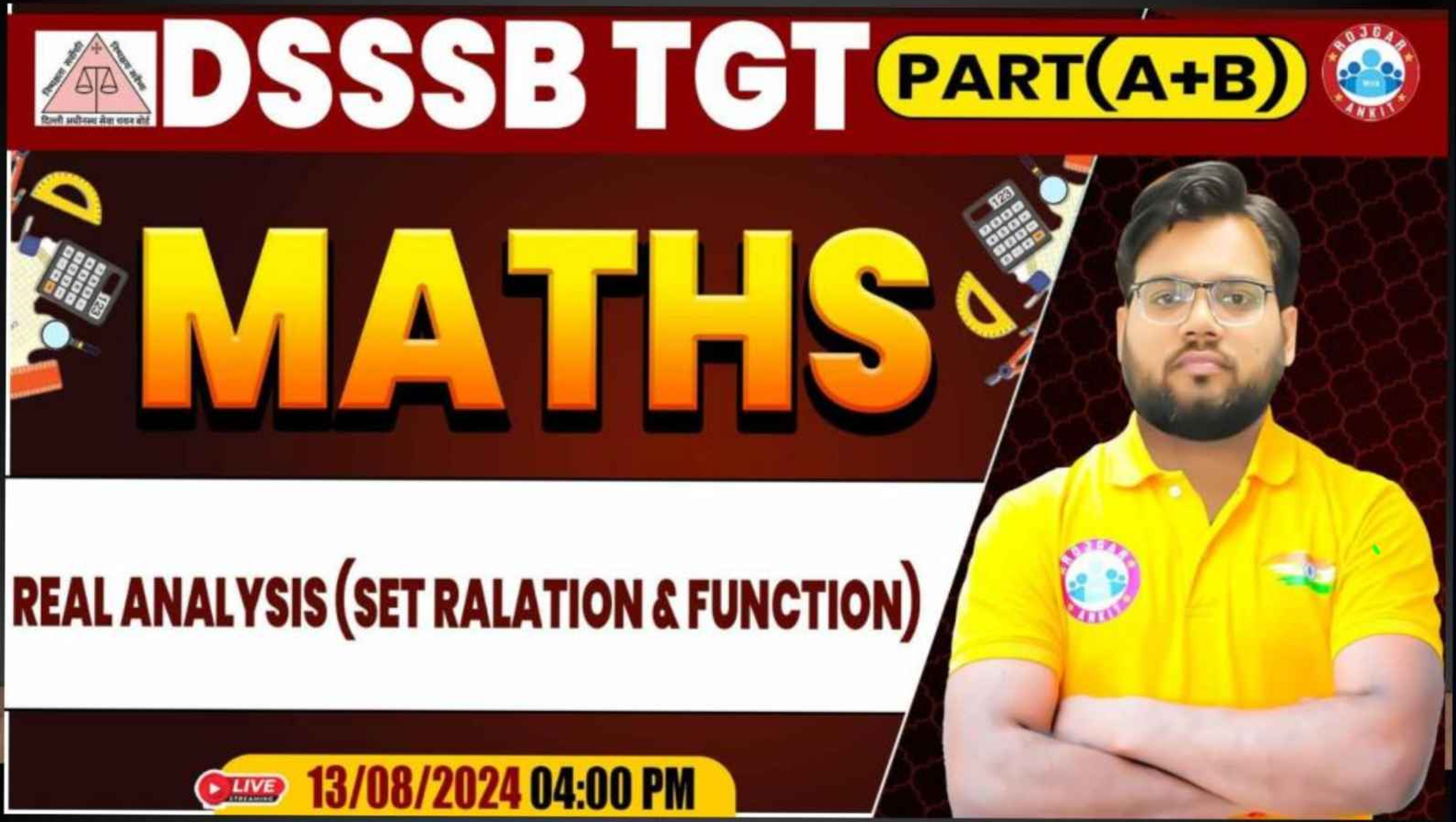
DSSSB TGT
PART(A+B)
MATHS
REAL ANALYSIS (SET RALATION & FUNCTION)
LIVE
13/08/2024 04:00 PM

Set Theory (समुच्चय सिद्धान्त) :-

1. Set

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

A well-defined list or collection of things is called a Set.

$A = \{a, e, i, o, u\}$

$\cancel{a} = \{A, E, I, O, U\}$

Sets are generally expressed by capital letters of English alphabet $A, B, C, \ldots.$ etc. and their elements are expressed by small letters a, b, c, d, x, y etc.

If a is an element of a set A and b is not an element of a set B. then symbolically we write it as $a \in A, b \notin B$.

