# CS & IT

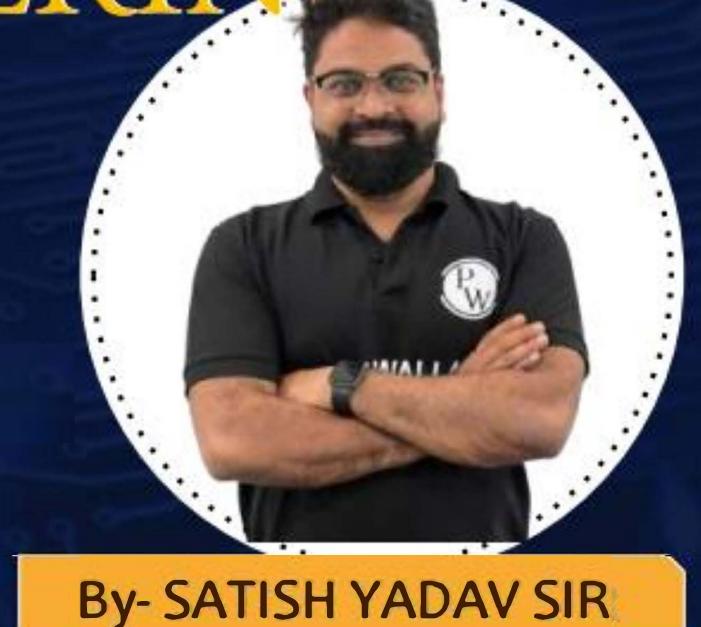
ENGINEERING

Discrete maths.

