Relation and Functions

Multiple Choice Questions :-

1) A relation R on set A = {1, 2, 3, 4, 5} is defined as R = {(1, 1), (2, 2), (3, 3), (4, 4), (5, 5)} then R is _____ relation
a) Reflexive b) Symmetric c) Transitive d) Equivalence.

2) Let R be the relation on set A = { $x \in Z : x \leq 20$}, defined by R = {(a, b) : Ia - bI is a multiple of 3}, then [4], the equivalence class of 4, is
a) {0, 4, 8, 12, 16, 20} b) {1, 4, 7, 10, 13, 16, 19}
c) {0, 1, 4, 7, 10, 13, 16, 19} d) A

3) If a relation R on the set {a, b, c, d} is defined as R = {(a, b)}, then R is _____ relation
a) Reflexive b) Symmetric c) Transitive d) simply a relation

4) The function f:R $\rightarrow$ Z, defined as $f(x) = [x]$ is (Z is set of integers)
a) neither one – one nor onto b) one – one but not onto
c) onto but not one – one d) one – one and onto

5) The function $f(x) = 5 - |\sin(4x)|$ has maximum value 'a' and minimum value 'b', then (a, b) =
a) (4, 5) b) (5, 4) c) (5, 6) d) (6, 5)

6) The function f: R $\rightarrow$ R, given by $f(x) = |x|$ is
a) Surjective b) Injective c) Bijective d) neither surjective nor injective.

7) A relation R on set A = {a, b, c} is defined as R = {(a, b), (b, b)} then R will be _____ relation when (b, a) will be added
a) Reflexive b) Symmetric c) Transitive d) Equivalence

8) The function f: R $\rightarrow$ R, given by $f(x) = 3x + 2$ is
a) Surjective b) Injective c) Bijective d) neither surjective nor injective.

9) The maximum number of equivalence relation on the set A = {a, b, c} are
a) 2 b) 3 c) 5 d) 6

10) A relation R on set A = {a, b, c} is defined as R = {(a, b), (b, b), (c,c), (a, a)} then R will be _____ relation when (b, a) will be added
a) Reflexive b) Symmetric c) Transitive d) Equivalence.

11) The function f:R $\rightarrow$ R, defined as $f(x) = [x] + x$ is

a) neither one – one nor onto b) one – one but not onto

c) onto but not one – one d) one – one and onto

Answers:

Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1	d	5	b	9	d
2	b	6	d	10	d
3	c	7	b	11	d
4	c	8	c		

Case Study Based Questions :-

Case Study Question – 1

A general election of Lok Sabha is a gigantic exercise. About 900 million people were eligible to vote and voter turnout was about 75%, the highest ever. 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 = $\{(V_{1,2}): V_1, V_2 \in I$ and both use their voting right in general election – 2019$\}$. Based on given information, answer the following questions

Q1) Is R a reflexive relation? Justify your answer. (1M)

Q2) Is R a symmetric relation? Justify your answer. (1M)

Q3) Is R a transitive relation? Justify your answer. (1M)

Q4) Is R an equivalence relation? Justify your answer. (1M)

Case Study Question - 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 i.e. A ={S, D} and B = {1,2,3,4,5,6}, based on given information, answer the following questions.

Q1) Let R : B ⟶ B be defined by R = {(x, y) : y is divisible by x}. Is R an equivalence relation? Justify your answer. (3M)

Q2) Raji wants to know the number of functions from A to B. How many number of functions are possible? (1M)

Case Study Questions – 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 G=$\{g_1,g_2\}$ and B = $\{b_1,b_2,b_3\}$ where B represents the set of boys selected and G the set of girls who were selected for the final race. based on given information, answer the following questions.

Q1) Ravi wishes to form all the relations possible from B to G. How many such relations are possible? (1M)

Q2) Ravi wants to know among those relations, how many functions can be formed from B to G? (1M)

Q3) Let R: B→B be defined by R = $\{(x, y)$: x and y are students of same sex}, then verify whether R is an equivalence relation? (2M)

Case Study Questions – 4

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.

Q1) Let f: $R\rightarrow R$ be defined by $(x)= x^2$, then verify whether f is a bijective function? (2M)

Q2) Let f: N→R be defined by $(x)= x^2$, then find the range of R? (1M)

Q3) Let f: Z→R be defined by $(x)= x^2$, Is f Injective function? Justify your answer? (1M)