CASE STUDY 1:

A general election of Lok Sabha is a gigantic exercise. About 911 million people were eligible to vote and voter turnout was about 67%, the highest ever

ONE – NATION
ONE – ELECTION
FESTIVAL OF
DEMOCRACY
GENERAL ELECTION – 2019

Let I be the set of all citizens of India who were eligible to exercise their voting right in general election held in 2019. A relation 'R' is defined on I as follows:

R = $\{(V1, V2) : V1, V2 \in I$ and both use their voting right in general election – 2019$\}$

1. Two neighbors X and Y∈ I. X exercised his voting right while Y did not cast her vote in general election – 2019. Which of the following is true?

a. (X,Y) ∈R
b. (Y,X) ∈R
c. (X,X) ∉R
d. (X,Y) ∉R

2. Mr.'X' and his wife 'W'both exercised their voting right in general election -2019, Which of the following is true?

a. both (X,W) and (W,X) ∈ R
b. (X,W) ∈ R but (W,X) ∉ R
c. both (X,W) and (W,X) ∉ R
d. (W,X) ∈ R but (X,W) ∉ R

3. Three friends F_1, F2 and F_3 exercised their voting right in general election-2019, then which of the following is true?

a. (F1,F2) ∈R, (F2,F3) ∈ R and (F1,F3) ∈ R
b. (F1,F2) ∈ R, (F2,F3) ∈ R and (F1,F3) ∉ R
c. (F1,F2) ∈ R, (F2,F2) ∈R but (F3,F3) ∉ R
d. (F1,F2) ∉ R, (F2,F3) ∉ R and (F1,F3) ∉ R

4. The above defined relation R is _____

a. Symmetric and transitive but not reflexive

b. Universal relation

c. Equivalence relation

d. Reflexive but not symmetric and transitive

5. Mr. Shyam exercised his voting right in General Election – 2019, then Mr. Shyam is related to which of the following?

a. All those eligible voters who cast their votes

b. Family members of Mr.Shyam

c. All citizens of India

d. Eligible voters of India

CASE STUDY 2

Sherlin and Danju are playing Ludo at home during Covid-19. While rolling the dice, Sherlin's sister Raji observed and noted the possible outcomes of the throw every time belongs to set {1,2,3,4,5,6}. Let A be the set of players while B be the set of all possible outcomes.

A = {S, D}, B = {1,2,3,4,5,6}

1. Let $R : B \to B$ be defined by R = $\{(x, y): y \text{ is divisible by } x\}$ is

a. Reflexive and transitive but not symmetric

b. Reflexive and symmetric and not transitive

c. Not reflexive but symmetric and transitive

d. Equivalence

2. Raji wants to know the number of functions from A to B. How many number of functions are possible?

a. 6^2

b. 2^6

c. 6!

d. 2^{12}

3. Let R be a relation on B defined by R = {(1,2), (2,2), (1,3), (3,4), (3,1), (4,3), (5,5)}. Then R is

a. Symmetric

b. Reflexive

c. Transitive

d. None of these three

4. Raji wants to know the number of relations possible from A to B. How many numbers of relations are possible?

a. 6^2

b. 2^6

c. 6!

d. 2^{12}

5. Let $R: B \to B$ be defined by R={(1,1),(1,2), (2,2), (3,3), (4,4), (5,5),(6,6)}, then R is

a. Symmetric

b. Reflexive and Transitive

c. Transitive and symmetric

d. Equivalence

CASE STUDY 3:

An organization conducted bike race under 2 different categories-boys and girls. Totally there were 250 participants. Among all of them finally three from Category 1 and two from Category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college project.

Let B = $\{b_1,b_2,b_3\}$ G=$\{g_1,g_2\}$ where B represents the set of boys selected and G the set of girls who were selected for the final race.

Ravi decides to explore these sets for various types of relations and functions

1. Ravi wishes to form all the relations possible from B to G. How many such relations are possible?

a. 2^6
b. 2^5
c. 0
d. 2^3

2. Let R: B→B be defined by R = $\{(x,y): x$ and y are students of same sex$\}$, Then this relation R is_____

a. Equivalence
b. Reflexive only
c. Reflexive and symmetric but not transitive
d. Reflexive and transitive but not symmetric

3. Ravi wants to know among those relations, how many functions can be formed from B to G?

a. 2^2
b. 2^{12}
c. 3^2
d. 2^3

4. Let $R: B \to G$ be defined by R = { (b_1,g_1), (b_2,g_2),(b_3,g_1)}, then R is_____

a. Injective
b. Surjective
c. Neither Surjective nor Injective
d. Surjective and Injective

5. Ravi wants to find the number of injective functions from B to G. How many numbers of injective functions are possible?

a. 0
b. 2!
c. 3!
d. 0!

CASE STUDY 5:

Students of Grade 9, planned to plant saplings along straight lines, parallel to each other to one side of the playground ensuring that they had enough play area. Let us assume that they planted one of the rows of the saplings along the line $y = x - 4$. Let L be the set of all lines which are parallel on the ground and R be a relation on L.

Answer the following using the above information.

1. Let relation R be defined by R = $\{(L1, L2): L1 \| L2$ where L_1,L_2 ∈ L} then R is_____ relation

a. Equivalence
b. Only reflexive

c. Not reflexive

d. Symmetric but not transitive

2. Let R = { $(L1, L2)$: $L1 \perp L2$ where L1, L2 € L } which of the following is true?

a. R is Symmetric but neither reflexive nor transitive

b. R is Reflexive and transitive but not symmetric

c. R is Reflexive but neither symmetric nor transitive

d. R is an Equivalence relation

3. The function f: R→R defined by $f(x) = x - 4$ is_____

a. Bijective

b. Surjective but not injective

c. Injective but not Surjective

d. Neither Surjective nor Injective

4. Let $f: R \to R$ be defined by $f(x) = x - 4$. Then the range of $f(x)$ is _____

a. R

b. Z

c. W

d. Q

5. Let R = {(L_1, L_2) : L_1 is parallel to L_2 and L_1 : y = x – 4} then which of the following can be taken as L_2?

a. 2x-2y+5=0

b. 2x+y=5

c. 2x + 2y + 7 =0

d. x+y=7

CASE STUDY 5:

Raji visited the Exhibition along with her family. The Exhibition had a huge swing, which attracted many children. Raji found that the swing traced the path of a Parabola as given by $y = x^2$.

Answer the following questions using the above information.

1. Let $f: R \to R$ be defined by $f(x) = x^2$ is_____

a. Neither Surjective nor Injective

b. Surjective

c. Injective

d. Bijective

2. Let $f: N \to N$ be defined by $f(x) = x^2$ is _____

a. Surjective but not Injective

b. Surjective

c. Injective

d. Bijective

3. Let f: {1,2,3,….}→{1,4,9,….} be defined by $f(x) = x^2$ is _____

a. Bijective

b. Surjective but not Injective

c. Injective but Surjective

d. Neither Surjective nor Injective

4. Let : $N \to R$ be defined by $f(x) = x^2$. Range of the function among the following is _____

a. {1, 4, 9, 16,…}

b. {1, 4, 8, 9, 10,…}

c. {1, 4, 9, 15, 16,…}

d. {1, 4, 8, 16,…}

5. The function f: Z→Z defined by $f(x) = x^2$ is_____

a. Neither Injective nor Surjective

b. Injective

c. Surjective

d. Bijective