Branch : CSE / IT **Batch : Hinglish**

Discrete Mathematics II

Combinatorics

DPP-02

[MCQ]

1. Among a group of students, 49 study Physics, 37 study English and 21 study Biology. If 9 of these students study Physics and English, 5 study English and Biology, 4 study Physics and Biology and 3 study Physics, English and Biology, find the number of students in the group.

(a) 91 (b) 92

(c) 86 (d) None of these

[NAT]

2. A large software development company employs 100 computer programmers. Of them, 45 are proficient in Java, 30 in C#, 20 in Python, six in C# and Java, one in Java and Python, five in C# and Python, and just one programmer is proficient in all three languages above. Determine the number of computer programmers that are not proficient in any of these three languages.

[NAT]

3. In a discrete mathematics class every student is a major in computer science or mathematics or both. The number of students having computer science as a major (possibly along with mathematics) is 25; the number of students having mathematics as a major (possibly along with computer science) is 13; and the number of students majoring in both computer science and mathematics is 8 . How many students are in the class?

[NAT]

4. **I**. Computes the total number of elements that satisfy at least one of several properties.

II. It prevents the problem of double counting.

The number of properties that are true with respect to inclusion exclusion principle are?

[MCQ]

5. The number of positive integers not exceeding 100 that are either odd or the square of an integer is _____.

(a) 63 (b) 59

(c) 55 (d) 50

Answer Key

1. **(b)**
2. **(84)**
3. **(30)**
4. **(2)**
5. **(c)**

Hints and Solutions

1. (b)

Let P represent the number of students who study Physics, E represent the number of students who study English and B represent the number of student who study Biology.

Number of student in the group = n(PUEUB)

Given n(P) = 49, n€ = 37, n(B) = 21

n(P∩E) = 9

n(E∩B) = 5

n(P∩B) = 4

n(P∩E∩B) = 3

n(P∪E∩B) = n(P) + n(E) + n(B) – n(E∩B) – n(P∩B) + n(P∩E∩B)

= 49 + 37 + 21 – 9 – 5 – 4 + 3

= 92

2. (84)

Let U denote the set of all employed computer programmers and let J, C and P denote the set of programmers proficient in Java, C# and Python, respectively. Thus:

|U| = 100

|J| = 45

|C| = 30

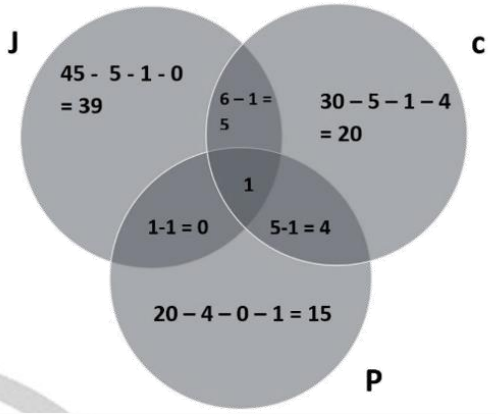
|P| = 20

|J∩C| = 6

|J∩P| = 1

|C∩P| = 5

|J∩C∩P| = 1



We now have sufficient information in order to answer the question.

Determine the number of computer programmers that are not proficient in any of these three languages.

|J ∪ C ∪ P|

= 39 + 5 + 20 + 4 + 15 = 1

= 84

Now calculate the complement:

|(J ∪ C ∪ P)'| = |∪| – |J ∪ C ∪ P|

= 100 – 84

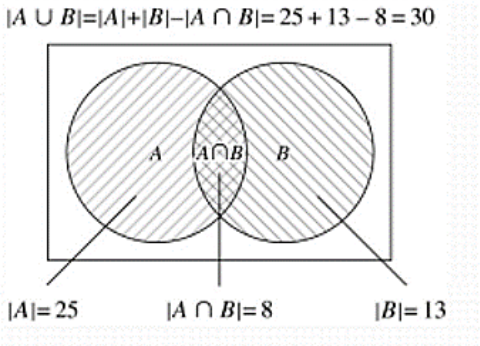
= 16

16 programmers are not proficient in any of the three languages.

3. (30)

|A ∪ B| = |A| + |B| – |A ∩ B|

= 25 + 13 – 8 = 30



4. (2)

Both are the properties of inclusion exclusion principle.

5. (c)

Required number = n(Odd numbers) + n(Square of integers) – n(odd number & square of integer)

From 1 to 100 there are 50 odd and 50 even numbers

Square of integers = 1, 4, 9, 16, 25, 64, 49, 64, 81, 100 = 10 numbers

Both odd & square of integer = 1, 9, 25, 49, 81 = 5 numbers

Hence required number = 50 + 10 – 5 = 55