

INCLUSION- EXCLUSION Principle:-

- Principle of Inclusion and Exclusion is an approach which derives the method of finding the number of elements in the union of two sets.
- This is used for solving combinations problems.
- Consider two finite sets A and B. We can denote the Principle of Inclusion and Exclusion formula as follows:-

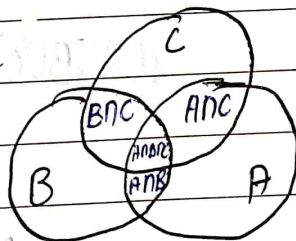
$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

for any finite sets A and B

$$= n(A \cup B) = n(A) + n(B) - n(A \cap B) \quad - (i)$$

Or any finite sets A, B, C

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



Notes by: @jpwebdevelopers

Q: In a Survey of Group of 80 People, it is found that 60 like Egg and 30 like fish. Find Percentage of people like both Eggs & fish.

Sol:

$$n(E) = 60$$

$$n(F) = 30$$

$$n(E \cap F) = ?$$

$$n(E \cup F) = 80$$

$$n(E \cup F) = n(E) + n(F) - n(E \cap F)$$

$$80 = 60 + 30 - n(E \cap F)$$

$$80 = 90 - n(E \cap F)$$

$$n(E \cap F) = 90 - 80$$

$$n(E \cap F) = 10$$

Q: In a Survey of the usage of three toothpaste = A, B, C. It is found that 60 people like A, 55 like B, 40 like C, 20 like A and B, 35 like B and C, 15 like A and C and 10 like all. Find the number of persons included in the Survey.

Sol:

$$n(A) = 60$$

$$n(B) = 55$$

$$n(C) = 40$$

$$n(A \cap B) = 20$$

$$n(B \cap C) = 35$$

$$n(A \cap C) = 15$$

$$n(A \cap B \cap C) = 10$$

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

$$= 60 + 55 + 40 - 20 - 15 - 35 + 10$$

$$= 95 \text{ Ans}$$