# SET

**1.** In a class of 140 students numbered 1 to 140, all even numbered students opted mathematics course, those whose number is divisible by 3 opted Physics course and theose whose number is divisible by 5 opted Chemistry course. Then the number of students who did not opt for any of the three courses is :

(1) 102 (2) 42 (3) 1 (4) 38

**2.** Two newspapers A and B are published in a city. It is known that 25% of the city populations reads A and 20% reads B while 8% reads both A and B. Further, 30% of those who read A but not B look into advertisements and 40% of those who read B but not A also look into advertisements, while 50% of those who read both A and B look into advertisements. Then the percentage of the population who look into advertisement is :-

(1) 12.8 (2) 13.5 (3) 13.9 (4) 13

**3.** Let A, B and C be sets such that $\phi \neq A \cap B \subseteq C$. Then which of the following statements is not true?

(1) If $(A - C) \subseteq B$, then $A \subseteq B$

(2) $(C \cup A) \cap (C \cup B) = C$

(3) If $(A - B) \subseteq C$, then $A \subseteq C$

(4) $B \cap C \neq \phi$

## SOLUTION

**1. Ans. (4)**

Let n(A) = number of students opted Mathematics = 70,

n(B) = number of students opted Physics = 46,

n(C)=number of students opted Chemistry= 28,

$n(A \cap B) = 23$,

$n(B \cap C) = 9$,

$n(A \cap C) = 14$,

$n(A \cap B \cap C) = 4$,

Now $n(A \cup B \cup C)$

$= n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$

$= 70 + 46 + 28 - 23 - 9 - 14 + 4 = 102$

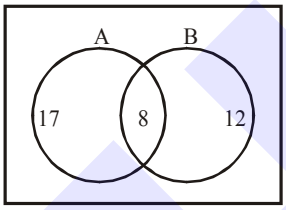
So number of students not opted for any course

= Total $- n(A \cup B \cup C)$

$= 140 - 102 = 38$

**2. Official Ans. by NTA (3)**

**Sol.** Let population = 100




$n(A) = 25$

$n(B) = 20$

$n(A \cap B) = 8$

$n(A \cap \bar{B}) = 17$

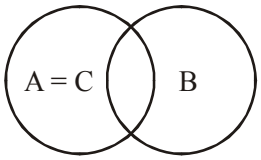
$n(\bar{A} \cap B) = 12$

$$\frac{30}{100} \times 17 + \frac{40}{100} \times 12 + \frac{50}{100} \times 8$$

$5.1 + 4.8 + 4 = 13.9$

**3. Official Ans. by NTA (1)**

**Sol.**




for $A = C$, $A - C = \phi$

$\Rightarrow \phi \subseteq B$

But $A \not\subseteq B$

$\Rightarrow$ option 1 is **NOT** true

Let $x \in (C$ $x \in (C \cup A) \cap (C \cup B)$

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

$\Rightarrow (x \in C \text{ or } x \in A)$ and $(x \in C \text{ or } x \in B)$

$\Rightarrow x \in C \text{ or } x \in (A \cap B)$

$\Rightarrow x \in C \text{ or } x \in C \quad (\text{as } A \cup B \subseteq C)$

$\Rightarrow x \in C$

$\Rightarrow (C \cup A) \cap (C \cup B) \subseteq C \qquad (1)$

Now $x \in C \Rightarrow x \in (C \cup A)$ and $x \in (C \cup B)$

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

$\Rightarrow C \subseteq (C \cup A) \cap (C \cup B) \qquad (2)$

$\Rightarrow$ from (1) and (2)

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

$\Rightarrow$ option 2 is true

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

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

$\Rightarrow x \in C \qquad (\text{as } A - B \subseteq C)$

Let $x \in A$ and $x \in B$

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

$\Rightarrow x \in C \qquad (\text{as } A \cap B \subseteq C)$

Hence $x \in A \Rightarrow x \in C$

$\Rightarrow A \subseteq C$

$\Rightarrow$ Option 3 is true

as $C \supseteq (A \cap B)$

$\Rightarrow B \cap C \supseteq (A \cap B)$

as $A \cap B \neq \phi$

$\Rightarrow B \cap C \neq \phi$

$\Rightarrow$ Option 4 is true.