FUNCTIONS

SINGLE CORRECT OPTION TYPE

1. Domain of the function $f(x)=\frac{1}{1+\frac{1}{1+\frac{1}{x}}}$ is

(A) $R-\{0\}$ (B) $R-\{0,1\}$ (C) $R-\left\{0,1,-\frac{1}{2}\right\}$ (D) $R-\left\{0,-1,-\frac{1}{2}\right\}$

2. Let bise$f(x)=\frac{\log x}{x}$, and solution of $f(x)=k$ be denoted by $g(k)$ $g(k)$ {where $k<0$}, $g:(-\infty,0)\to(0,1)$, then $y=g(x)$ will be

(A) bijective function (B) many one function (C) periodic function (D) into function

3. If $f:N\to N$, $f(x)=(x+1)^2+x-\left[\sqrt{(x+1)^2+(x+1)}\right]^2$, then $f(x)$ will be $([.]\text{ is GIF})$

(A) bijective function (B) many one function (C) periodic function (D) into function

4. $f(x)=\frac{x}{\ell nx}$ and $g(x)=\frac{\ell nx}{x}$. Then identify the CORRECT statement

(A) $\frac{1}{g(x)}$ and $f(x)$ are identical functions (B) $\frac{1}{f(x)}$ and $g(x)$ are identical functions

(C) $f(x).g(x)=1\ \forall x>0$ (D) $\frac{1}{f(x).g(x)}=\forall x>0$

5. Range of function $f(x)=\tan^{-1}\left(\sqrt{[x]+[-x]}\right)+\sqrt{2-|x|}+\frac{1}{x^2}$ is where $[*]$ is the greatest integer function.

(A) $\left[\frac{1}{4},\infty\right)$ (B) $\left\{\frac{1}{4}\right\}\cup[2,\infty)$ (C) $\left\{\frac{1}{4},2\right\}$ (D) $\left[\frac{1}{4},2\right]$

6. Let $F(x)=\begin{cases} x|x| & \text{if } x\le -1 \\ [1+x]+[1-x] & \text{if } -1<x<1 \\ -x|x| & \text{if } x\ge 1 \end{cases}$ where $[x]$ denotes the greatest integer function then $F(x)$ is

(A) even (B) odd (C) neither odd nor even (D) even as well as odd

7. For the function $f(x)=\frac{e^x+1}{e^x-1}$, if $n(d)$ denotes the number of integers which are not in its domain and $n(r)$ denotes the number of integers which are not in its range, then $n(d)+n(r)$ is equal to

(A) 2 (B) 3 (C) 4 (D) infinite

8. Let f be a function such that $f(x)=f(2-x)\forall x\in R$ and $g(x)=f(1+x)$, then

(A) $g(x)$ is an odd function (B) $g(x)$ is an even function

(C) $g(x)$ is neither odd not even function (D) graph of $f(x)$ is symmetrical w.r.t. line $x=\frac{1}{2}$

9. If $f(x)=\sin\{[x+5]+\{x-\{x\}\}\}$ for $x\in\left(0,\frac{\pi}{4}\right)$ is invertible, where $\{.\}$ and $[.]$ represent fractional part and greatest integer functions respectively, then $f^{-1}(x)$ is not equal to

(A) $\sin^{-1}x$ (B) $\frac{\pi}{2}-\cos^{-1}x$ (C) $\sin^{-1}\{x\}$ (D) $\cos^{-1}\{x\}$

10. Let $f(x)=\sqrt{(\sin^{-1}x-\cos^{-1}x)}$, $g(x)=\sqrt{(\tan^{-1}x-\cot^{-1}x)}$ and $h(x)=\sqrt{(\sec^{-1}x-\operatorname{cosec}^{-1}x)}$ then incorrect statement(s) is (are)

(A) Domain of $f(x)+g(x)$ is $\{1\}$
(B) Domain of $g(x)+h(x)$ is $\left[\sqrt{2},\infty\right)$
(C) Domain of $h(x)+f(x)$ is $\left[\frac{1}{\sqrt{2}},1\right]$
(D) Domain of $f(x)+g(x)+h(x)$ is ϕ

11. Let $f:[-1,1]\to\left[\frac{-3\pi}{2},\frac{3\pi}{2}\right]$ be a real-valued function defined as $f(x)=\sin^{-1}x+\left|\sin^{-1}x\right|+\sin^{-1}|x|$, then

(A) $f(x)$ is one-one but not onto

(B) the number of solutions of the equation $f(x)=x$ is one

(C) $\lim_{x\to 0}\frac{f(x)}{x}=3$

(D) the number of solutions of the equation $f(x)=\frac{\pi}{2}$ are three

12. Consider the functions $f(x)=\left|\frac{1}{|x|-1}\right|$, $g(x)=\{x\}$

Where $\{.\}$ represents fractional part function.

