Q1) {1, 2, 3, 4} Reflexive, Symmetric, Anti Symmetric & Transitive.

i) $R_1 = \{(1,1), (1,2), (2,1), (2,2), (3,4), (4,1), (4,4)\}$
→ –

ii) $R_2 = \{(1,1), (1,2), (2,1)\}$
→ Symmetric, Transitive.

iii) $R_3 = \{(1,1), (1,2), (1,4), (2,1), (2,2), (3,3), (4,1), (4,4)\}$
→ Reflexive, Symmetric, Transitive.

iv) $R_4 = \{(2,1), (3,1), (3,2), (4,1), (4,2), (4,3)\}$
→ Anti-symmetric, Transitive.

v) $R_5 = \{(1,1), (1,2), (1,3), (1,4), (2,2), (2,3), (2,4), (3,3), (3,4), (4,4)\}$
→ Transitive, Anti-Symmetric

vi) $R_6 = \{(3,4)\}$
→ Antisymmetric, Transitive

Q2.

i) R_1 → None

ii) R_2 → Reflexive & Symmetric

iii) R_3 → Symmetric

iv) R_4 → Anti-Symmetric

v) R_5 → Reflexive, Symmetric, Antisymmetric and Transitive

vi) R_6 → None.

Q3.

i) (a,a), (a,b), (b,b).
→ Reflexive, Anti-symmetric, Transitive.

ii) (a,a), (b,b), (c,c).
→ Reflexive, Anti-symmetric, Symmetric, Transitive.

iii) (a,a), (a,b), (b,a), (b,b)
→ Reflexive, Symmetric, Transitive.

iv) (c,a), (c,b), (a,a), (b,b), (c,c).
→ Reflexive, Symmetric, Transitive.

Q4. i) $x+y=0$ → Symmetric.

ii) $x = \pm y$ → Symmetric, Reflexive, Transitive.

iii) $x-y$ is a rational number.
→ All the values, reflexive, Symmetric, Transitive.

iv) $x = 2y$ → Antisymmetric.

v) $xy \geq 0$ → Reflexive, Symmetric.

vi) $xy = 0$ → Symmetric.

vii) $x = 1$ → Antisymmetric, Transitive.

viii) $x = 1$ or $y = 1$. → Symmetric.