NCERT CHAPTER 1 : RELATIONS AND FUNCTIONS

NCERT EXERCISE 1.1

1. Determine whether each of the following relations are reflexive, symmetric and transitive :

(*i*) Relation R in the set A = {1, 2, 3, ..., 13, 14} defined as R = {$(x, y) : 3x - y = 0$}

(*ii*) Relation R in the set **N** of natural numbers defined as R = {$(x, y) : y = x + 5$ and $x < 4$}

(*iii*) Relation R in the set A = {1, 2, 3, 4, 5, 6} as R = {$(x, y) : y$ is divisible by x}

(*iv*) Relation R in the set **Z** of all integers defined as R = {$(x, y) : x - y$ is an integer}

(*v*) Relation R in the set A of human beings in a town at a particular time given by.

(*a*) R = {$(x, y) : x$ and y work at the same place}

(*b*) R = {$(x, y) : x$ and y live in the same locality}

(*c*) R = {$(x, y) : x$ is exactly 7 cm taller than y}

(*d*) R = {$(x, y) : x$ is wife of y}

(*e*) R = {$(x, y) : x$ is father of y}.

2. Show that the relation R in the set **R** of real numbers, defined as **R** = {$(a, b) : a \leq b^2$}, is neither reflexive nor symmetric nor transitive.

3. Check whether the relation R defined in the set {1, 2, 3, 4, 5, 6} as R = {$(a, b) : b = a + 1$} is reflexive, symmetric or transitive.

4. Show that the relation R in **R** defined as R = {$(a, b) : a \leq b$}, is reflexive and transitive but not symmetric.

5. Check whether the relation R in **R** defined by R = {$(a, b) : a \leq b^3$} is reflexive, symmetric or transitive.

6. Show that the relation R in the set {1, 2, 3} given by R = {(1, 2), (2, 1)} is symmetric but neither reflexive nor transitive.

7 Show that the relation R in the set A of all the books in a library of a college, given by R = {$(x, y) : x$ and y have same number of pages}, is an equivalence relation.

8. Show that the relation R in the set A = {1, 2, 3, 4, 5}, given by R = {$(a, b) : |a - b|$ is even}, is an equivalence relation. Show that all the elements of {1, 3, 5} are related to each other and all the elements of {2, 4} are related to each other. But no element of {1, 3, 5} is related to any element of {2, 4}.

9. Show that the relations R in the set A = {$x \in \mathbf{Z} : 0 \leq x \leq 12$}, given by

(*i*) R = {$(a, b) : |a - b|$ is a multiple of 4}, (*ii*) R = {$(a, b) : a = b$},

are equivalence relations. Find the set of all elements related to 1 in each case.

10. Give examples of relations which are

(*i*) Symmetric but neither reflexive nor transitive.

(*ii*) Transitive but neither reflexive nor symmetric.

(*iii*) Reflexive and symmetric but not transitive.

(*iv*) Reflexive and transitive but not symmetric.

(*v*) Symmetric and transitive but not reflexive.