

CHAPTER-2
RELATIONS & FUNCTIONS
05 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	Find the set of values for which the function $f(x) = x + 3$ and $g(x) = 3x^2 - 1$ are equal	5
2.	Find domain and Range of $f(x) = \frac{1}{1 - 2\cos x}$	5
3.	If $f(x) = y = \frac{ax-b}{(cx-a)}$, then Prove that $f(y) = x$	5
4.	If $f: R \rightarrow R$ satisfies $f(x + y) = f(x) + f(y)$ for all $x, y \in R$ and $f(1) = 7$, find $\sum_{r=1}^n f(r)$	5

ANSWERS:

Q. NO	ANSWER	MARKS
1.	<p>$f(x) = x + 3, g(x) = 3x^2 - 1$</p> <p>To find:- Set of values of x for which $f(x) = g(x)$</p> <p>Consider,</p> <p>$f(x) = g(x)$</p> <p>$x+3 = 3x^2 - 1$</p> <p>$3x^2 - x - 4 = 0$</p> <p>$3x^2 - 4x + 3x - 4 = 0$</p> <p>$x(3x-4) + (3x-4) = 0$</p> <p>$(3x - 4)(x + 1) = 0$</p> <p>$x = 4/3$ or $x = -1$</p> <p>The set values for which $f(x)$ and $g(x)$ have same value is $\{ 4/3, -1\}$.</p>	5
2.	<p>Given function $f(x) = \frac{1}{1-2\cos x}$</p> <p>Domain:</p> <p>$1 - 2\cos x = 0$</p> <p>$\cos x = 1/2$</p> <p>$\cos x = \cos(\frac{\pi}{3})$</p> <p>We know that</p> <p>$\cos x = \cos \alpha$</p> <p>$x = 2n\pi \pm \alpha$</p> <p>Here $x = 2n\pi \pm \frac{\pi}{3}$</p> <p>So $f(x)$ is defined if</p> <p>$x \neq 2n\pi \pm \frac{\pi}{3}$</p> <p>So domain of $f(x)$ all real number except $2n\pi \pm \frac{\pi}{3}$</p> <p>Domain is: $\mathbf{R - \{2n\pi \pm \frac{\pi}{3}\}}$ where n is integer</p>	5

	<p>Range:</p> <p>We know that</p> $-1 \leq \cos x \leq 1$ $-2 \leq 2\cos x \leq 2$ $3 \leq 1 - 2\cos x \leq -1$ $-1 \leq \frac{1}{1 - 2\cos x} \leq \frac{1}{3}$ <p>Range is: $[-1, \frac{1}{3}]$</p>	
3.	<p>We have,</p> $y = \frac{ax-b}{cx-a}$ $\Rightarrow ycx - ay = ax - b$ $\Rightarrow ycx - ax = ay - b$ $\Rightarrow x(cy - a) = ay - b$ $\Rightarrow x = \frac{ay-b}{cy-a}$ $\Rightarrow x = f(y)$ <p>or $f(y) = x$</p>	
4.	$\sum_{r=1}^n f(x) = f(1) + f(2) + f(3) + \dots + f(n)$ $= f(1) + 2f(1) + 3f(1) + \dots + nf(1)$ $\because f(x+y) = f(x) + f(y)$ $f(1+1) = f(1) + f(1) = 2f(1) \text{ and so on}$ $= (1 + 2 + 3 + \dots + n)f(1)$ $= \frac{n(n+1)}{2} f(1)$ $= \left(\frac{n+1}{2}\right) (7) = \frac{7n(n+1)}{2}$	