Relation & function

 # Sets :- it is a collection of well define objects.

✓ ✓ $A = \{1, 2, 3, 4\} \rightarrow \boxed{n(A) = 4}$

$A = \{a, b, c, d, \ldots\}$

$A = \{1, 1, 2, 3\} \rightarrow n(A) = 3$

 # Subset :- ✓ **no. of subset :-** $2^n = 2^4 = 16$

 # Cartesian product of sets :- If $A = \{1, 2, 3\}$ & $B = \{6, 7\}$

$A \times B = \{(1,6)(1,7)(2,6)(2,7)(3,6)(3,7)\}$

$B \times A = \{(6,1)(7,1)(6,2)(7,2)(6,3)(7,3)\}$

Relation & function

$A = \{1, 2, 3\}$, $B = \{6, 7\}$

$n(A) = 3$, $n(B) = 2$

$\Rightarrow A \times B = \{(1,6)(1,7)(2,6)(2,7)(3,6)(3,7)\}$

subset:- i) $\{(1,6)\}$ → Relation

ii) $\{(1,6)(1,7)\}$

iii) $\{(2,7)(3,6)(3,7)\}$

$\Rightarrow$ no. of elements in $(A \times B) = n(A) \times n(B)$

$= 3 \times 2 = 6$

no. of subset of $(A \times B) \Rightarrow 2^{n} = 2^{6} = 64$

Relation

If A & B be two non-empty sets. then any subset of $A \times B$ is define as the Relation from A to B.

$\Rightarrow \left[R = \{(x, y) ; x \in A \ \& \ y \in B\} \right]$

no. of Relations = ?

$A = \{1, 2\}$, $B = \{3\}$, $C = \{4, 5\}$

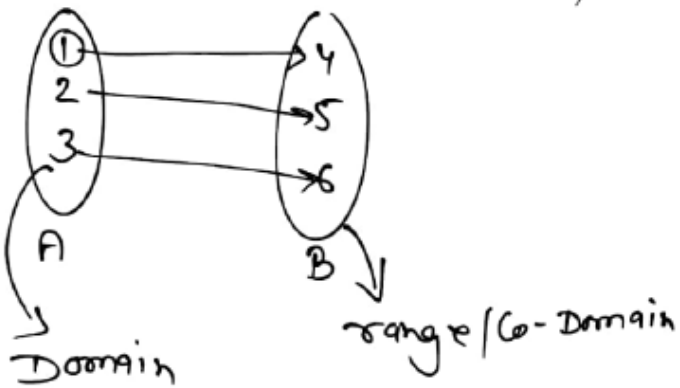
$A \times B \times C = \{(1,3,4)(1,3,5)(2,3,4)(2,3,5)\}$

any subset → Relation

Relation & function

Ex: $A = \{1, 2, 3\}$, $B = \{4, 5, 6\} \rightarrow A \times B$

$R = \{(1,4)(2,5)(3,6)\} \rightarrow A \rightarrow B$



(1) $R = \{(1,4)(2,5)(3,6)\}$

(2) $R = \{(x, y) ; y = x+3, \text{ where } x \in A, y \in B\}$

(3) $xRy \Leftrightarrow y = x+3, x \in A, y \in B$

Ex:- $A = \{1, 2, 3\}$, $A = \{1, 2, 3\}$

$A \times A = \{(1,1)(1,2)(1,3)(2,1)(2,2)(2,3)(3,1)(3,2)(3,3)\}$

$R_1 = \{(1,1)(2,2)(3,3)\}$

$R_2 = \{(1,1)(1,2)(2,1)\}$

$R_3 = \{(1,2)(2,3)(3,3)\}$

$\Rightarrow$ Relation on A $(A \times A)$