CHAPTER-2

RELATIONS & FUNCTIONS

03 MARK TYPE QUESTIONS

Q. NO	**QUESTION**	**MARK**
1.	Redefine the function: f(x) = $\|x-1\| - \|x+6\|$. Write its domain also.	3
2.	Find the domain and range of the real function f(x) = x/1+x²	3
3.	What is the fundamental difference between a relation and function? Is every relation a function?	3
4.	Redefine the function: $f(x) = \|x-1\| - \|x+6\|$. Write its domain also.	3
5.	Let f and g be two real valued functions, defined by $f(x) = (x+1)$ and $g(x) = (2x-3)$. Find $i) f+g$ ii) $f-g$ iii) $\frac{f}{g}$	3
6.	If $f: R \to R$ is defined by $f(x) = 3x + \|x\|$, Prove that $f(2x) - f(-x) - 6x = f(x)$	3

ANSWERS:

Q. NO	ANSWER	MARKS
1.	Given function is $f(x) = \|x - 1\| - \|x + 6\|$ Redefine of the function is: $f(x)=-x+1+x+6, x\leq -6$ $-x+1-x-6, -6\leq x<1$ $x-1-x-6, x\geq 1$ $=7, x\leq -6$ $-2x-5, -6\leq x<1$ $-7, x\geq 1$ The domain of this function is R	3
2.	Given real function is $f(x) = x/1+x^2$. $1 + x^2 \neq 0$ $X^2 \neq -1$ Domain : $x \in R$ Let $f(x) = y$ $y = x/1+x^2$ $\Rightarrow x = y(1 + x^2)$ $\Rightarrow yx^2 - x + y = 0$ This is quadratic equation with real roots. $(-1)^2 - 4(y)(y) \geq 0$ $1 - 4y^2 \geq 0$ $\Rightarrow 4y^2 \leq 1$ $\Rightarrow y^2 \leq 1/4$ $\Rightarrow -½ \leq y \leq ½$	3

	$\Rightarrow -1/2 \leq f(x) \leq ½$ Range = [-½, ½]	
3.	Every function is a relation, but every relation need not be a function. A relation f from A to B is called a function if (i) Dom(f) = A (ii) no two different ordered pairs in f have the same first component. For. e.g. Let A = {a, b, c, d} and B = {1, 2, 3, 4, 5} f = {(a, 1), (b, 2), (c, 3), (d, 4)} g = {(a, 1), (b, 3), (c, 5)} h = {(a, 1), (b, 2), (b, 3), (c, 4), (d, 5)} In the relation f, f={(a,1),(b,2),(c,3),(d,4)} (i) Dom (f) = A (ii) All first components are different. So, f is a function. In the relation g, (i) Dom (g) ≠ A So, the condition is not satisfied. Thus, g is not a function. In the relation h, h={(a,1),(b,2),(b,3),(c,4),(d,5)} (i) Dom (h) = A (i) Two first components are the same, i.e. b has two different images.	3

	So, h is not a function. No, every relation is not a function.	
4.	Given function is $f(x) = \|x-1\| - \|x+6\|$ Redefine of the function is: $f(x) = \begin{cases} -x+1+x+6, & x \le -6 \\ -x+1-x-6, & -6 \le x < 1 \\ x-1-x-6, & x \ge 1 \end{cases}$ $= \begin{cases} 7, & x \le -6 \\ -2x-5, & -6 \le x < 1 \\ -7, & x \ge 1 \end{cases}$ The domain of this function is R	
5.	Given, $f(x) = (x+1)$ and $g(x) = (2x-3)$ i) $(f+g)(x) = f(x) + g(x)$ $= (x+1) + (2x-3)$ $= (3x-2)$ $\Rightarrow (f+g)(x) = (3x-2)$ ii) $(f-g)(x) = f(x) - g(x)$ $= (x+1) - (2x-3)$ $\Rightarrow (f-g)(x) = (4-x)$ iii) $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{x+1}{2x-3}$	
6.	$f(x) = 3x + \|x\|$ $f(2x) = (3(2x) + \|2x\|) = 6x + 2\|x\|$ $f(-x) = (3(-x) + \|-x\|) = -3x + \|x\|$ $\therefore f(2x) - f(-x) - 6x = (6x + 2\|x\|) - (-3x + \|x\|) - 6x$ $= 6x + 2\|x\| + 3x - \|x\| - 6x$ $= 3x + \|x\| = f(x)$ Hence proved.	