations:

1. Union 2. Intersection 3. Difference 4. Symmetric difference.

2.2. DE-MORGAN'S LAWS:

Let A, B, C be any three sets, then

$$1. (A \cup B)' = A' \cap B'$$

$$2. (A \cap B)' = A' \cup B'$$

$$3. A - (B \cup C) = (A - B) \cap (A - C)$$

$$4. A - (B \cap C) = (A - B) \cup (A - C)$$

2.3. TYPES OF FUNCTIONS:

- One - one function:** The function $f: A \rightarrow B$ is one - one if different elements in A have different images in B .
- Many to one function:** The function $f: A \rightarrow B$ is called many to one, if two or more elements of set A , corresponds to one elements of set B .
- Into Function:** The mapping $f: A \rightarrow B$ is called into, if there is atleast one element of set B which has no pre-image in set A .
- Onto function:** The mapping $f: A \rightarrow B$ is called onto if every element in set B has pre-image in set A .
(i.e.) Range is equal to co-domain.
- Constant function:** A function $f: A \rightarrow B$ is called a constant function if every element of A has the same image in B .
- Identity function:** Let A be a non-empty set A function $f: A \rightarrow A$ is called an identity function if each element of A is associated with itself under f .
(i.e.) $f(x) = x$ for each $x \in A$.

7. Step functions:

(i) **Greatest integer function:** The function whose value at any real number x is the greatest integer less than or equal to x is called the greatest integer function. It is denoted by $[x]$.

(ii) **Least integer function:** The function whose value at any real number x is the smallest integer greater than or equal to x is called the least integer function and is denoted by $\lceil x \rceil$.

8. **Signum Function:** If $f: R \rightarrow R$ is defined by

$$f(x) = \begin{cases} \frac{|x|}{x} & , x \neq 0 \\ 0 & , x = 0 \end{cases}$$

then f is called signum function.

The domain of the function is R and the range is $\{-1, 0, 1\}$.

