CHAPTER-2

RELATIONS & FUNCTIONS

04 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	Let A = {1, 2} and B = {2, 4, 6}. Let f = {(x, y) : x ϵ A, y ϵ B and y > 2x + 1}. Write f as a set of ordered pairs. Show that f is a relation but not a function from A to B	4
2.	Let R+ be the set of all positive real numbers. Let f : R+→ R : f(x) = logx. Base e Find (i) Range (f) (ii) {x : x ϵ R+ and f(x) = -2}. (iii) Find out whether f(x + y) = f(x). f(y) for all x, y ϵ R.	4
3.	Let $A = \{5,7\}$ and $B = \{9,13\}$ Let $R = \{(x,y): x \in A, y \in B, x - y = odd\ integer\}$ Show that R is an empty relation from set$A$ to set$B$	4
4.	Find the domain range of $f(x) = \frac{1}{\sqrt{x-[x]}}$	4

ANSWERS:

Q. NO	ANSWER	MARKS
1.	Given: A = {1, 2} and B = {2, 4, 6} f = {(x, y): x ∈ A, y ∈ B and y > 2x + 1} Putting x = 1 in y > 2x + 1, we get y > 2(1) + 1 ⇒ y > 3 and y ∈ B this means y = 4, 6 if x = 1 because it satisfies the condition y > 3 Putting x = 2 in y > 2x + 1, we get y > 2(2) + 1 ⇒ y > 5 this means y = 6 if x = 2 because it satisfies the condition y > 5. ∴ f = {(1, 4), (1, 6), (2, 6)} (1, 2), (2, 2), (2, 4) are not the members of 'f' because they do not satisfy the given condition y > 2x + 1 Firstly, we have to show that f is a relation from A to B. First elements = 1, 2 All the first elements are in Set A So, the first element is from set A Second elements in F = 4, 6 All the second elements are in Set B	

	So, the second element is from set B Since the first element is from set A and second element is from set B Hence, F is a relation from A to B. Function: (i) all elements of the first set are associated with the elements of the second set. (ii) An element of the first set has a unique image in the second set. Now, we have to show that f is not a function from A to B f = {(1, 4), (1, 6), (2, 6)} Here, 1 is coming twice. Hence, it does not have a unique (one) image. So, it is not a function.	
2.	Given that f: R+→ R such that f(x) = logx To find: (i) Range of f Here, f(x) = logx We know that the range of a function is the set of images of elements in the domain. ∴ The image set of the domain of f = R Hence, the range of f is the set of all real numbers. To find: (ii) {x : x ϵ R+ and f(x) = -2} We have, f(x) = -2 …(a) And f(x) = logx …(b) From eq. (a) and (b), we get logx = -2 Taking exponential both the sides, we get ⇒ x = e^{-2} ∴{x : x ϵ R+ and f(x) = -2} = {e^{-2} } To find: (iii) f(xy) = f(x) + f(y) for all x, y ϵ R We have,	

	f(xy) = log(xy) = log(x) + log(y) [Product Rule for Logarithms] = f(x) + f(y) [∵f(x) = logx] ∴ f(xy) = f(x) + f(y) holds.	
3.	$A = \{5,7\},\ B = \{9,13\}$ $A \times B = \{(5,9),\ (5,13),\ (7,9),\ (7,13)\}$ Every relation is a subset of $A \times B$ $R = \{(x,y): x \in A,\ y \in B,\ \ x - y = An\ odd\ ingteger\}$ Now $(5-9) = -4,\ (5-13) = -8,\ (7-9) = -2,\ \ (7-13) = -6$ We see that every ordered pair (x,y) of $A \times B,\ x - y$ is not odd, i.e, no $(x,y) \in R$ Hence, R is an empty relation.	
4.	We have, $f(x) = \frac{1}{\sqrt{x-[x]}}$ Domain of f: We know that $0 \leq x - [x] < 1\ for\ all\ x \in R$ and $x - [x] = 0\ for\ x \in Z$ $\therefore 0 < x - [x] < 1$ for all $x \in R - Z$ $\Rightarrow f(x) = \frac{1}{\sqrt{x-[x]}}\ exists\ for\ all\ x \in R - Z$ Hence, Domain (f) = $R - Z$ Range of f: We have $0 < x - [x] < 1\ for\ all\ x \in R - Z$ $\Rightarrow 0 < \sqrt{x - [x]} < 1\ for\ all\ x \in R - Z$ $\Rightarrow 1 < \frac{1}{\sqrt{x-[x]}} < \infty\ for\ all\ x \in R - Z$ $\Rightarrow 1 < f(x) < \infty\ for\ all\ x \in R - Z$ Range $(f) = (1, \infty)$	