
DSSSB TGT
PART(B)
MATHS
METRIX
(BASIC CONCEPTS OF METRIX)
PART-07
LIVE
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Disconnected space → A metric space (X, d) said to be disconnected if two non-empty subset A and B are in X.

$A \subseteq X, \ B \subseteq X \longrightarrow X = A \cup B$

$A \neq \phi, \ B \neq \phi$

1. $A \cap \overline{B} = \phi$ & $\overline{A} \cap B = \phi$

$A' \Rightarrow$ derived set of A

$\overline{A} = A \cup A'$

Connected spaces

→ # Singleton set is always connected.

(X, d) is said to be connected. if it is not disconnected.

or

two non empty set A and B having no common point. then at least one of the subset contain a limit point of other.

$A \neq \phi$, $B \neq \phi$

$\boxed{A \cap B = \phi}$ → disjoint set.

→ B contain no point of A, B contain limit point of A.

$\boxed{\bar{A} = A \cup A'}$

Que) Let $X = \{x \in R,\ -1 \le x < 0$ or $0 < x \le 1\}$ then with the metric include.

$A = [-1, 0) \neq \phi$ $\quad$ $B = (0, 1] \neq \phi$

(a) Connected

(b) disconnected ✓

(c) Compact

(d) None

$A \cap B = \phi$

$$\boxed{\begin{array}{l} A \cap \bar{B} \Rightarrow \phi \\ \\ \bar{A} \cap B \Rightarrow \phi \end{array}}$$

$\bar{A} = A \cup A' \Rightarrow [-1, 0) \cup [-1, 0)' \Rightarrow [-1, 0) \cup [-1, 0] \Rightarrow [-1, 0]$

$\bar{B} = B \cup B' \Rightarrow [0, 1]$

Que if $X = \{ z \in \mathbb{C}$ such that $|z| \leq 1$ or $|z-3| \leq 1 \}$ with the metric included.

$$-1 \leq z \leq 1 \qquad -1 \leq z-3 \leq 1$$

(a) Connected

(b) disconnected ✓

(c) compact

(d) None

$A \Rightarrow [-1, 1] \neq \phi$

$$2 \leq z \leq 4$$

$B = [2, 4] \neq \phi$

$\overline{A}$ $\qquad$ $\overline{B}$

$$\boxed{\begin{gathered} A \cap B = \phi \\ A \cap \overline{B} = \phi \\ \overline{A} \cap B = \phi \end{gathered}}$$

Theorem - ① (X, d) is a metric space, then following is.

①. (X, d) is disconnected.

② There exist two non-empty disjoint subset A and B both are $\boxed{\text{open.}}$ $\boxed{\text{or closed}}$ in such that $\boxed{X = A \cup B}$

③. There exist a proper subset of A and B both are open and closed in X.

Theorem 2

Let (X,d) metric space of real number with the usual metri is always $\boxed{\text{connected}}$.

The real line is connected.

Theorem 3

$\mathbb{R}$ and ϕ set are the only subset on $\mathbb{R}$, which are $\boxed{\text{open}}$ and $\boxed{\text{closed}}$ as well as in $\mathbb{R}$.

Theorem 4

Let (X, d) is a metric space, then following is.

1. (X, d) is disconnected.
2. a continous map $\boxed{\text{onto}}$ discrete two elements. space (X_0, d_0).
3. the only continous map (X, d) $\boxed{\text{into}}$ (X_0, d_0) are the constant mapping element.

Theorem 5

Let (X, d) be a connected metric space

Let $f : (X, d_X) \longrightarrow (Y, d_Y)$ be a continous mapping.

$\downarrow$ Domain $\qquad \downarrow$ Co-domain.

then the space. $f(X)$ the metric space.

introduced from X is connected.