Sets Ex 1.7 Q1

To show $A' - B' = B - A$

We show that $A' - B' \subseteq B - A$ and vice versa

Let, $x \in A' - B'$

$\Rightarrow \quad x \in A'$ and $x \notin B'$

$\Rightarrow \quad x \notin A$ and $x \in B \qquad [\because A \cap A' = \phi$ and $B \cap B' = \phi]$

$\Rightarrow \quad x \in B$ and $x \notin A$

$\Rightarrow \quad x \in B - A$

This is true for all $x \in A' - B'$

Hence $A' - B' \subseteq B - A$

Conversely,

Let, $x \in B - A$

$\Rightarrow \quad x \in B$ and $x \notin A$

$\Rightarrow \quad x \notin B'$ and $x \in A' \qquad [\because B \cap B' = \phi$ and $A \cap A' = \phi]$

$\Rightarrow \quad x \in A'$ and $x \notin B'$

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

This is true for all $x \in B - A$

Hence $B - A \subseteq A' - B'$

$\therefore \ A' - B' = B - A$ Proved.

Sets Ex 1.7 Q2(i)

LHS $= A \cap (A' \cup B)$

$= (A \cap A') \cup (A \cap B) \qquad [\because \cap$ distributes over (i)$]$

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

$= A \cap B \qquad [\because \phi \cup x = x$ for any set $x]$

= RHS

$\therefore$ LHS = RHS Proved.

Sets Ex 1.7 Q2(ii)

For any sets A and B we have by De-morgan's laws

$$(A \cup B)' = A' \cap B', \quad (A \cap B)' = A' \cup B'$$

Also,

LHS $= A - (A - B)$

$= A \cap (A - B)'$

$= A \cap (A \cap B')'$

$= A \cap (A' \cup (B')') \qquad$ [By De-morgan's law]

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

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

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

$= A \cap B \qquad [\because \phi \cup x = x$, for any set $x]$

= RHS

$\therefore$ LHS = RHS Proved.

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