Past Year Questions from Relations

4 JEE Main 2021 (Online) 31st August Morning Shift

MCQ (Single Correct Answer)

Which of the following is not correct for relation R on the set of real numbers ?

A $(x, y) \in R \Leftrightarrow 0 < |x| - |y| \leq 1$ is neither transitive nor symmetric.

B $(x, y) \in R \Leftrightarrow 0 < |x - y| \leq 1$ is symmetric and transitive.

C $(x, y) \in R \Leftrightarrow |x| - |y| \leq 1$ is reflexive but not symmetric.

D $(x, y) \in R \Leftrightarrow |x - y| \leq 1$ is reflexive nd symmetric.

Explanation

Note that (a, b) and (b, c) satisfy $0 < |x - y| \leq 1$ but (a, c) does not satisfy it so $0 \leq |x - y| \leq 1$ is symmetric but not transitive.

For example,

$x = 0.2, y = 0.9, z = 1.5$

$0 \leq |x - y| = 0.7 \leq 1$

$0 \leq |y - z| = 0.6 \leq 1$

But $|x - z| = 1.3 > 1$

So, (b) is correct.

Concept of symmetric relation is used in this question.