Practice Exercise

Level - I

1. A function f is defined by $f(x)=x+\frac{1}{x}$. Consider the following.

(1) $(f(x))^2=f(x^2)+2$

(2) $(f(x))^3=f(x^3)+3f(x)$

Which of the above is/are correct?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

2. What is the range of the function $f(x)=\frac{|x|}{x}, x\neq 0$?

(a) Set of all real numbers (b) Set of all integers

(c) $\{-1, 1\}$ (d) $\{-1, 0, 1\}$

3. The domain of the function $f(x)=\frac{\sqrt{(x+1)(x-3)}}{x-2}$ is

(a) $[-1, 2)\cup[3, \infty)$ (b) $(-1, 2)\cup[3, \infty)$

(c) $[-1, 2]\cup[3, \infty)$ (d) None of these

4. If $f(x)=\sqrt{x^3}$, then $f(3x)$ will be equal to

(a) $\sqrt{3x^3}$ (b) $3\sqrt{x^3}$

(c) $3\sqrt{(3x^3)}$ (d) $3\sqrt{x^5}$

5. If $f(x)=e^x$, then the value of $7f(x)$ will be equal to

(a) e^{7x} (b) $7e^x$

(c) $7e^{7x}$ (d) e^x

6. If $f(x)=\frac{x+1}{x-1}, x\neq 1$, find $f\left(f\left(f\left(f\left(f(2)\right)\right)\right)\right)$

(a) 2 (b) 3

(c) 4 (d) 6

7. Find fof if $f(t)=t/(1+t^2)^{1/2}$.

(a) $1/(1+2t^2)^{1/2}$ (b) $t/(1+2t^2)^{1/2}$

(c) $(1+2t^2)$ (d) None of these

8. $f(x)=3x^2$, $g(x)=h(x)=3x^3+3$. The value of $f(x)\,g(x)$ differ from the corresponding values of $h(x)$ approximately by what value

(a) 9 (b) 5

(c) 3 (d) Cannot be determined

9. If $f(x)=|x|$ and $g(x)=[x]$, then value of $fog\left(-\frac{1}{4}\right)+gof\left(-\frac{1}{4}\right)$ is

(a) 0 (b) 1

(c) -1 (d) 1/4

10. If $f(x)$ is an even function, then the graph $y=f(x)$ will be symmetrical about

(a) x-axis (b) y-axis

(c) Both the axes (d) None of these

11. The domain of definition of $y=\left[\log_{10}\left(\frac{5x-x^2}{4}\right)\right]^{1/2}$ is

(a) $[1, 4]$ (b) $[-4, -1]$

(c) $[0, 5]$ (d) $[-1, 5]$

12. If $f(t)=\sqrt{t}, g(t)=t/4$ and $h(t)=4t-8$, then the formula for $g(f(h(t)))$ will be

(a) $\frac{\sqrt{t-2}}{4}$ (b) $2\sqrt{t}-8$

(c) $\frac{\sqrt{(4t-8)}}{4}$ (d) $\frac{\sqrt{(t-8)}}{4}$

13. If $f(x)=5x^3$ and $g(x)=3x^5$, then $f(x).g(x)$ will be

(a) Even function (b) Odd function

(c) Both (d) None of these

14. If $f(x)=\begin{cases}1-x, & 0\le x\le 2\\ x-1, & 2\le x\le 4\\ 1, & 4\le x\le 6\end{cases}$; then find

$f(0)+f\left(\frac{1}{2}\right)+f(1)+f\left(\frac{45}{18}\right)$

(a) 1 (b) 2

(c) 3 (d) None of these

15. Given $f(x)=\log\left(\frac{1+x}{1-x}\right)$ and $g(x)=\frac{3x+x^3}{1+3x^2}$, then $fog(x)$ is

(a) $-f(x)$ (b) $3f(x)$

(c) $[f(x)]^3$ (d) None of these

16. If $3f(x)+5f\left(\frac{1}{x}\right)=\frac{1}{x}-3, \forall\ x\neq 0\in R$, then $f(x)=$

(a) $\frac{1}{16}\left(\frac{3}{x}+5x-6\right)$ (b) $\frac{1}{16}\left(-\frac{3}{x}+5x-6\right)$

(c) $\frac{1}{14}\left(-\frac{3}{x}+5x+6\right)$ (d) None of these

17. Which of the following is not an even function?
(a) $f(x) = e^x + e^{-x}$ (b) $f(x) = e^x - e^{-x}$
(c) $f(x) = e^{2x} + e^{-2x}$ (d) None of these

18. Let $f(x) = |x-2| + |x-3| + |x-4|$ and $g(x) = f(x+1)$. Then
(a) $g(x)$ is an even function
(b) $g(x)$ is an odd function
(c) $g(x)$ is neither even nor odd
(d) None of these

19. Find the value of $f(f(-2))$, if $f(x) = \dfrac{x}{x+1}$
(a) 3/2 (b) 4/3
(c) 2/3 (d) None of these

20. Find the value of $f(f(f(3))) + f(f(1))$, if

$$f(x) = \begin{cases} \dfrac{x}{x+1}; & \text{if } x \text{ is an integer} \\ \dfrac{1}{x-(x)}; & \text{if is not an integer} \end{cases}$$

(a) 4 (b) 5
(c) 6 (d) 7

21. Let $f(x)$ be a function satisfying $f(x)f(y) = f(xy)$ for all real x, y. If $f(2) = 4$, then what is the value of $f\left(\dfrac{1}{2}\right)$?
(a) 0 (b) $\dfrac{1}{4}$
(c) $\dfrac{1}{2}$ (d) cannot be determined

22. Which of the following functions is an odd function?
(a) $2^{-x.x}$ (b) $2^{x-x.x.x.x}$
(c) Both (a) and (b) (d) Neither (a) nor (b)

23. If $f(t) = t^2 + 2$ and $g(t) = (1/t) + 2$, then for $t = 2, f[g(t)] - g[f(t)] = ?$
(a) 1.2 (b) 2.6
(c) 4.34 (d) None of these

24. Given $f(t) = kt + 1$ and $g(t) = 3t + 2$. If $fog = gof$, find k.
(a) 2 (b) 3
(c) 5 (d) 4

25. If $f(x) = e^x$ and $g(x) = \log_e x$, then value of fog will be
(a) x (b) 0
(c) 1 (d) e

Level - II

1. Which of the following two functions are identical?
(i) $f(x) = x^2/x$ (ii) $g(x) = \left(\sqrt{x}\right)^2$
(iii) $h(x) = x$
(a) (i) and (ii) (b) (ii) and (iii)
(c) (i) and (iii) (d) None of these

2. If $f(x) = \log x^4$ and $g(x) = 4 \log x$, then the domain for which $f(x)$ and $g(x)$ are identical?
(a) $(-\infty, \infty)$ (b) $[0, \infty)$
(c) $(0, \infty)$ (d) None of these

3. If $f(x) = x^3 - 4x + p$, and $f(0)$ and $f(1)$ are of opposite signs, then which of the following is necessarily true?
(a) $-1 < p < 2$ (b) $0 < p < 3$
(c) $-2 < p < 1$ (d) $-3 < p < 0$

4. If $f(x)$ is a function satisfying $f(x).f(1/x) = f(x) + f(1/x)$ and $f(4) = 65$, what will be the value of $f(6)$?
(a) 37 (b) 217
(c) 64 (d) None of these