1. $\lim\limits_{x\to 0}\dfrac{\sin(x^{1/3})\,\ell n(1+3x)}{(\tan^{-1}\sqrt{x})^2\,(e^{5x^{1/3}}-1)}$ =

(1) $\frac{3}{5}$ (2) $\frac{1}{5}$ (3) $\frac{2}{5}$ (4) $\frac{5}{3}$

2. $\lim\limits_{x\to 0}\left(\dfrac{x-\int_0^x \cos t^2 dt}{x^3-6x}\right)$ equals

(1) 0 (2) $\frac{1}{2}$ (3) -2 (4) $-\frac{1}{6}$

3. $\lim\limits_{x\to 0}\left(\dfrac{5}{2+\sqrt{9+x}}\right)^{1/\sin x}$ is equal to

(1) $e^{-\frac{1}{3}}$ (2) $e^{\frac{1}{3}}$ (3) e^{-30} (4) $e^{-\frac{1}{30}}$

4. If $\lim\limits_{x\to a}(f(x)+g(x))$ exists finitely then

(1) Only $\lim\limits_{x\to a} f(x)$ exist

(2) Only $\lim\limits_{x\to a} g(x)$ exist

(3) Both must be exist

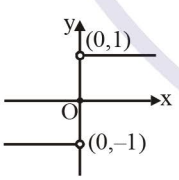
(4) Both may not be exist

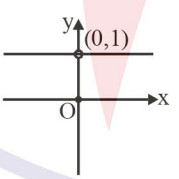
5. $\lim\limits_{n\to\infty}\left(\frac{1}{2.5}+\frac{1}{5.8}+\frac{1}{8.11}+....+n\text{ terms}\right)$ equals

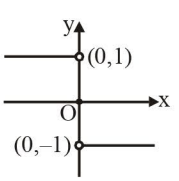
(1) $\frac{1}{2}$ (2) $\frac{1}{3}$ (3) $\frac{1}{10}$ (4) $\frac{1}{6}$

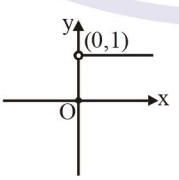
6. Which of the following is the graph of the function

$f(x)=\lim\limits_{n\to\infty}\frac{2}{\pi}\tan^{-1}(nx)$

(1) 

(2) 

(3) 

(4) 

7. $\lim\limits_{x\to 2}\dfrac{(\cos\alpha)^x+(\sin\alpha)^x-1}{x-2}=$

(1) $(\cos^2\alpha)\,\ell n\cos\alpha+(\sin^2\alpha)\,\ell n\sin\alpha$

(2) 1

(3) $\ell n((\cos\alpha)(\sin\alpha))$

(4) $\ell n((\sin^2\alpha)\times(\cos^2\alpha))$

8. $\lim\limits_{x\to\frac{\pi}{2}^+} e^{[\cot x]}$ is equal to

(where [.] is greatest integer function)

(1) e (2) 1 (3) 0 (4) $\frac{1}{e}$

9. $\lim\limits_{x\to a^+}\dfrac{|x|^3}{a}-\left[\dfrac{x}{a}\right]^3$ $(a>0)$; is equal to

(where [x] is greatest integer function and |x| is modulus function)

(1) a^2-3 (2) a^2-1

(3) a^2 (4) Does not exist

10. Let a = Minimum $\{x^2+2x+3,\ x\in R\}$

and b = $\lim\limits_{\theta\to 0}\dfrac{1-\cos\theta}{\theta^2}$ The value of $\sum\limits_{r=0}^{n} a^r.b^{n-r}$ is

(1) $\dfrac{2^{n+1}-1}{3.2^n}$ (2) $\dfrac{2^{n+1}+1}{3.2^n}$

(3) $\dfrac{4^{n+1}-1}{3.2^n}$ (4) None of these

11. If $\lim\limits_{x\to 0}\phi(x)=a^3$, $(a\neq 0)$; then $\lim\limits_{x\to 0}\phi\left(\dfrac{x}{a}\right)$ is equal to

(1) $\frac{1}{a^3}$ (2) a^3 (3) a^2 (4) $\frac{1}{a^2}$

12. If f(x) = Sgn(Sgn(Sgn(x))), then $\lim\limits_{x\to 0} f(x)$ is equal to

(1) 1 (2) -1

(3) 0 (4) does not exist

13. $\lim\limits_{x\to 0}\left(\dfrac{a^x+b^x+c^x}{3}\right)^{2/x}$ is equal to

(1) $a^{2/3}+b^{2/3}+c^{2/3}$ (2) abc

(3) $(abc)^{2/3}$ (4) 1

14. If L = $\lim\limits_{x\to 0}\dfrac{2-\sqrt{4-x^2}-\frac{x^2}{4}}{x^4}$ then L =

(1) 1/2 (2) 1/4 (3) 1/8 (4) 1/64

15. $\lim\limits_{x\to 0}\dfrac{(3\sin x-\sin 3x)^4}{(\sec x-\cos x)^6}$ is equal to