DISCRETE MATHS
SET THEORY

**Basics of function** 

Lecture No. 3



TOPICS TO BE COVERED



01 Basics of Functions

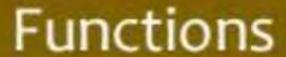
02 Terms in Functions

03 Number of Functions

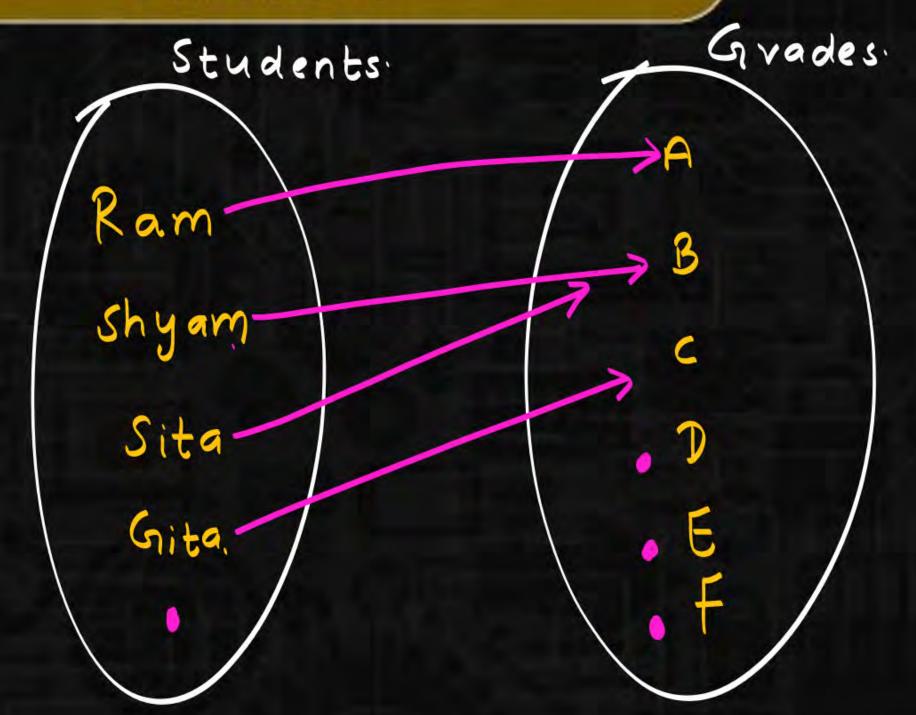
**04** Types of Functions

05 Various Examples in Functions

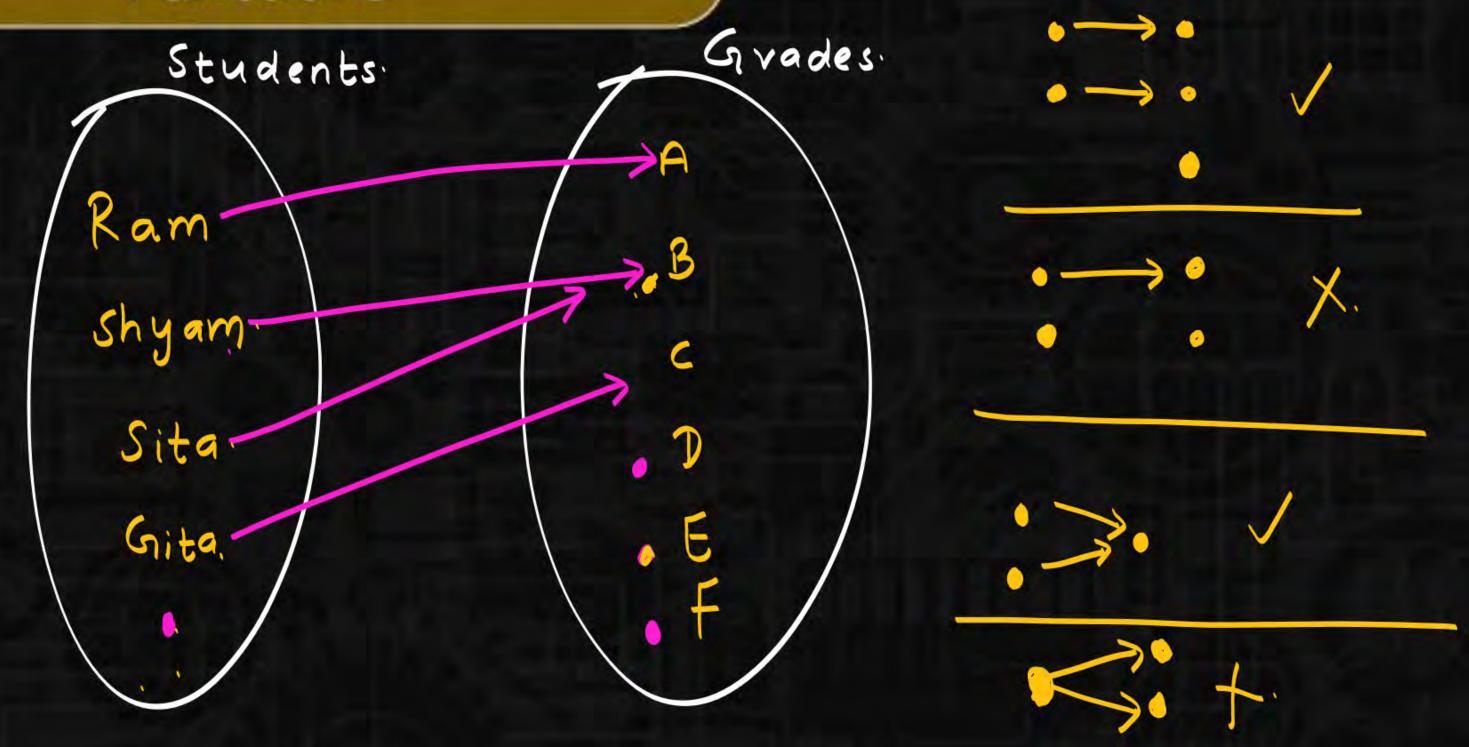












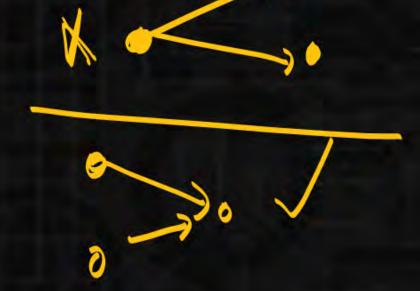


Seta!
Sita >70
80

Sem 2 Sita 70 Sem 3
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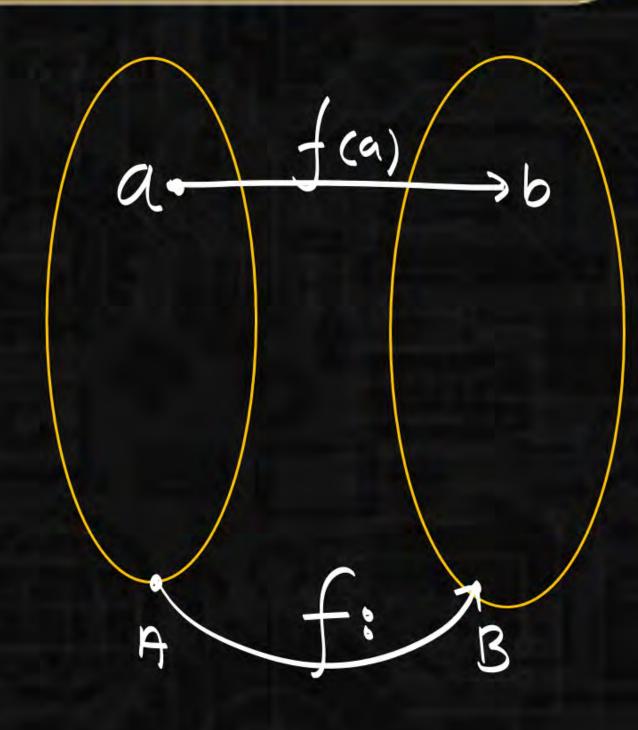
atsame

time









Range = codomain.



f: A -B

function is an assignment from A to B
Such that all elements of A point to some
Elements & B

elements & B

one element & A can not point to at least & elements of B

@ Same time







f: 
$$x \rightarrow y$$
 Total no. of  
yn functions =  $q \rightarrow (GATE)$   
a)  $|x| = q \rightarrow |y| = 1$ . (1) = 1.  
b)  $|x| = \Gamma$   $|y| = q \rightarrow (q \rightarrow) = (q \rightarrow) = q \rightarrow (q \rightarrow) = (q \rightarrow) = q \rightarrow (q \rightarrow) = ($ 



1:1. (one-to-one injective)

f is called 1:1 function if it sabsfies:

$$f(a) = f(b) \rightarrow a = b$$
 or  $f(a) \neq f(b)$ 

a,bare elementsin domain

$$f(a) = f(b)$$

$$\begin{array}{c} a \longrightarrow f(a) \\ b \longrightarrow f(b) \end{array}$$





