

## Topic :- RELATIONS AND FUNCTIONS

1. The function  $f:R \rightarrow R$  given by  $f(x) = x^3 - 1$  is
 

a) A one-one function	b) An onto function
c) A bijection	d) Neither one-one nor onto
  
2. Let  $[x]$  denote the greatest integer  $\leq x$ . If  $f(x) = [x]$  and  $g(x) = |x|$ , then the value of  $f(g(\frac{8}{5})) - g(f(-\frac{8}{5}))$  is
 

a) 2	b) -2	c) 1	d) -1
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3. The domain of the function  $f(x) = \frac{\cos^{-1}x}{[x]}$  is
 

a) $[-1, 0) \cup \{1\}$	b) $[-1, 1]$	c) $[-1, 1)$	d) None of these
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4. The set of values of  $x$  for which the function  $f(x) = \frac{1}{x} + 2^{\sin^{-1}x} + \frac{1}{\sqrt{x-2}}$  exists is
 

a) $R$	b) $R - \{0\}$	c) $\phi$	d) None of these
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5. If  $f(x)$  satisfies the relation  $2f(x) + f(1-x) = x^2$  for all real  $x$ , then  $f(x)$  is
 

a) $\frac{x^2 + 2x - 1}{6}$	b) $\frac{x^2 + 2x - 1}{3}$	c) $\frac{x^2 + 4x - 1}{3}$	d) $\frac{x^2 - 3x + 1}{6}$
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6. If the function  $f(x)$  is defined by  $f(x) = a + bx$  and  $f^r = fff \dots$  (repeated  $r$  times), then  $f^r(x)$  is equal to
 

a) $a + b^r x$	b) $ar + b^r x$	c) $ar + bx^r$	d) $a(\frac{b^r - 1}{b - 1}) + b^r x$
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7. If  $f(x) = \frac{x-1}{x+1}$ , then  $f(2x)$  is
 

a) $\frac{f(x)+1}{f(x)+3}$	b) $\frac{3f(x)+1}{f(x)+3}$	c) $\frac{f(x)+3}{f(x)+1}$	d) $\frac{f(x)+3}{3f(x)+1}$
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8. If  $f(x)$  is an odd periodic function with period 2, then  $f(4)$  equals
 

a) 0	b) 2	c) 4	d) -4
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9. The domain of definition of  $f(x) = \sqrt{\log_{0.4}\left(\frac{x-1}{x+5}\right) \times \frac{1}{x^2-36}}$ , is
 

a) $(-\infty, 0) - \{-6\}$	b) $(0, \infty) - \{1, 6\}$	c) $(1, \infty) - \{6\}$	d) $[1, \infty) - \{6\}$
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10. The domain of the function  $f(x) = \log_2(\log_3(\log_4 x))$  is

- a)  $(-\infty, 4)$                       b)  $(4, \infty)$                       c)  $(0, 4)$                       d)  $(1, \infty)$

11. Let  $f(x) = |x - 2| + |x - 3| + |x - 4|$  and  $g(x) = x + 1$ . Then,

- a)  $g(x)$  is an even function  
 b)  $g(x)$  is an odd function  
 c)  $g(x)$  is neither even nor odd  
 d)  $g(x)$  is periodic

12. If a function  $f : [2, \infty) \rightarrow B$  defined by  $f(x) = x^2 - 4x + 5$  is a bijection, then  $B =$

- a)  $R$                                       b)  $[1, \infty)$                                       c)  $[4, \infty)$                                       d)  $[5, \infty)$

13.  $R$  is relation on  $N$  given by  $R = \{(x, y) : 4x + 3y = 20\}$ . Which of the following belongs to  $R$ ?

- a)  $(-4, 12)$                                       b)  $(5, 0)$                                       c)  $(3, 4)$                                       d)  $(2, 4)$

14. If  $f: R \rightarrow R$  be a mapping defined by  $f(x) = x^3 + 5$ , then  $f^{-1}(x)$  is equal to

- a)  $(x + 5)^{1/3}$                                       b)  $(x - 5)^{1/3}$                                       c)  $(5 - x)^{1/3}$                                       d)  $5 - x$

15. Let  $f(x) = x$  and  $g(x) = |x|$  for all  $x \in R$ . Then, the function  $\phi(x)$  satisfying  $[\phi(x) - f(x)]^2 + [\phi(x) - g(x)]^2 = 0$

- a)  $\phi(x) = x, x \in [0, \infty)$   
 b)  $\phi(x) = x, x \in R$   
 c)  $\phi(x) = -x, x \in (-\infty, 0]$   
 d)  $\phi(x) = x + |x|, x \in R$

16. In a function  $f(x)$  is defined for  $x \in [0, 1]$ , then the function  $f(2x + 3)$  is defined for

- a)  $x \in [0, 1]$                                       b)  $x \in [-3/2, -1]$                                       c)  $x \in R$                                       d)  $x \in [-3/2, 1]$

17. If  $f(x) = x^2 - 2|x|$  and

$g(x) = \begin{cases} \text{Min}\{f(t) : -2 \leq t \leq x\}, & -2 \leq x < 0 \\ \text{Max}\{f(t) : 0 \leq t \leq x\}, & 0 \leq x \leq 3 \end{cases}$ , then  $g(x)$  equals

a)  $\begin{cases} x^2 - 2x, & -2 \leq x \leq -1 \\ -1, & -1 \leq x < 0 \\ 0, & 0 \leq x < 2 \\ x^2 + 2x, & 2 \leq x \leq 3 \end{cases}$

b)  $\begin{cases} x^2 + 2x, & -2 \leq x \leq -1 \\ -1, & -1 \leq x < 0 \\ 0, & 0 \leq x < 1 \\ x^2 - 2x, & 1 \leq x \leq 3 \end{cases}$

c)  $\begin{cases} x^2 + 2x, & -2 \leq x \leq -0 \\ x^2 - 2x, & 0 \leq x \leq 3 \end{cases}$

d)  $\begin{cases} x^2 + 2x, & -2 \leq x \leq 0 \\ 0, & 0 \leq x < 2 \\ x^2 - 2x, & 2 \leq x \leq 3 \end{cases}$

18. Let  $R$  be the set of real numbers and the mapping  $f:R \rightarrow R$  and  $g:R \rightarrow R$  be defined by  $f(x) = 5 - x^2$  and  $g(x) = 3x - 4$ , then the value of  $(f \circ g)(-1)$  is

- a) -44                      b) -54                      c) -32                      d) -64

19.  $f:R \rightarrow R$  is defined by  $f(x) = \frac{e^{x^2} - e^{-x^2}}{e^{x^2} + e^{-x^2}}$ , is

- a) One-one but not onto  
b) Many-one but onto  
c) One-one and onto  
d) Neither one-one nor onto

20. Let  $f:N \rightarrow N$  defined by  $f(x) = x^2 + x + 1$ ,  $x \in N$ , then  $f$  is

- a) One-one onto              b) Many-one onto              c) One -one but not onto      d) None of these

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