(1) 96 (2) 144 (3) 216 (4) 256

16. If the value of $\lim\limits_{x\to 0^+}\left(\dfrac{(3/x)+1}{(3/x)-1}\right)^{1/x}$ can be expressed in the form of $e^{p/q}$, where p and q are relative prime then (p + q) is equal to

(1) 2 (2) 3 (3) 4 (4) 5

17. $\lim\limits_{x\to\infty} 2^{x-1}\left(\sin\frac{\pi}{2^x}+\tan\frac{\pi}{2^x}\right)$ is equal to

(1) 0 (2) 1 (3) π (4) $\frac{\pi}{2}$

18. $\lim\limits_{x\to\frac{\pi}{4}} \frac{\int_{2}^{\sqrt{2}\sec x} f(t)\,dt}{\left(x^2-\frac{\pi^2}{16}\right)}$ equals

(1) $\frac{8}{\pi}f(2)$ (2) $\frac{2}{\pi}f(2)$ (3) $\frac{2}{\pi}f(\sqrt{2})$ (4) $\frac{4}{\pi}f(2)$

19. If $L = \lim\limits_{x\to 0}\frac{x(1-\cos x)-ax^2\sin x}{x^5}$ exists finitely, then a & L equals

(1) a = 1, L = $\frac{1}{12}$ (2) a = $\frac{1}{2}$, L = $\frac{1}{24}$

(3) a = $\frac{1}{3}$, L = $\frac{1}{24}$ (4) a = $\frac{1}{4}$, L = $\frac{1}{12}$

20. The value of $\lim\limits_{x\to 0}\left(\left[\frac{100x}{\sin x}\right]+\left[\frac{99\sin x}{x}\right]\right)$ is (where **[.]** is greatest integer function)

(1) 199 (2) 198
(3) 0 (4) does not exist

21. $\lim\limits_{x\to 0}\frac{10^x-2^x-5^x+1}{x\tan x}=$

(1) ln 7 (2) (ln 5) (ln 2)

(3) ln 10 (4) $\ln\left(\frac{5}{2}\right)$

22. For x > 0, $\lim\limits_{x\to 0}\left((\sin x)^{\frac{1}{x}}+\left(\frac{1}{x}\right)^{\sin x}\right)$ is equal to

(1) 0 (2) –1 (3) 1 (4) 2

23. $\lim\limits_{x\to-\infty}\frac{\sqrt{3x^2-1}-\sqrt{2x^2-1}}{4x+3}$ equals

(1) $\frac{\sqrt{2}-\sqrt{3}}{4}$ (2) $\frac{\sqrt{3}-\sqrt{2}}{4}$

(3) 0 (4) 1

24. $\lim\limits_{x\to\pi/4}\frac{1-\cot^3 x}{2-\cot x-\cot^3 x}$ equals

(1) $\frac{3}{4}$ (2) $-\frac{3}{4}$ (3) $\frac{4}{3}$ (4) 3

25. $\lim\limits_{x\to 0}\left(\frac{1+2^x+2^{2x}}{3}\right)^{\frac{1}{x}}$ equals

(1) $\sqrt{2}$ (2) $\frac{1}{2}$ (3) 2 (4) $5^{\frac{1}{3}}$

26. If f(x+y) = f(x) + f(y) ; $\forall$ x, y $\in$ R and f(1) = 1, then $\lim\limits_{x\to 0}\frac{2^{f(\tan x)}-2^{f(\sin x)}}{x^2 f(\sin x)}$ equals

(1) $\frac{1}{2}\ell n\ 2$ (2) $-\frac{1}{2}\ell n\ 2$ (3) $\ell n\ 2$ (4) $\frac{1}{2}$

27. The value of

$\lim\limits_{n\to\infty} n^2\left\{\sqrt{\left(1-\cos\frac{1}{n}\right)\sqrt{\left(1-\cos\frac{1}{n}\right)\sqrt{\left(1-\cos\frac{1}{n}\right)\ldots\infty}}}\right\}$ is

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

28. If $f(n+1)=\frac{1}{2}\left\{f(n)+\frac{9}{f(n)}\right\}$, $n\in N$ and f(n) > 0 for all n $\in$ N then $\lim\limits_{n\to\infty} f(n)$ is equal to

(1) 3 (2) –3 (3) $\frac{1}{2}$ (4) 0

29. Let $f:(1,\infty)\longrightarrow(0,\infty)$ be a continuous decreasing function with $\lim\limits_{x\to\infty}\frac{f(4x)}{f(8x)}=1$ then $\lim\limits_{x\to\infty}\frac{f(6x)}{f(8x)}$ is equal to

(1) $\frac{4}{8}$ (2) $\frac{4}{6}$ (3) $\frac{6}{8}$ (4) 1

30. It f(x) is differentiable function at every where.

$\lim\limits_{x\to 0}\left(\frac{f(x)+f\left(\frac{x}{2}\right)+f\left(\frac{x}{2^2}\right)+\ldots..+\text{upto }\infty\text{ terms}}{x}\right)$

is equal to : (where f(0) = 0 & f'(0) = 1)

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

ANSWER KEY — Exercise-I

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