1. Relations and Functions

1. If $f : R \to R$ defined by $f(x) = x^2 + 2$, then the pre-images of 27 are

(1) $5, -5$ (2) $\sqrt{5}, -\sqrt{5}$ (3) $5, 0$ (4) $0, 5$

2. If $f\left(x - \dfrac{1}{x}\right) = x^2 + \dfrac{1}{x^2}$, then $f(x) = $ _____.

(1) $x^2 + 2$ (2) $x^2 - 2$ (3) $x^2 + \dfrac{1}{x^2}$ (4) $x^2 - \dfrac{1}{x^2}$ a

3. If $A = \{a, b, c\}$, $B = \{2, 3\}$ and $C = \{a, b, c, d\}$ then $n\left[(A \cap C) \times B\right]$ is

(1) 4   (2) 8   (3) 6   (4) 12

4. If the ordered pairs $(a, -1)$ and $(5, b)$ belong to $\{(x, y) / y = 2x + 3\}$, then the values of a and b are

(1) $-13, 2$ (2) $2, 13$ (3) $2, -13$ (4) $-2, 13$

5. The function $f : \mathbb{N} \to \mathbb{N}$ is defined by $f(x) = 2x$. Then the function f is

(1) Not one-one but onto   (2) one-one but not onto
(3) One-one and onto   (4) not one-one and not onto

6. If $f(x) = x + 1$, then $f(f(f(y + 2)))$ is

(1) $y + 3$ (2) $y + 5$ (3) $y + 7$ (4) $y + 9$

7. If $f(x) = mx + n$, where m and n are integers, $f(-2) = 7$ and $f(3) = 2$, then m and n are equal to

(1) $-1, 5$ (2) $-1, -5$ (3) $1, -9$ (4) $1, 9$

8. The function t which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(C) = \dfrac{9c}{5} + 32$. The Fahrenheit degree is 95 then the value of C will be

(1) 37   (2) 36   (3) 35   (4) 29

9. If $f(x) = ax - 2$, $g(x) = 2x - 1$ and $f \circ g = g \circ f$, then the value of a is

(1) -3 (2) 3   (3) $\dfrac{1}{3}$ (4) 13

10.   If $f(x) = \dfrac{1}{x}$ and $g(x) = \dfrac{1}{x^3}$, then $f \circ g \circ f(y)$ is

(1) $\dfrac{1}{y^8}$ (2) $\dfrac{1}{y^6}$ (3) $\dfrac{1}{y^4}$ (4) $\dfrac{1}{y^3}$

11.   If $f(x) = 2 - 3x$ then $f \circ f(1-x) = ?$

(1) $9x - 5$ (2) $5x - 9$ (3) $5x + 9$ (4) $5 - 9x$

12.   If $f(x) + f(1-x) = 2$ then $f\left(\dfrac{1}{2}\right)$ is

(1) 1   (2) -1 (3) 5   (4) -9

13.   If f is a constant function of value $\dfrac{1}{10}$. Then the value of
      $f(1) + f(2) + \text{........} + f(100)$ is

(1) $\dfrac{1}{10}$ (2) 10   (3) 100   (4) $\dfrac{1}{100}$

14.   If $f(x) = \dfrac{x+1}{x-2}$ and $g(x) = \dfrac{1+2x}{x-1}$ then $f \circ g(x)$ is

(1) Constant function   (2) Identity function
(3) Quadratic function   (4) Cubic function

15.   If f is a identity function, then the value of $f(1) - 2f(2) + f(3)$ is
(1) 1   (2) 0   (3) -1 (4) -3