Sets Ex 1.6 Q13

This is a false statement

Let, $A = \{1\}$ and $B = \{2\}$

Then,

$$P(A) = \{\phi, \{1\}\}$$

and $$P(B) = \{\phi, \{2\}\}$$

$\therefore$ $$P(A) \cup P(B) = \{\phi, \{1\}, \{2\}\}$$

Now,

$$A \cup B = \{1, 2\}$$

and $$P(A \cup B) = \{\phi, \{1\}, \{2\}, \{1, 2\}\}$$

Hence, $P(A) \cup P(B) \neq P(A \cup B)$

Sets Ex 1.6 Q14(i)

i. We know that $(A \cap B) \subset A$ and $(A - B) \subset A$

$\Rightarrow (A \cap B) \cap (A - B) \subset A$.....(1)

Let and $x \in (A \cap B) \cap (A - B)$

$\Rightarrow x \in (A \cap B)$ and $x \in (A - B)$

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

$\Rightarrow x \in A$ and $x \in A$ [$\because x \in B$ and $x \notin B$ are not possible simultaneously]

$\Rightarrow x \in A$

$\therefore (A \cap B) \cap (A - B) \subset A$.....(2)

From (1) and (2), we get

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

Sets Ex 1.6 Q14(ii)

ii. Let $x \in A \cup (B - A)$

$\Rightarrow x \in A$ or $x \in (B - A)$

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

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

$\Rightarrow x \in (A \cup B)$

$\therefore A \cup (B - A) \subset (A \cup B)$.....(1)

Let and $x \in (A \cup B)$

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

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

$\Rightarrow x \in A$ or $x \in (B - A)$

$\Rightarrow x \in A \cup (B - A)$

$\therefore (A \cup B) \subset A \cup (B - A)$.....(2)

From (1) and (2), we get

$A \cup (B - A) = A \cup B$

Sets Ex 1.6 Q15

Since each X_r has 5 elements and each element of S belongs to exactly 10 of X_r's.

$\therefore S = \bigcup_{r=1}^{20} X_r \Rightarrow \frac{1}{10}\sum_{r=1}^{20} n(X_r) = \frac{1}{10}(5 \times 20) = 10$.....(i)

Since each Y_r has 2 elements and each element of S belongs to exactly 4 of X_r's.

$\therefore S = \bigcup_{r=1}^{n} X_r \Rightarrow \frac{1}{4}\sum_{r=1}^{n} n(Y_r) = \frac{1}{4}(2n) = \frac{n}{2}$....(ii)

From (i) and (ii), we get

$10 = \frac{n}{2} \Rightarrow n = 20$

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