## Relations Ex 1.1 Q1(i)

$A$ be the set of human beings.

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

**Reflexive:**

$\therefore$   $x$ and $x$ works together

$\therefore$   $(x, x) \in R$

$\Rightarrow$   $R$ is reflexive

**Symmetric:** If $x$ and $y$ work at the same place, which implies, $y$ and $x$ work at the same place

$\therefore$   $(y, x) \in R$

$\Rightarrow$   $R$ is symmetric

**Transitive:** If $x$ and $y$ work at the same place then $x$ and $y$ work at the same place and $y$ and $z$ work at the same place

$\Rightarrow$   $(x, z) \in R$ and

Hence,

$\Rightarrow$   $R$ is transitive

## Relations Ex 1.1 Q1(ii)

$A$ be the set of human beings.

$R = \{(x,y): x \text{ and } y \text{ lives in the same locality }\}$

Reflexive: since $x$ and $x$ lives in the same locality

$\Rightarrow \qquad (x,x) \in R$

$\Rightarrow \qquad R$ is reflexive

Symmetric: Let $(x,y) \in R$

$\Rightarrow \qquad x$ and $y$ lives in the same locality
$\Rightarrow \qquad y$ and $x$ lives in the same locality
$\Rightarrow \qquad (y,x) \in R$

Transitive: Let $(x, y) \in R$ and $(y, z) \in R$

$\qquad (x, y) \in R$
$\Rightarrow x$ and $y$ lives in the same locality

$\qquad$ and $(y, z) \in R$
$\Rightarrow y$ and $z$ lives in the same locality

$\Rightarrow x$ and $z$ lives in the same locality

$\Rightarrow (x, z) \in R$

$\Rightarrow \qquad R$ is transitive

Relations Ex 1.1 Q1(iii)

$R = \{(x,y): x \text{ is wife of } y\}$

Reflexive: since $x$ can not be wife of $x$

$\therefore \qquad (x,x) \notin R$

$\Rightarrow \qquad R$ is not reflexive

Symmetric: Let $(x,y) \in R$

$\Rightarrow \qquad x$ is wife of $y$
$\Rightarrow \qquad y$ is husband of $x$
$\Rightarrow \qquad (y,x) \notin R$

$\Rightarrow \qquad R$ is not symmetric

Transitive: Let $(x,y) \in R$ and $(y,z) \in R$

$\Rightarrow \qquad x$ is wife of $y$ and $y$ is husband of $z$
$\qquad \qquad$ which is a contradiction
$\Rightarrow \qquad (x,z) \notin R$

$\Rightarrow \qquad R$ is not transitive

Relations Ex 1.1 Q1(iv)

A be the set of human beings

R = {(x, y) : x is father of y}

Reflexive: since x can not be father of x

∴ (x, x) ∉ R

⟹ R is not reflexive

Symmetric: Let (x, y) ∈ R

⟹ x is father of y
⟹ y can not be father of x

⟹ (y, x) ∉ R

⟹ R is not symmetric

Transitive: Let (x, y) ∈ R and (y, z) ∈ R

⟹ x is father of y and y is father of z
⟹ x is grandfather of z

⟹ (x, z) ∉ R

⟹ R is not transitive