$a \in A, \quad b \notin B$

2. Representation of a Set

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

Roster Form: In this form a set is represented by listing all or some of its elements. The elements are separated by commas and enclosed in curly brackets {}

$A = \{x \mid x \in \underbrace{N}_{\text{Natural No.}};\ x < 6\}$

Set Builder Form: In this form we use a letter x to represent an arbitrary element, write specific properties say $P(x)$, satisfied by elements of the set and the set is represented as

$$\{x \underset{\text{Such that}}{\mid} P(x)\} \text{ or } \{x \underset{\text{Such that}}{:} P(x)\}$$

Roster form

$\Downarrow$

$A = \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$

Set Buider form ->

$A = \{x \mid x \in W ; x < 9\}$

$= \{x : x \in W ; x < 9\}$

$W \rightarrow$ Whole No.

Set of natural numbers $\{1, 2, 3, 4, \ldots \infty\}$ N

Set of whole numbers $\{0, 1, 2, 3, 4, \ldots \infty\}$ W

Set of integers $\{0, \pm 1, \pm 2, \pm 3, \ldots \infty\}$ Z

zero) → Rational or Irrational

Set of rational numbers $\left\{\frac{p}{q}, p, q \in Z, q \neq 0\right\}$ Q

$\frac{0}{1}, \frac{0}{2}, \frac{0}{3}, \frac{0}{4}, \frac{0}{5}, \frac{0}{6}$

Set of irrational numbers $\{x \mid x \in R, x \notin Q\}$ T

$(\sqrt{2}, \sqrt{5}, \pi \ldots\}$

Set of real numbers → $\{x \mid x \in Q, x \in T\}$ R

Set of Complex numbers $\{x+iy \mid x, y \in R\}$ C

3. Void Set or Null Set

If a set has no element, then it is called a void or null set and it is expressed as ϕ or {}

Infinite set

$Z = \{ \ldots -4, -3, -2, -1, 0, 1, 2, 3, 4, 5 \ldots \infty \}$

$A = \phi = \{ \}$

$A = \{ x \mid x \in Z,\ 2 < x < 3 \}$

Null Set

$\{\phi\}$ → This is not a void or null set.

ϕ एक Element है।

$$A = \{x : x \in Z,\ 100 < x < 101\}$$

This is a null set. $= \{\ \}$

Void set.

Empty Set $= \phi$

Finite and Infinite Sets

A set whith is either empty or has a tinite number of ~~different~~ elements is called a finite set and aset which is not finte is called an in finite set.

In a tinite set A , the number ot its different elements is called its order and it is expressed as

$$n(A) \text{ or } o(A)$$

Notes :

order$(A) \geq 0$

(i) For every set A, $n(A) \geq 0$ **and** $n(A) \in W$. → पूर्ण संख्या

$|-4| = 4 > 2$

(ii) If $n(A) = 1$, **then** A **is called singleton set.**

Example. $A = \{x \mid x \in Z, |x| \leq 2\}$

$\{x \mid x \in Z, |x| \leq 2\}$

$|-x| = x$

$|-2| = 2$ ✓ $\quad |1| = 1$

$|-1| = 1$ ✓ $\quad |2| = 2$

$|0| = 0$ ✓

$A = \{-2, -1, 0, 1, 2\}$

find the order of a set A. if

$$A = \{ y \mid y \in Z,\ |y| \geq 2 \}$$

$n(A)$ या $o(A) = \infty$

(Infinite)

$|-2| = 2$ ✓

$|-3| = 3$ ✓

4

5

6

$\vdots$

∞

$\{-1, 0, 1\}$ नहीं लिख सकते बस

Equal and Equivalent Sets

$(A = B)$ $(A \sim B)$

$A = \{5, 6, 7, 8, 9\}$

$B = \{9, 5, 7, 6, 8\}$

$9 \in A$, $7 \in A$

$9 \in B$, $7 \in B$

Two sets A and B are said to be equal sets if every element of A is in B and every element of B is in A

$$\boxed{A = B} \Leftrightarrow x \in A \Rightarrow x \in B \land x \in B \Rightarrow x \in A$$

Two finite sets A and B are said to be equivalent sets.

$(A \sim B)$ if they have equal number of elements

$P = \{1, 2, 3, 4\}$

$Q = \{5, 6, 7, 8\}$

$n(P) = n(Q) = 4$ $(P \sim Q)$

$o(A) = o(B)$

$$A \sim B \Leftrightarrow n(A) = n(B)$$

Subset

Called a

If every elemen of aset A is in B, then A is ~~acalide~~ subset of B which is expresed as

1. $A \subset B$ → A is Subset of B

Hence

$$A \subset B \Leftrightarrow x \in A \Rightarrow x \in B$$