Sets and Relations

Question1

If set A has 5 elements, set B has 7 elements, then the number of many one functions that can be defined from A to B is

AP EAPCET 2024 - 22th May Morning Shift

Options:

A. $7^5 - 7$

B. $5^7 - 5$

C. $5^7 - {}^7P_5$

D. $7^5 - {}^7P_5$

Answer: D

Solution:

Set A has 5 elements.

Set B has 7 elements.

In a function from A to B, every element of A must be mapped to an element of B. Therefore, total number of functions will be

$= 7 \times 7 \times 7 \times 7 \times 7 = 7^5$

Now, number of many one functions = Total functions-number of one-one functions

$$= 7^5 - {}^7C_5 \times 5!$$
$$= 7^5 - \frac{7!}{(7-5)!5!} \times 5!$$
$$= 7^5 - \frac{7!}{(7-5)!} = 7^5 - {}^7P_5$$
$$\left(\because {}^nP_r = \frac{n!}{(n-r)!}\right)$$
$$= 7^5 - {}^7P_5$$

Question2

205 students take an examination of whom 105 pass in English, 70 students pass in Mathematics and 30 students pass in both. How many students fail in both subjects?

AP EAPCET 2022 - 5th July Morning Shift

Options:

A. 60

B. 145

C. 175

D. 30

Answer: A

Solution:

Total number of students $= 205$

Number of students passed in Math $= 70$

Number of students passed in English = 105

and number of students pass in both $= 30$

Now,

Number of students passed in Math or English $=$ Number of students passed in Math + Number of student passed in English $-$ Number of students passed in both $= 70 + 105 - 30 = 145$

So, number of students fail in both subjects $=$ Total number of students $-$ Students passed in Math or English $= 205 - 145 = 60$