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, n²) | n is a positive integer}** is a function? Give reasons for your answer.	2
3.	Express the function f: A—R. f(x) = x² − 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) = x²and 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

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) = x² − 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}.	2
	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}	
5.	Given,	2
	f(x) = x² and g(x) = 2x + 1	
	(f + g) (x) = x² + 2x + 1	
	(f − g) (x) = x² -(2x + 1) = x² − 2x − 1	
	(fg) (x) = x²(2x + 1) = 2x³+ x²	
	(f/g) (x) = x²/(2x + 1), x ≠ -1/2	
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 $f : R \rightarrow R$ 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	