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SETS

Sets

- Collection of well defined objects.
- Set is denoted by capital letters and elements are in small letters

Representation of Set

I. Roaster Method/Tabular Method
Listing of all elements separated by commas and enclosed them in curly bracket.
$$A = \{ 1,2,3,4,5\}$$

II. Set-Builder Form
Represented the elements by some common property
$$A = \{ x : x \in N and x < 6 \}$$

Classification of Sets

- Finite and Disjoint Sets
- Empty/Null Sets
- Singleton Sets
- Disjoint sets
- Equal and equivalent Sets

Sub-Sets

- If A and B are two sets seen that each elements of set A is an elements of set B.It is denoted as A ⊂ B
- $A \subseteq A$&1 ⊂ A
- If $A \subseteq B$and A $B \subseteq A$ than A=B
- If $A \subseteq C$ and A ≠ B, than A is proper subset of B
- If A is set with n (A) =P, then number subset of A = 2^P

Power Set

- The set of all subsets of the given set is known as power et
- The power set of a set A is denoted as P(A)
- If$|A| = n, P(A) = 2^n$

Universal Sets

- Universal set is the set of all objects pertaining to a particular problem
- It is denoted as U

Venn diagram

- Diagrammatical representation of set is known as Venn diagram
- Universal set U is represented by interior of rectangle and other set are represented by interior of circles

Components of a Set

- The component of set A is the set of A is the set of elements which are in U but not in A
- It is represented $A' = U - A$
- $A^c = U - A, U^c = Q$
- $A \cup A' = U, A \cap A' = Q, (A')' = A$

De Morgan's Law

a) $(A \cup B)' = A' \cap B'$
b) $(A \cap B)' = A' \cup B'$

Operation on Sets

1. Intersection of Sets

The intersection of set A and B is denoted by $A \cap B$

$$A \cap B = \{x : x \in A and x \in B\}$$

2. Union of Sets

The union of two sets A and B is denoted as $A \cup B$

$$A \cup B = \{x : x \in A or x \in B\}$$

3. Difference of Sets

The difference of set B from set A is the set of those elements which are B but not in A

It is denoted as A-B

$$A - B = \{x : x \in A and x \notin B\}$$
$$B - A = \{x : x \in B and x \notin A\}$$

Check YourProgress

1) If two sets do not have any common element, then these sets are as:
   (A) Finite sets
   (B) Infinite sets
   (C) Disjoint sets
   (D) Empty sets
2) In a set 'A' have three elements, then number of subsets of 'A' are:
   (A) 3
   (B) 9
   (C) 8
   (D) 6
3) The double complement of any set is equal to:
   (A) Sets itself
   (B) Null set
   (C) Complement of set
   (D) Undefined
4) Between two sets 'A' and 'B: if A⊆B and B⊆A, then relationship between 'A' and 'B' as:
   (A) A > B
   (B) A < B
   (C) A = B
   (D) A = B = 0
5) A = {1,2,3,4,5,6}, B = {2,3,4} then B – A is equal to:
   (A) {1,5,6}
   (B) {2,3,4}
   (C) {4,5,6}
   (D) {1,2,3}

STRETCH YOURSELF

1. By taking suitable example, prove De-Morgan's Law
   (i) $(A \cup B)' = A' \cap B'$
   (ii) $(A \cap B)' = A' \cup B'$
2. Draw Ven diagram for each of following case:
   (i) $A \cap B$, When $B \subset A$
   (ii) $A \cap B$, When A and B are disjoint sets
3. If $A = \{x : x \in N\}$ and $B = \{y : y \in Z \text{ and } -8 \leq y \leq 0\}$

   Find $A \cup B$, and write your answer in the roster form and in set – builder form
4. By taking an example, prove that
   $$(A - B) \cup (B - A) = (A \cup B) - (B \cap A)$$

5 Write the subset of the following sets
5 (i) i{p,q,r} ii {a,b}

Answer to Check Your Process

1 D

2 C

3 A

4 C

5A