

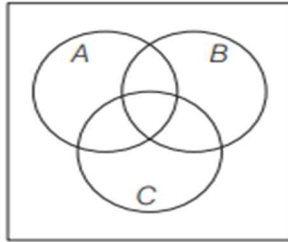
Question: -

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 those 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

(2019 Main, 10 Jan I)

- (a) 42 (b) 102
(c) 38 (d) 1

Solution: -



Let A be the set of even numbered students then
 $n(A) = \left[\frac{140}{2} \right] = 70$ ([.] denotes greatest integer function)

Let B be the set of those students whose number is divisible by 3,

$$\text{then } n(B) = \left[\frac{140}{3} \right] = 46$$

([.] denotes greatest integer function)

Let C be the set of those students whose number is divisible by 5,

$$\text{then } n(C) = \left[\frac{140}{5} \right] = 28$$

([.] denotes greatest integer function)

$$\text{Now, } n(A \cap B) = \left[\frac{140}{6} \right] = 23$$

(numbers divisible by both 2 and 3)

$$n(B \cap C) = \left[\frac{140}{15} \right] = 9$$

(numbers divisible by both 3 and 5)

$$n(C \cap A) = \left[\frac{140}{10} \right] = 14$$

(numbers divisible by both 2 and 5)

$$n(A \cap B \cap C) = \left[\frac{140}{30} \right] = 4$$

(numbers divisible by 2, 3 and 5)

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

$$\begin{aligned} &= \Sigma n(A) - \Sigma n(A \cap B) + n(A \cap B \cap C) \\ &= (70 + 46 + 28) - (23 + 9 + 14) + 4 = 102 \end{aligned}$$

\therefore Number of students who did not opt any of the three courses

$$= \text{Total students} - n(A \cup B \cup C) = 140 - 102 = 38$$