1. If $F(n+1) = \frac{2F(n)+1}{2}$, $n \in N$ and $f(1) = 2$, then $f(101)$ equals

(1) 49 (2) 50 (3) 51 (4) 52

2. Let f be a function satisfying $f(xy) = \frac{f(x)}{y}$ for all positive real numbers x and y. If $f(30) = 20$, then the value of $f(40)$ is-

(1) 15 (2) 20 (3) 40 (4) 60

3. Let $f(x) = \begin{cases} x^2 - 3x + 4 & ; \ x < 3 \\ x + 7 & ; \ x \geq 3 \end{cases}$ and

$g(x) = \begin{cases} x + 6 & ; \ x < 4 \\ x^2 + x + 2 & ; \ x \geq 4 \end{cases}$, then which of the following is Not true -

(1) $(f + g)(1) = 9$ (2) $(f - g)(3.5) = 1$

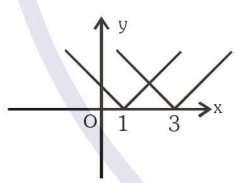
(3) $(f\,g)(0) = 24$ (4) $\left(\frac{f}{g}\right)(5) = \frac{8}{3}$

4. If $x^4 f(x) - \sqrt{1 - \sin 2\pi x} = |f(x)| - 2f(x)$, then $f(-2)$ equals

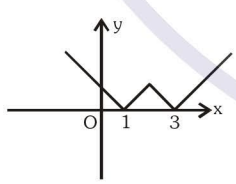
(1) $\frac{1}{17}$ (2) $\frac{1}{11}$ (3) $\frac{1}{19}$ (4) 0

5. Which of the following is the graph of $y = |x - 1| + |x - 3|$?

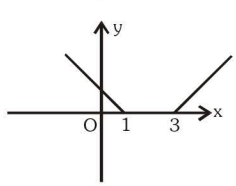
(1)



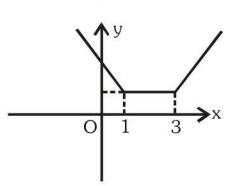
(2)



(3)

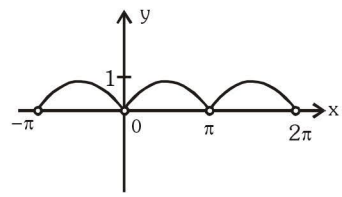


(4)

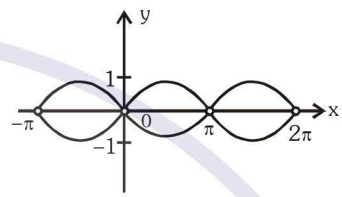


6. Which of the following is the graph of $y = \frac{|\sin x|}{\sin x}$

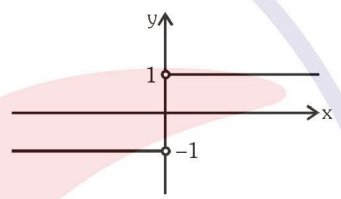
(1)



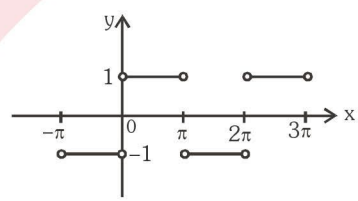
(2)



(3)



(4)



7. If $f(x,y) = \max(x,y) + \min(x,y)$ and $g(x,y) = \max(x,y) - \min(x,y)$,

then the value of $f\left(g\left(-\frac{2}{3}, -\frac{3}{2}\right), g(-3,-4)\right)$ is greater than -

(1) 1 (2) 2 (3) 3 (4) 4

8. If $2f(x) - 3f\left(\frac{1}{x}\right) = x^2$, $(x \neq 0)$ then $f(2)$ is equal to

(1) $-\frac{7}{4}$ (2) $\frac{5}{2}$

(3) -1 (4) none of these

9. The number of integers lying in the domain of the function $f(x) = \sqrt{\log_{0.5}\left(\frac{5-2x}{x}\right)}$ is

(1) 3 (2) 2 (3) 1 (4) 0

10. The range of the function $f : N \to I$; $f(x) = (-1)^{x-1}$, is -

(1) $[-1, 1]$ (2) $\{-1, 1\}$

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

11. A function f has domain [– 1, 2] and range [0, 1]. The domain and range respectively of the function g defined by g (x) = 1 – f (x + 1) is

(1) [–1, 1] ; [–1, 0] (2) [–2, 1]; [0, 1]

(3) [0, 2] ; [–1, 0] (4) [1, 3] ; [–1, 0]

***12.** Which of the following function(s) have the same domain and range ?

(1) $f(x)=\sqrt{1-x^2}$ (2) $g(x)=\frac{1}{x}$

(3) $h(x)=\sqrt{x}$ (4) $l(x)=\sqrt{4-x}$

13. Range of function

$f(x)=\log_2\left(\frac{4}{\sqrt{x+2}+\sqrt{2-x}}\right)$ is given by

(1) $(0, \infty)$ (2) $\left[\frac{1}{2}, 1\right]$

(3) [1, 2] (4) $\left[\frac{1}{4}, 1\right]$

14. Which of the following functions is an odd function?

(1) $|x-2|+(x+2)\,\text{sgn}(x+2)$

(2) $\frac{1}{x(e^x-1)}+\frac{1}{2x}$

(3) $\log\left(\sin x+\sqrt{1+\sin^2 x}\right)$

(4) $e^{-4x}(e^{2x}-1)^4$

(where sgn(x) denotes signum function of x)

