

$$(B - A) = \{b, d, f, g\} - \{a, b, c, d\} = \{f, g\}.$$

$$\therefore A \Delta B = (A - B) \cup (B - A) = \{a, c\} \cup \{f, g\} = \{a, c, f, g\}.$$

COMPLEMENT OF A SET

Let U be the universal set and let $A \subset U$. Then, the complement of A , denoted by A' or $(U - A)$, is defined as

$$A' = \{x \in U : x \notin A\}.$$

Clearly, $x \in A' \Leftrightarrow x \notin A$.

EXAMPLE 14 If $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ and $A = \{2, 4, 6, 8\}$, find (i) A' (ii) $(A')'$.

SOLUTION We have

$$(i) A' = U - A$$

$$= \{1, 2, 3, 4, 5, 6, 7, 8\} - \{2, 4, 6, 8\} = \{1, 3, 5, 7\}.$$

$$(ii) (A')' = U - A'$$

$$= \{1, 2, 3, 4, 5, 6, 7, 8\} - \{1, 3, 5, 7\} = \{2, 4, 6, 8\} = A.$$

EXAMPLE 15 Let N be the universal set.

(i) If $A = \{x : x \in N \text{ and } x \text{ is odd}\}$, find A' .

(ii) If $B = \{x : x \in N \text{ and } x \text{ is divisible by 3 and 5}\}$, find B' .

SOLUTION We have

$$(i) A' = \{x : x \in N \text{ and } x \text{ is not odd}\} = \{x : x \in N \text{ and } x \text{ is even}\}.$$

$$(ii) B' = \{x : x \in N, x \text{ is not divisible by 3 or } x \text{ is not divisible by 5}\}.$$

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