

FUNCTION

1. The function $f(x) = \log(x + \sqrt{x^2 + 1})$ is

(a) an even function	(c) periodic function
(b) An odd function	(d) None of these
2. If the function $f(x) = \frac{(a^x + a^{-x})}{2}$ (where, $a > 2$), then $f(x + y) + f(x - y)$ is equal to

(a) $2f(x).f(y)$	(c) $\frac{f(x)}{f(y)}$
(b) $f(x).f(y)$	(d) $\frac{f(y)}{f(x)}$
3. Let $f(x) = \frac{ax}{x+1}$, $x \neq -1$. Then, for what value of a is $f\{f(x)\} = x$?

(a) $\sqrt{2}$	(c) c
(b) $-\sqrt{2}$	(d) -1
4. The values of b and c for which the identity $f(x+1) - f(x) = 8x + 3$ is satisfied, where $f(x) = bx^2 + cx + d$, are

(a) $b = 2, c = 1$	(c) $b = -1, c = 4$
(b) $b = 4, c = -1$	(d) None of these
5. If $f(x) = \cos \{\log x\}$, then $f(x^2).f(x^2) - \frac{1}{2} \left[f\left(\frac{x^2}{2}\right) + f\left(\frac{x^2}{y^2}\right) \right]$ has the value

(a) $\cos(x^2 + y^2)$	(c) $\cos \log(x^2 - y^2)$
(b) $\cos \{\log(x + y)\}$	(d) None of these
6. The period of the function $f(x) = |\sin x| + |\cos x|$ is

(a) $\frac{\pi}{2}$	(c) 2π
(b) π	(d) $\frac{\pi}{4}$

7. The inverse of the function $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} + 2$ is given by
- (a) $\frac{1}{2} \log \frac{x-2}{x-1}$ (c) $\frac{1}{2} \log \frac{x}{2-x}$
 (b) $\frac{1}{2} \log \frac{x-1}{3-x}$ (d) $-2 \log \frac{x-1}{1+x}$
8. The inverse of the function $f(x) = \log_a(x + \sqrt{x^2 + 1})$
 (where, $a < 0, a \neq 1$) is
- (a) $\frac{1}{2}(a^x - a^{-x})$ (c) defined for $x > 0$
 (b) Not defined for all $x > 0$ (d) None of these
9. If $f(x) = 3x + 10$ and $g(x) = x^2 - 1$, then $(f \circ g)^{-1}$ is equal to
- (a) $\left(\frac{x-7}{3}\right)^{1/2}$ (c) $\left(\frac{x-3}{7}\right)^{1/2}$
 (b) $\left(\frac{x+7}{3}\right)^{1/2}$ (d) $\left(\frac{x+3}{7}\right)^{1/2}$
10. Which of the following function is an even function?
- (a) $f(x) = x \left(\frac{a^x - 1}{a^x + 1}\right)$ (c) $f(x) = \frac{a^x - a^{-x}}{2}$
 (b) $f(x) = \tan k$ (d) $f(x) = \frac{a^x + 1}{a^x - 1}$
11. If $g\{f(x)\} = |\sin x|$ and $f\{g(x)\} = (\sin \sqrt{x})^2$, then
- (a) $f(x) = \sin^2 x, g(x) = \sqrt{x}$ (c) $f(x) = \sin^2, g(x) = \sin \sqrt{x}$
 (b) $f(x) = \sin x, g(x) = |x|$ (d) Cannot be determined
12. If $f(x) = x^3 - x$ and $\phi(x) = \sin 2x$, then
- (a) $\phi[f(2)] = \sin 2$ (c) $f\left[\phi\left(\frac{\pi}{12}\right)\right] = -\frac{3}{8}$
 (b) $\phi[f(1)] = 1$ (d) $f[f(1)] = 2$
13. If $f(x)$ is an odd periodic function with period 2, then $f(4)$ equals to
- (a) 0 (c) 4
 (b) 2 (d) -4



14. The domain of the function

$$F(x) = \frac{1}{\log_{10}(1-x)} + \sqrt{(x+2)} \quad \text{is}$$

- (a) $] -3, -2.5[\cup] -2.5, -2[$ (c) $] 0, 1[$
 (b) $] -2, 0[\cup] 0, 1[$ (d) None of these

15. The domain of the function $f(x) = \sqrt{(2 - 2x - x^2)}$ is

- (a) $-3 \leq x \leq \sqrt{3}$ (c) $-2 \leq x \leq 2$
 (b) $-1 - \sqrt{3} \leq x \leq -1 + \sqrt{3}$ (d) None of these

16. The range of the function $f(x) = \frac{1}{(2 - \sin 3x)}$ is

- (a) $]\frac{1}{3}, 1[$ (c) $]\frac{1}{3}, 1[$
 (b) $[\frac{1}{3}, 1]$ (d) $[\frac{1}{3}, 1]$

17. The range of the function $y = \frac{x}{1+x^2}$ is

- (a) $]-\frac{1}{2}, \frac{1}{2}[$ (c) $[-\frac{1}{2}, \frac{1}{2}]$
 (b) $]-\frac{1}{2}, \frac{1}{2}]$ (d) $[-\frac{1}{2}, \frac{1}{2}]$