15. Period of $f(x)=\{x\}+\left\{x+\frac{1}{3}\right\}+\left\{x+\frac{2}{3}\right\}$ is equal to

(where {.} denotes fractional part function)

(1) 1 (2) 2/3 (3) 1/2 (4) 1/3

16. The period of the function $\frac{\sin x+\sin 5x}{\cos x+\cos 5x}$ is -

(1) $\pi/3$ (2) $\pi/2$ (3) π (4) 2π

17. If $f(x) = a\log\left(\frac{1+x}{1-x}\right)+bx^3+c\sin x+5$ and $f(\log_3 2) = 4$, then $f\left(\log_3\left(\frac{1}{2}\right)\right)$ is equal to

(1) 1 (2) 3 (3) 4 (4) 6

18. Let $f(x)=\frac{9^x}{9^x+3}$ then find the value of the sum

$$f\left(\frac{1}{2006}\right)+f\left(\frac{2}{2006}\right)+f\left(\frac{3}{2006}\right)+\ldots\ldots f\left(\frac{2005}{2006}\right)$$

(1) 1002 (2) 1002·5 (3) 1003 (4) 1001

19. The period of the function

f(x) = logcos2x + sin4x is

(1) π (2) 2π

(3) $\frac{\pi}{2}$ (4) Not defined

20. If a function f(x) is such that

$f\left(x+\frac{1}{x}\right)=x^2+\frac{1}{x^2}$; then (fof) $(\sqrt{11})$ =

(1) 9 (2) 81

(3) 79 (4) $\sqrt{11}$

21. Let f : R → R be a function defined by

$f(x)=-\frac{|x|^5+|x|}{1+x^4}$; then the graph of f(x) is lies in the :-

(1) I and II Quadrants

(2) I and III Quadrants

(3) II and III Qudrants

(4) III and IV Quadrants

22. Which of the following functions cannot have their inverse defined ?

(1) f : R → R^+ ; y = e^x

(2) f : R^+ → R ; y = log |x|

(3) $f:\left[-\frac{\pi}{2}, \frac{\pi}{2}\right] \to [-1, 1]$; $y = \sin^3 x$

(4) f : R → R^+ ; $y = e^{[x]}$

(where [.] → greatest integer function)

23. If $g(x) = x^2 + x - 2$ and $\frac{1}{2}(gof)(x) = 2x^2 - 5x + 2$ then $f(x)$ is equal to

(1) 2x – 3

(2) 2x + 3

(3) $2x^2 + 3x + 1$

(4) $2x^2 - 3x - 1$

24. If a function g(x) is defined in [–1, 1] and two vertices of an equilateral triangle are (0, 0) and (x, g(x)) and its area is $\frac{\sqrt{3}}{4}$, then g(x) equals

(1) $\sqrt{1+x^2}$ (2) $-\sqrt{1+x^2}$

(3) $\sqrt{1-x^2}$ or $-\sqrt{1-x^2}$ (4) None of these

25. If function $f : R \to S$, $f(x) = (\sin x - \sqrt{3}\cos x + 1)$ is onto, then S is equal to

(1) [0, 1] (2) [–1, 1]

(3) [0, 3] (4) [–1, 3]

26. If the function $f : R \to R$ is defined by $f(x) = \log_a(x + \sqrt{x^2+1})$, $(a > 0, a \neq 1)$, then $f^{-1}(x)$ is

(1) $\left(\frac{a^x + a^{-x}}{2}\right)$

(2) $\left(\frac{a^x - a^{-x}}{2}\right)$

(3) Doesn't exist $\forall\ x \in R$

(4) Exists for $x \in R^+$ only

27. Which pair of functions is identical ?

(1) $\sin^{-1}(\sin x)$ & $\sin(\sin^{-1}x)$

(2) $\log_e e^x$ & $e^{\log_e x}$

(3) $\log_e x^2$ & $2\log_e x$

(4) Signum function $(x^4 + 1)$ & $g(x) = \sin^2 x + \cos^2 x$

28. Let $f : R \to R$ be defined by $f(x) = 3x^2 - 5$ and $g : R \to R$ by $g(x) = \frac{x}{x^2+1}$; then gof is

(1) $\frac{3x^2-5}{9x^4-30x^2+26}$ (2) $\frac{3x^2-5}{9x^4-6x^2+26}$

(3) $\frac{3x^2}{x^4+2x^2-4}$ (4) $\frac{3x^2}{9x^4+30x^2-2}$

29. If $y = 3[x] + 1 = 4[x - 1] - 10$, then $[x + 2y]$ is equal to (where [.] is G.I.F.)

(1) 76 (2) 61

(3) 107 (4) 67

30. If $f : R \to R$; $f(x) = 2x+1$, $g : R \to R$, $g(x) = x^3$, then $(fog)^{-1}(55)$ equals

(1) 27 (2) 3

(3) – 27 (4) – 3

* **Marked Question is multiple answer**

ANSWER KEY — Exercise-1

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**4**	**1**	**4**	**1**	**4**	**4**	**1**	**1**	**3**	**2**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**2**	**2,3**	**2**	**3**	**4**	**3**	**4**	**2**	**1**	**3**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**4**	**4**	**1**	**3**	**4**	**2**	**4**	**1**	**3**	**2**