$$f(n) = n^{2} \xrightarrow{\text{not } 2:2}$$

$$f(a) = f(b) \rightarrow a = f(2) = f(-2) \rightarrow 2$$

$$1 \rightarrow 1$$

$$2 \rightarrow 4$$

$$1 \rightarrow 1$$



$$f: Z \rightarrow Z$$

$$f(n) = n+1$$

$$it is 1: 2 function$$

$$1 \rightarrow 2$$

$$2 \rightarrow 3$$

$$3 \rightarrow 4$$

$$f(p) = f(\omega)$$

$$P + 1 = \omega + 1$$

$$P = \omega$$

$$f(a) = f(b)$$

$$\Rightarrow a = b$$



$$f: A \rightarrow B. \quad (L.S > R.S. 1:1 \text{ function is not possible})$$

$$(L.S \leq R.S) \quad \text{Total no of } 1:1 \text{ functions} = R.S. \text{ plus}$$

$$(A \leq B) \quad = 5 * 4 * 3 * 2!$$

$$B = 6 \cdot 0 \rightarrow 0$$

$$S^{\text{sol}} = 5!$$



$$f(n) = n^{2}$$

$$f(x) = n^{2}$$

$$1 \longrightarrow 2$$

$$2$$

$$3$$



$$f(n) = n+1 \quad f(z \rightarrow z)$$

$$(Right side)$$

$$2 \longrightarrow 3$$

$$3 \longrightarrow 4$$

$$3 \longrightarrow 4$$

$$3 \longrightarrow 4$$

$$4 \longrightarrow 1 \longrightarrow 9 \longrightarrow 1$$

$$y = n+1$$

$$y - 1 = (n)$$



$$f: Z \rightarrow Z.$$

$$f(n) = 2n - 3.$$

$$4.$$

$$2 \cdot 2 \cdot 3.$$

$$\frac{y=2n-3}{\sqrt{3+3}} = n \quad \text{we will not qet}$$

$$y=2$$



(L. S > R.S)

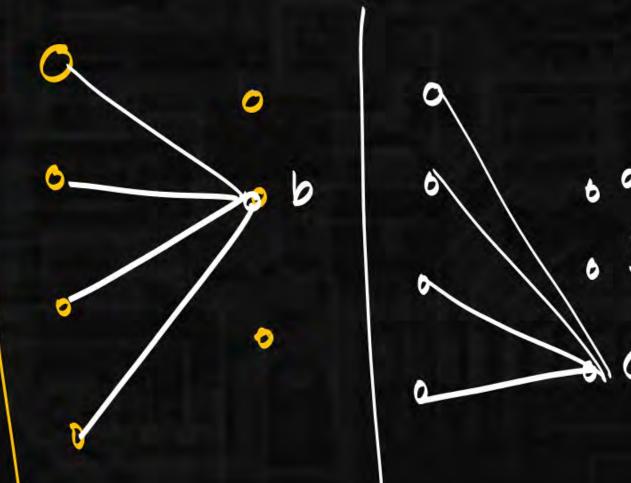


onto = Totalfuctn- non onto functn.

