SINGLE CORRECT OPTION TYPE

1. The value of $\lim\limits_{x\to-\infty} \operatorname{cosec}^{-1}\left(\dfrac{3x^2-4x+2}{3x^2+x+7}\right)$ is

(A) $\dfrac{\pi}{2}$ (B) $\dfrac{-\pi}{2}$ (C) does not exist (D) can not say

2. The value of the limit, $\lim\limits_{x\to0}\left(\dfrac{2^x-x\ln2}{3^x-x\ln3}\right)^{\left(1/x^2\right)}$ is

(A) $6^{\left(\frac{\ln(2/3)}{2}\right)}$ (B) $6^{\left(\frac{\ln(3/2)}{2}\right)}$ (C) $\left(\dfrac{2}{3}\right)^{\left(\frac{\ln6}{3}\right)}$ (D) $\left(\dfrac{3}{2}\right)^{\left(\frac{\ln6}{2}\right)}$

3. $\lim\limits_{x\to0}\dfrac{\sin(\sin x)-\sin x}{ax^5+bx^3+c}=\dfrac{1}{12}$, then

(A) a=2 ,b=0 ,c=1 (B) $a\in R$,b=2 ,c=0 (C) a=2 ,$b\in R$,c=0 (D) $a\in R$, b= -2 ,c=0

4. Let $P(x)=a_1x+a_2x^2+a_3x^3+.....+a_{100}x^{100}$,where $a_1=1$ and $a_i\in R\ \forall i=2,3,4...100$.

Then $\lim\limits_{x\to1}\dfrac{\sqrt[100]{1+P(x-1)}-1}{x-1}$ has the value equal to

(A) 100 (B) $\dfrac{1}{100}$ (C) 1 (D) 5050

5. $\lim\limits_{x\to0}\dfrac{a^{\tan x}-a^{\sin x}}{\tan x-\sin x}$ is equal to $(a>0)$

(A) $\log_e a$ (B) 1 (C) 0 (D) ∞

6. Let f (x)= $8x^3+3x$, $f^{-1}(x)$ be the inverse function of f (x),then $\lim\limits_{x\to\infty}\dfrac{x^{\frac{1}{3}}}{f^{-1}(8x)-f^{-1}(x)}=$

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

7. The value of $\lim\limits_{x\to0}\left(\dfrac{1+2x}{1+3x}\right)^{\frac{1}{x^2}}.e^{\frac{1}{x}}$ is

(A) $e^{\frac{5}{2}}$ (B) e^2 (C) e^3 (D) 1

8. Let $f(x)=x^3\left\{\sqrt{x^2+\sqrt{x^4+1}}-x\sqrt{2}\right\}$. Then $\lim\limits_{x\to\infty}f(x)$ is equal to

(A) $\dfrac{1}{2\sqrt{2}}$ (B) $\dfrac{1}{4\sqrt{2}}$ (C) $\dfrac{3}{4\sqrt{2}}$ (D) does not exist

9. $\lim\limits_{x\to\left(\frac{-1}{3}\right)^-}\dfrac{1}{x}\left[\dfrac{-1}{x}\right]$

(A) -9 (B) -12 (C) -6 (D) 0

10. $f(x) = \cos x$ and $g(x) = \begin{cases} \min f(t) : 0 \le t \le x, x \in [0, \pi] \\ \sin x - 1 \quad ; \quad x > \pi \end{cases}$ then which of the following is true ?

(A) g(x) is discontinuous at $x = \pi$
(B) g(x) is continuous for $x \in [0, \infty)$
(C) g(x) is differentiable at $x = \pi$
(D) g(x) is differentiable for $x \in [0, \infty)$

11. Which of the following function is not differentiable at $x = 1$

(A) $f(x) = (x^2 - 1)|(x-1)(x-2)|$
(B) $f(x) = \sin(|x-1|) - |x-1|$
(C) $f(x) = \tan(|x-1|) + |x-1|$
(D) None of these

12 Let $f(x) = \begin{cases} \left(\dfrac{1}{1+[\sin x]}\right)^{\frac{2}{2x-\pi}} ; x \ne \dfrac{\pi}{2} \\ p^2 - 1 \quad ; x = \dfrac{\pi}{2} \end{cases}$

Then the value of p for which f(x) is continuous at $x = \dfrac{\pi}{2}$, is

([.] denotes greatest integer function)

(A) 1 (B) – 1 (C) $\sqrt{2}$ (D) 0

13. Let $f(x) = \begin{cases} x^2 \sin\dfrac{1}{x} \text{ if } x \ne 0 \\ 0 \quad \text{if } x = 0 \end{cases}$ and g(x) = sin x which of the following is incorrect?

