CHAPTER-2

RELATIONS & FUNCTIONS

02 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	The Cartesian product A × A has 9 elements among which are found (–1, 0) and (0,1). Find the set A and the remaining elements of A × A.	2
2.	Is the given relation **S = {(n, n^2) | n is a positive integer}** is a function? Give reasons for your answer.	2
3.	**Express the function f: A→R. f(x) = x^2 – 1. where A = { -4, 0, 1, 4} as a set of ordered pairs.**	2
4.	**Assume that A = {1, 2, 3,…,14}. Define a relation R from A to A by R = {(x, y) : 3x – y = 0, such that x, y ∈ A}. Determine and write down its range, domain, and codomain.**	2
5.	Let f(x) = $x^2$and g(x) = 2x + 1 be two real functions. Find (f + g) (x), (f –g) (x), (fg) (x), (f/g) (x)	2
6.	Let $A = \{x, y, z\}$ and $B = \{1,2\}$. Find the number of relations from A to B	2
7.	If $A = \{1,2\}$, find $(A \times A \times A)$	2
8.	Write the range of Signum function	2
9.	Find the domain of $f(x) = [x] + x$	2
10.	Let $R = \{(1,3), (4,2), (2,4), (2,3), (3,1)\}$ be a relation on the set $A = \{1, 2, 3, 4\}$. Examine whether given relation is a function or not by giving reasons	2

ANSWERS:

Q. NO	ANSWER	MARKS
1.	We know that, If n(A) = p and n(B) = q, then n(A × B) = pq From the given, n(A × A) = 9 n(A) × n(A) = 9, n(A) = 3 ……(i) The ordered pairs (-1, 0) and (0, 1) are two of the nine elements of A × A. Therefore, A × A = {(a, a) : a ∈ A} Hence, -1, 0, 1 are the elemets of A. …..(ii) From (i) and (ii), A = {-1, 0, 1} The remaining elements of set A × A are (-1, -1), (-1, 1), (0, -1), (0, 0), (1, -1), (1, 0) and (1, 1).	2
2.	YES We have, S= {(n, n^2) | n is a positive integer} Since the square of any positive integer is unique, every element in the domain has unique image. Hence, it is a function.	2
3.	Given, A = {-4, 0, 1, 4} f(x) = x^2 – 1 f(-4) = (-4)2 – 1 = 16 – 1=15 f(0) = (0)2 – 1 = -1 f(1) = (1)2 – 1 = 0 f(4) = (4)2 – 1 = 16 – 1 =15	2

	Therefore, the set of ordered pairs = {(-4, 15), (0, -1), (1, 0), (4, 15)}	
4.	It is given that the relation R from A to A is given by R = {(x, y): 3x – y = 0, where x, y ∈ A}. It means that R = {(x, y) : 3x = y, where x, y ∈ A} Hence, R = {(1, 3), (2, 6), (3, 9), (4, 12)} We know that the domain of R is defined as the set of all first elements of the ordered pairs in the given relation. Hence, the domain of R = {1, 2, 3, 4} To determine the codomain, we know that the entire set A is the codomain of the relation R. Therefore, the codomain of R = A = {1, 2, 3,…,14} As it is known that, the range of R is defined as the set of all second elements in the relation ordered pair. Hence, the Range of R is given by = {3, 6, 9, 12}	2
5.	Given, f(x) = x^2 and g(x) = 2x + 1 (f + g) (x) = x^2 + 2x + 1 (f – g) (x) = x^2 -(2x + 1) = x^2 – 2x – 1 (fg) (x) = x^2(2x + 1) = $2x^3$+ x^2 (f/g) (x) = x^2/(2x + 1), x ≠ -1/2	2
6.	We have $A \times B = \{(x,1),\ (x,2),\ (y,1),\ (y,2),\ (z,1),\ (z,2)\}$ Since $n(A \times B) = 6$, the number of subsets of $A \times B$ is 2^6 So, the number of relations from $A\ to\ B$ is 64	
7.	We have $(A \times A \times A) = \{(1,1,1),\ (1,1,2),\ (1,2,1),\ (2,1,1),\ (2,1,2),\ (2,2,1),\ (1,2,2),\ (2,2,2)\}$	
8.	The real function $f: R \to R$ is defined by: $f(x) = \begin{cases} 1, if\ x > 0 \\ 0, if\ x = 0 \\ -1, if\ x < 0 \end{cases}$ Is called the signum function domain of $f = R$ and range of $f = \{1,0,-1\}$	

9.	$f(x) = [x] + x = g(x) + h(x)$, where $g(x) = [x]$ and $h(x) = x$ $[x]$ is the greatest integer $\leq x$ and is defined for every real number value of x. So, the domain of $g = (-\infty, \infty)$, i.e R and $h(x) = x$. As for every real value of x, the function is uniquely defined. So domain of $h = R$. Hence, domain of $f = R$	
10.	$R = \{(1,3),\ (4,2),\ (2,4),\ (2,3),\ (3,1)\}$ We observe that two ordered pairs (2,4) and (2,3) of R have the same first element 2, therefore, the relation R is not a function	