18. The domain of definition of $f(x) = \frac{\log_2(x+3)}{x^2+3x+2}$ is

- (a) $\frac{R}{\{-1, -2\}}$ (c) $\frac{R}{\{-1, -2, -3\}}$
 (b) $(-2, \infty)$ (d) $\frac{-3, \infty}{\{-1, -2\}}$

19. Find the value of $[f(x_2, x_3), f(x_5, x_6)]$, if $n = 3$.

- (a) x_3 (c) x_{13}
 (b) x_{10} (d) x_8

20. Find the value of $g[g(x_2, x_3), f(x_7, x_8)]$, if $n = 5$.

- (a) x_1 (c) x_5
 (b) x_2 (d) None of these



21. Find the value of $\{20@4\} \# 35$.
- (a) 280081 (c) 262781
(b) 292681 (d) 301756
22. Find the value of $12 \# [14@ \{12 \# 13\}]$
- (a) 4539 (c) 45369
(b) 42336 (d) 89719
23. Find the value of $\{9 \# 7\} @ (21 \# 5)$.
- (a) 67600 (c) 57600
(b) 62500 (d) 56600
24. Find the value of $\{2@2\} + \{3 \# 3\} - \{4 \# 4\} + \{5 \# 5\}$.
- (a) 64 (c) 28
(b) -48 (d) 84
25. What is the range of the function $f(x) = \frac{|x|}{x}$, where $x \neq 0$?
- (a) Set of all real numbers (c) $\{-1, 1\}$
(b) Set of all integers (d) $\{-1, 0, 1\}$
26. If N be the set of natural number and $f: N \rightarrow N$ be a function given by $f(x) = x + 1$ for $x \in N$, then which one of the following is correct?
- (a) F is one-one and onto
(b) F is one-one but not onto
(c) f is only onto
(d) f is neither one-one nor onto
27. If $f: R \rightarrow R$ be a function whose is $\frac{x+5}{3}$, then what is the value of $f(x)$?
- (a) $F(x) = 3x + 5$ (c) $f(x) = 5x - 3$
(b) $F(x) = 3x - 5$ (d) does not exist



28. Consider the following statements

I. If $f(x) = x^3$ and $g(y) = y^3$, then $f = g$.

II. Identity function is not always a bijection.

Which of the above statements is/are correct?

- (a) Only I (c) Both I and II
(b) Only II (d) Neither I nor II

29. If $A = \{x \in R \mid x \geq 0\}$. A function $f : A \rightarrow A$ is defined by

$f(x) = x^2$, then which one of the following is correct?

- (a) The function does not have inverse
(b) f is its own inverse
(c) The function has an inverse but is not its own inverse
(d) None of the above

30. If $(xy) = f(x) f(y)$, then $f(t)$ may be of the form

- (a) $t + k$ (c) $t^k + c$
(b) $ct + k$ (d) t^k

31. What is the range of $f(x) = \cos 2x - \sin 2x$?

- (a) $[2, 4]$ (c) $[-\sqrt{2}, \sqrt{2}]$
(b) $[-1, 1]$ (d) $(-\sqrt{2}, \sqrt{2})$

32. If $f(x) = a \cos (bx + c) + d$, then the range of $f(x)$ is

- (a) $[a + a, d + 2a]$ (c) $[d + a, a - d]$
(b) $[a - d, a + d]$ (d) $[d - a, d + a]$

33. Consider the following statements

I. Every function has a primitive.

II. A primitive of a function is unique.

Which of the statements given above is/are correct?

- (a) Only I (c) Both I and II
(b) Only II (d) Neither I nor II



34. If $f : \mathbb{R} \rightarrow \mathbb{R}$, $g : \mathbb{R} \rightarrow \mathbb{R}$ and $g(x) = x + 3$ and $(f \circ g)(x) = (x + 3)^2$, then what is the value of $f(-3)$?
- (a) -9 (c) 9
(b) 0 (d) 3
35. Which one of the following real valued function is never zero?
- (a) Polynomial function (c) Logarithmic function
(b) Trigonometric function (d) Exponential function
36. If $g : \mathbb{R} \rightarrow \mathbb{R}$ be a function such that $g(x) = 2x + 5$, then, what is $g^{-1}(x)$ equal to?
- (a) $\frac{x-5}{2}$ (c) $x - \frac{5}{2}$
(b) $2x - 5$ (d) $\frac{x}{2} + \frac{5}{2}$
37. What is the inverse of the function $y = 5^{\log x}$?
- (a) $x = 5^{1/\log y}$ (c) $5^{\log y}$
(b) $x = y^{1/\log 5}$ (d) $x = y^{\log 5}$
38. If the function $f : A \rightarrow \mathbb{R}$ is, where $A = \left\{x \in \mathbb{R}, -\frac{\pi}{2} < x < \frac{\pi}{2}\right\}$ defined by $f(x) = \tan x$, then the function is
- (a) Injective (c) bijective
(b) not injective (d) not bijective

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