(Right side is not

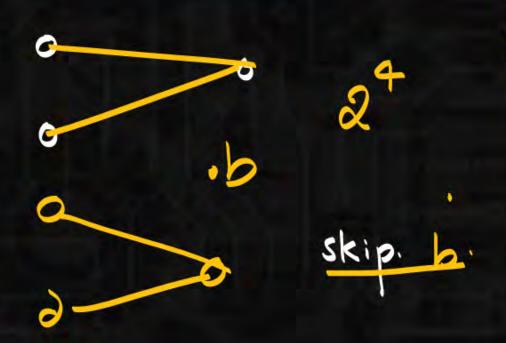
full)



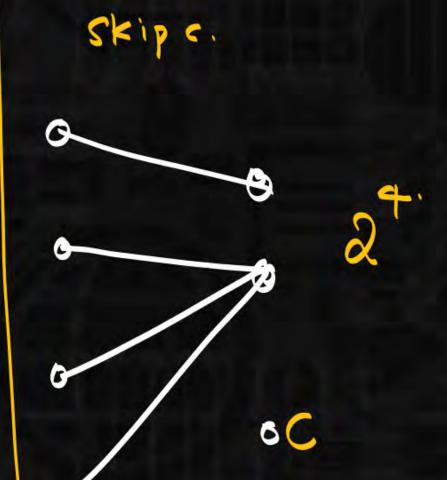


Skipping 2 elementes



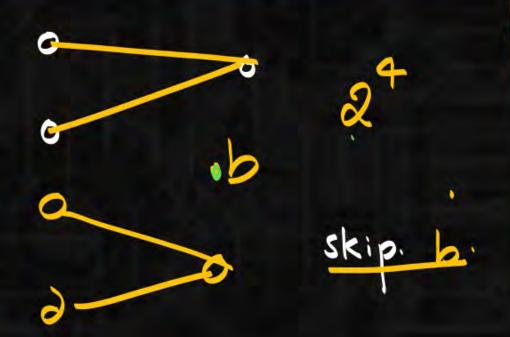


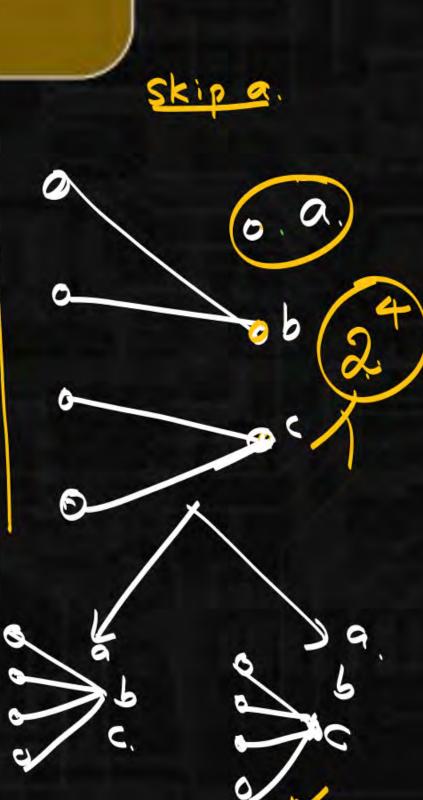






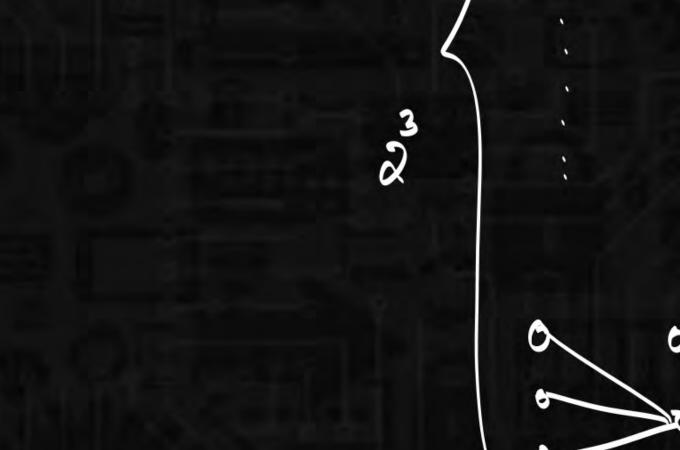










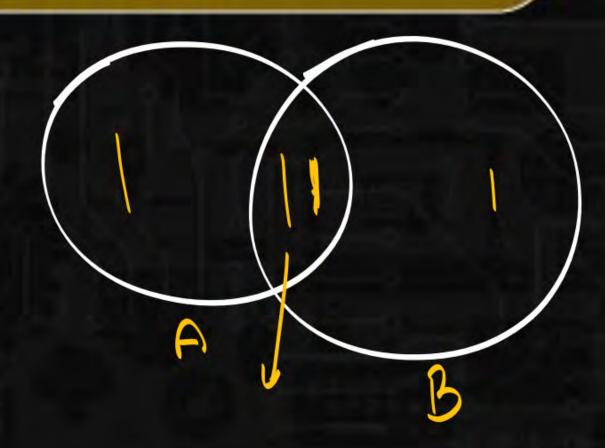




Total non onto = Total function - non onto functions.

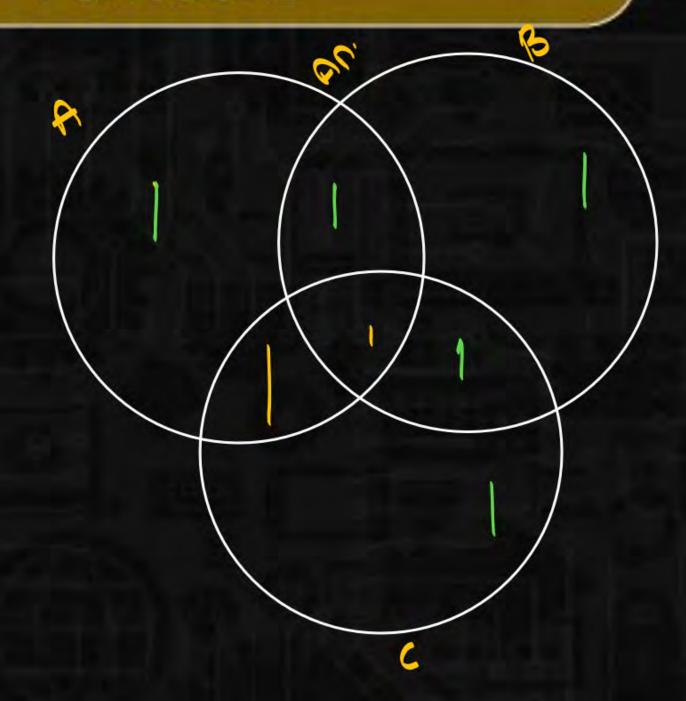






$$AUB = A + B - (ANB)$$





Total onto functions = Total-total non onto.



Total onto functions = Total-total non onto = 0 =

$$= 3^{4} - 3c_{1}^{2} + 3c_{2}^{4}$$