Number of solutions of equation $f(x)=g(x)$ in $[-3,3]$ is

(A) 1 (B) 4 (C) 2 (D) 0

13. Let $f(x)=\sin\left((x)^0\right)$, $g(x)=(\sin x)^0$ then

(A) f, g both are periodic
(B) f is periodic but not g
(C) g is periodic but not f
(D) f, g are not periodic

14. Find the number of integers in the domain of $f(x)=\frac{1}{\sqrt{\ln\cos^{-1}x}}$

(A) 1 (B) 2 (C) 3 (D) 4

15. Let a function $f:(0,\infty)\to[0,\infty)$ be defined by $f(x)=\left|1-\frac{1}{x}\right|$. Then f is

(A) injective only
(B) not injective but it is surjective
(C) both injective as well as surjective
(D) neither injective nor surjective

16. $f:R\to(-\infty,0], f(x)=\ell n\left(\sqrt{1+x^4}-x^2\right)$ is

(A) many-one, into and even
(B) many-one onto and even
(C) one-one, onto and odd
(D) one-one, into and odd

17. Let $f(x)=\begin{cases} x^2-3, & x\le -5 \\ x+\lambda & -5<x<-1 \\ (\mu-7)(|1-x|+|1+x|) & -1\le x\le 1 \\ x+6 & 1<x<5 \\ 3-x^2 & x\ge 5 \end{cases}$

If $f(x)$ is an odd function then find the value of $(\lambda+\mu)$

(A) 1 (B) 2 (C) 4 (D) 3

18. If $f(x)=\cos^{-1}(x-x^2)+\sqrt{\left(1-\frac{1}{|x|}\right)}+\frac{1}{[x^2-1]}$, then domain of $f(x)$ is (where $[.]$ is the greatest integer)

(A) $\left[\sqrt{2},\frac{1+\sqrt{5}}{2}\right]$ (B) $\left[-\sqrt{2},\frac{1-\sqrt{5}}{2}\right]$ (C) $\left[-\sqrt{2},\frac{1+\sqrt{5}}{2}\right]$ (D) None of these

19. If the functions $f(x)$ and $g(x)$ are defined on $R\to R$ such that $f(x)=\begin{cases} x+3, & x\in \text{rational} \\ 4x, & x\in \text{irrational} \end{cases}$ and $g(x)=\begin{cases} x+\sqrt{5}, & x\in \text{irrational} \\ -x & x\in \text{rational} \end{cases}$ then $(f-g)(x)$ is

(A) one-one and onto (B) neither one-one nor onto

(C) one-one but not onto (D) onto but not one-one

20. Find the sum of all solution of the equation $\cot\frac{\pi x}{2}=\log_2\{x\}$ in $x\in(0,100)$

[Note: $\{k\}$ denotes the fractional part function of k]

(A) 2528 (B) 2525 (C) 2727 (D) 2626

NUMERICAL BASED

21. If $f(x)+f\left(1-\frac{1}{x}\right)=1+x\,\forall x\in R-\{0,1\}$. Then the value of $4f(2)$

22. Let a function f defined from $R\to R$ as $f(x)=\begin{cases} x+p^2, & \text{for } x\le 2 \\ px+5, & \text{for } x>2 \end{cases}$. If the function is surjective, then find the sum of all possible integral values of p in $[-100,100]$.

23. Let $f(x)=[\sec\{x\}]$ where $[x]$ and $\{x\}$ denote greatest integer and fractional part of x respectively and $g(x)=2x^2-3x(k+1)+k(3k+1)$. Find number of integral values of k if $g(f(x))<0\,\forall x\in R$

24. If $f(x)=\cos\left(2010\{x^3\}\left(2011^{[x^2]}+2012x\right)\right)$; $x\in R$ then f_{max} is equal to (where $\{.\}$ denotes fractional part function and $[.]$ denotes greatest integer function)

25. Domain of the function $f(x)=\sqrt{100x-x^2}+\sqrt{\cos^{2013}\pi x+\sin^{2014}\pi x-1}$ is set A, then sum of all the elements of set A equals

KEY

1.	D	**2.**	A	**3.**	A	**4.**	A	**5.**	C
6.	A	**7.**	C	**8.**	B	**9.**	D	**10.**	C
11.	B	**12.**	A	**13.**	C	**14.**	B	**15.**	B
16.	B	**17.**	A	**18.**	C	**19.**	B	**20.**	B
21.	3	**22.**	5047	**23.**	1	**24.**	1	**25.**	5050

❇ *Wish You all the Best* ❇