(A) f (x) is differentiable at x = 0
(B) f(x) is continuous at x = 0
(C) $\lim\limits_{x \to 0} \dfrac{f(x)}{g(x)}$ does not exist
(D) None of these

14. Let $f : R \to R$ be differential function satisfying $f\left(\dfrac{x+y}{3}\right) = \dfrac{2 + f(x) + f(y)}{3}$ for all real x & y & f′(2) = 2 If. g(x) = $|f(|x|) - 3|$ for all $x \in R$, then for g(x) total non-different table points are

(A) 1 (B) 3 (C) 4 (D) 9

15. Number of points of non-differentiability of $f(x) = \left\{\dfrac{x}{5}\right\} + \left[\dfrac{x}{2}\right]$ in $x \in [0,100]$ is/are (where[.] denotes greatest integer function and {.} denotes fractional part function)

(A) 50 (B) 51 (C) 52 (D) 61

16. If $f(x) = \left(\tan\left(\dfrac{\pi}{4} + \ell nx\right)\right)^{\log_x e}$ is to be made continuous at x = 1, then f(1) should be equal to

(A) e^2 (B) e (C) 1/e (D) $1/e^2$

17. The function $f(x) = \text{sgn}(x-1).\cot^{-1}[x-1]$ is ([x] denotes greatest integer function of x)

(A) Discontinuous at $x = 1$
(B) Continuous and differentiable at $x = 1$
(C) Not defined at $x = 1$
(D) Continuous but not differentiable at $x = 1$

18. Let $f : R \to R$ be defined by $f(x) = \begin{cases} \{x\}, & \text{if } x \in Q \\ x - 2 & \text{if } x \in R - Q \end{cases}$

Then set of values of 'x'for which f(x) is differentiable

[Note : {k} denotes the fractional part of k and Q be the set of all rational numbers.]

(A) (2, 3) (B) [2, 3] (C) (0, 1) (D) None of these

19. If $f(x)=\left[\tan^2\left(x-\frac{\pi}{4}\right)\right]$, where [x] is greatest integer function, then

(A) f(x) is continuous at x = 0

(B) f(x) is differentiable at $x=\frac{\pi}{2}$

(C) f(x) is continuous in $\left(0,\frac{\pi}{2}\right)$

(D) f(x) is differentiable in $\left(-\frac{\pi}{4},\frac{\pi}{4}\right)$

20. The function $f(x)=\min\{|x|-1,|x-2|-1,|x-1|-1\}$ is not differentiable at

(A) 2 points (B) 5 points (C) 4 points (D) 3 points

NUMERICAL BASED

21. $\lim_{n\to\infty}\left[\left((2018)^{2019}\right)^n+\left((2019)^{2018}\right)^n\right]^{\frac{1}{n}}$ is equal to a^b and $a,b\in N$ then the value of $|a-b|$ is…..(select a and b such that $|a-b|$ value should lie from 0 to 9)

22. If the equation $\left||x-1|-6\lim_{t\to\infty}\left(\frac{\sqrt{2t^2-t-1}-\sqrt{t^2-t+1}}{t\left(\tan\frac{\pi}{8}\right)}\right)\right|=2k$ has four distinct solutions then the number of integral values of k is,

23. Total number of points where $f(x)=\left[\tan^{-1}2x-\tan^{-1}x\right]$ is not differentiable is (where $[\cdot]$ is greatest integer function)

24. Let $f(x)=\begin{cases}ax^{2018}-bx^{2017}-10cx^{2016}+5a & x<1\\ x^2+31x-29 & 1\le x\le 2\\ ax^3+(b+c)x^2+3b-3a+c & x>2\end{cases}$ is a continuous function $\forall x\in R$ and a, b, c are non-negative integers then the value of $a+b+c$ is

25. The function $f(x)=\begin{cases}(-1)^{[x^2]} & ; x<0\\ \lim_{n\to\infty}\left(\frac{1}{1+x^n}\right) & ; x\ge 0\end{cases}$, then the number of integral value(s) of x in $[-2,5]$ where $f(x)$ is discontinuous is (are) (where $[\cdot]$ denotes greatest integer function)

KEY

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

❇ *Wish You all the Best* ❇