$$= 3c_{0}^{4} - 3c_{1}^{2} + 3c_{2}^{4} + 3c_{2}^{2}$$

$$= 3c_{0}^{4} - 3c_{1}^{2} + 3c_{2}^{4} + 3c_{2}^{2}$$

$$= 3c_{0}^{4} - 3c_{1}^{4} + 3c_{2}^{4} + 3c_{2}^{4}$$

$$= 9c_{0}^{4} - 3c_{1}^{4} + 3c_{2}^{4} + 3c_{2}^{4} + 3c_{2}^{4}$$



$$3c_0(3-0)^4 - 3c_1(3-1)^4 + 3c_2(3-2)^4$$
  
 $n_{c_0}(n-0)^m - n_{c_1}(n-1)^m + n_{c_2}(n-2)^m$ 

$$= \sum_{i=0}^{\infty} (-i)^{i} \times n_{c} \cdot \times (n-i)^{m}$$

 $\begin{cases} m = 7 & n = 4 \\ (-1)^{1} & n & (-1)^{1}$ 

7:272 Touxo. f: 2 → 2. f(n) = n+7  $= \chi^2 + \chi$ 

A={ 1, 2, 3, 4} B={ 123456] +: A -> B how many 1:14 onto. f: B->A how many 1:1 a onto



