Sets Ex 1.6 Q9

Given $A \cap B = \phi$, i.e., A and B are disjoint sets this can represented by venn diagram as follows

To show: $A \subseteq B'$

This is clear from the venn diagram itself

$\because$ A is lying in the complement of B, but we give a proof of it.

So let $x \in A$

$\because \quad A \cap B = \phi,$

$\therefore \quad x \notin B$

and so $x \in B'$ $\quad [\because x \notin B \Rightarrow x \in B']$

Thus $x \in A \Rightarrow x \in B'$. This is true for all $x \in A$

Hence, $A \subseteq B'$

Sets Ex 1.6 Q10

We need to show that $(A - B) \cap (A \cap B) = \phi$, $(A \cap B) \cap (B - A) = \phi$ and $(A - B) \cap (B - A) = \phi$

The 3 sets $A - B$, $A \cap B$ and $B - A$ may be represented by a venn diagram as follows

It is clear from the diagram that the 3 sets are pairwise disjoint, but we shall give a proff of it.

We first show that $(A - B) \cap (A \cap B) = \phi$

Let $x \in (A - B)$

$\Rightarrow \quad x \in A$ and $x \notin B$ $\quad$ [by definition of $A - B$]

$\Rightarrow \quad x \notin A \cap B$. This is true for all $x \in (A - B)$

Hence $(A - B) \cap (A \cap B) = \phi$

On a similar lines, it can be seen that $(A \cap B) \cap (B - A) = \phi$

Finally, we show that $(A - B) \cap (B - A) = \phi$

We have,

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

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

Hence, $(A - B) \cap (B - A) = \phi$.

Sets Ex 1.6 Q11

We need to show $(A \cup B) \cap (A \cap B') = A$

Now,

$(A \cup B) \cap (A \cap B') = ((A \cup B) \cap A) \cap B'$ $\quad$ [Using associative property]

$= ((A \cap A) \cup (B \cap A)) \cap B'$ $\quad$ [$\because A \cap A = A$ and $B \cap A = A \cap B$, by commutative law]

$= A \cap B'$ $\quad$ [$\because A \cup (A \cap B) = A$]

$= A$

Sets Ex 1.6 Q12(i)

We have $A' \cup B = \cup$, the universal set

To show: $A \subset B$

Let, $x \in A$

$\Rightarrow \quad x \notin A' \quad [\because A \cap A' = \phi]$

$\because \quad x \in A$ and $A \subset \cup$

$\Rightarrow \quad x \in \cup$

$\Rightarrow \quad x \in (A' \cup B) \quad [\because \cup = A' \cup B]$

$\Rightarrow \quad x \in A'$ or $x \in B$

But, $x \notin A'$,

$\therefore \quad x \in B$

Thus, $x \in A \Rightarrow x \in B$

This is true for all $x \in A$

$\therefore \quad A \subset B$

Sets Ex 1.6 Q12(ii)

We have $B' \subset A'$

To show: $A \subset B$

Let, $x \in A$

$\Rightarrow \quad x \notin A' \quad [\because A \cap A' = \phi]$

$\Rightarrow \quad x \notin B' \quad [\because B' \subset A']$

$\Rightarrow \quad x \in B \quad [\because B \cap B' = \phi]$

Thus, $x \in A \Rightarrow x \in B$

This is true for all $x \in A$

$\therefore \quad A \subset B$

*********** END **********