CS-206 ASSIGNMENT-4

Tanusi Mittal
1901CS65

Que 1:-

(a) The set of airline flights from New York to New Delhi, the set of nonstop airline flights from New York to New Delhi

⇒ set A = {set of airline flights from New York to New Delhi}

set B = {set of nonstop airline flights from New York to New Delhi}

⇒ Every nonstop airline flight from New York to New Delhi is also considered to be an airline flight from New York to New Delhi. Thus every element of the second set B is also in first set A,

⇒ the second set B is a subset of the first set A

$$\boxed{B \subset A}$$

(b) The set of people who speak English, the set of people who speak Chinese.

⇒ set A = {People who speak English}

set B = {People who speak Chinese}

These are people who speak English that do not speak Chinese ⇒ A is not a subset of set B

And similarly B is not a subset of set A

⇒ **Neither is a subset of the other.**

Tarun Muttal
1901 CS65

(c) The set of flying squirrels, the set of living creatures that can fly.

⇒ Set A = { flying squirrels }

Set B = { living creatures that can fly }

Flying squirrels are living creatures that can fly. Thus every element of the first set A is also in second set B,

⇒ Set A is a subset of set B

⇒ $\boxed{A \subset B}$

Que2:-

(a) $0 \in \emptyset$

⇒ False

→ The statement implies that 0 is an element of the empty set. But as we know that empty set doesnot contain any element so the given statement is false.

(b) $\emptyset \in \{0\}$

⇒ False

→ The statement implies that the empty set is an element of the set which contains only 0, but that set doesnot contain an empty set so the given statement is false.

(c) $\emptyset \subset \{0\}$

⇒ True

→ The statement implies that the empty set is a subset of the set which contains only 0.

As we know that the empty set is the subset of every set so the given statement is true.

(d) $\{0\} \in \{0\}$

⇒ False

→ The statement implies that a set which contains only 0 is an element of the set which contains only 0, but the set doesnot contain any set in it. Therefore the given statement is false.

(e) $\{0\} \subset \{0\}$

⇒ False

→ As both the sets are same it implies that set 1 is inclusive of 2 and not just a subset; Therefore the given statement is false.

(f) $\{\phi\} \subseteq \{\phi\}$

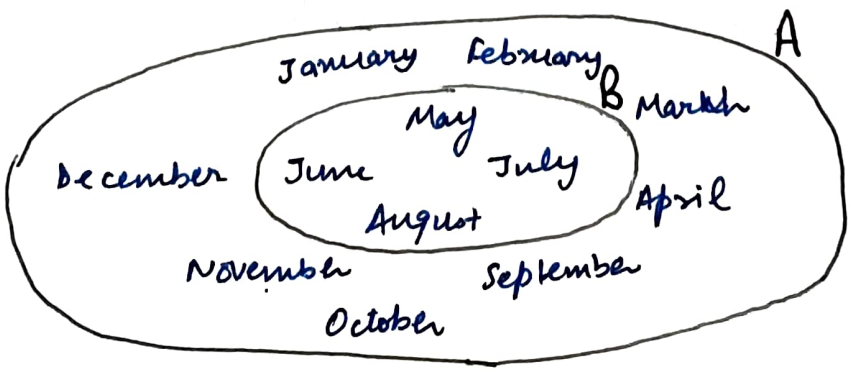
⇒ True

→ As the both sets are empty ; ⇒ both sets are inclusive as a set is always an inclusive subset of itself.
So, the given statement is true.

Que3 :-

⇒ Set A = {January, February, March, April, May, June, July, August, September, October, November, December}

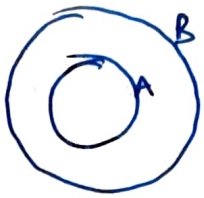
Set B = {May, June, July, August} ⇒ Months without letter R.



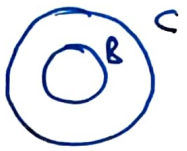
Tarun Mittal
1901CS65
Panipat

Que 4:

⇒ $A \subset B \Rightarrow$

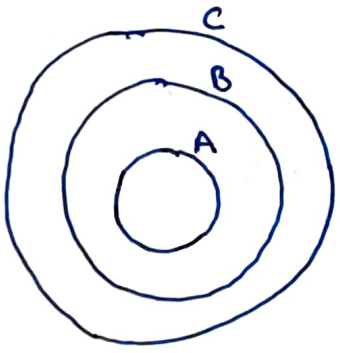


$B \subset C \Rightarrow$



Combining both

$A \subset B$ and $B \subset C \Rightarrow$



Que 5:

⇒ Cardinality → No of elements in the set

(a) $\{a\} \longrightarrow 1 \quad (a)$

(b) $\{\{a\}\} \longrightarrow 1 \quad (\{a\})$

(c) $\{a, \{a\}\} \longrightarrow 2 \quad (a, \{a\})$

(d) $\{a, \{a\}, \{a, \{a\}\}\} \longrightarrow 3 \quad (a, \{a\}, \{a, \{a\}\})$.

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Que 6:

⇒ We know that if A and B are two sets

⇒ $|A \times B| = |A| \times |B|$

ie the cardinality of the output set of the cartesian product is the product of cardinalities of the two sets.

Let A be a set
and B be an empty set.

$$|A \times \phi| = 0 = |\phi \times A|$$

Also the cardinality of empty set $\{\phi\}$ is 0

So ⇒ $|A \times \phi| = \phi = |\phi \times A|$

⇒ $\boxed{A \times \phi = \phi = \phi \times A}$

Que 7:

⇒ Given: $A - B = \{1, 5, 7, 8\}$

$B - A = \{2, 10\}$.

$A \cap B = \{3, 6, 9\}$.

We know ⇒ $A = (A \cap B) \cup (A - B)$

$= \{3, 6, 9\} \cup \{1, 5, 7, 8\}$

$A = \{3, 6, 9, 1, 5, 7, 8\}$

⇒ $\boxed{A = \{1, 3, 5, 6, 7, 8, 9\}}$

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// ly $B = (A \cap B) \cup (B - A)$

$= \{3, 6, 9\} \cup \{2, 10\}$

$B = \{3, 6, 9, 2, 10\}$

$\Rightarrow \boxed{B = \{2, 3, 6, 9, 10\}}$

Ques 2.

$\Rightarrow$ Let us consider $a \in A$, $b \in B$, $c \in C$.

The cartesian product $A \times B \times C$ contains triplets of the form (a, b, c) with the elements in the triplet in the same order as the sets that the elements belong to.

$$A \times B \times C = \{a, b, c\}.$$

But $(A \times B) \times C$ contains doublets of the form $(\{a, b\}, c)$

$x \in A \times B$

$(A \times B) \times C = \{x, c\}$

As the elements in both the sets are not equal, so these both sets are not equal.

Hence Proved.