1. The values of $\lim_{x\to 0}\frac{(1-\cos 2x)\sin 5x}{x^2\sin 3x}$ is-

[AIEEE - 2002]

(1) 10/3 (2) 3/10 (3) 6/5 (4) 5/6

2. $\lim_{x\to\infty}\left(\frac{x^2+5x+3}{x^2+x+3}\right)^x =$

[AIEEE - 2002]

(1) e^4 (2) e^2 (3) e^3 (4) e

3. $\lim_{x\to\infty}\frac{\ell n x^n-[x]}{[x]}$, $n \in N$, (where [x] denotes greatest integer less than or equal to x) **[AIEEE - 2002]**

(1) Has value -1 (2) Has values 0

(3) Has value 1 (4) Does not exist

4. Let f(a) = g(a) = k and their n^{th} derivatives $f^n(a)$, $g^n(a)$ exist and are not equal for some n. Further it $\lim_{x\to a}\frac{f(a)g(x)-f(a)-g(a)f(x)+g(a)}{g(x)-f(x)} = 4$ then the value of k is **[AIEEE - 2003]**

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

5. If $\lim_{x\to 0}\frac{\log(3+x)-\log(3-x)}{x} = k$, the value of k is-

[AIEEE - 2003]

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

6. $\lim_{x\to\pi/2}\frac{\left[1-\tan\left(\frac{x}{2}\right)\right][1-\sin x]}{\left[1+\tan\left(\frac{x}{2}\right)\right][\pi-2x]^3}$ is- **[AIEEE - 2003]**

(1) ∞ (2) $\frac{1}{8}$ (3) 0 (4) $\frac{1}{32}$

7. If $\lim_{x\to\infty}\left(1+\frac{a}{x}+\frac{b}{x^2}\right)^{2x} = e^2$, then the values of a and b, are- **[AIEEE - 2004]**

(1) $a \in R$, $b \in R$ (2) $a = 1$, $b \in R$

(3) $a \in R$, $b = 2$ (4) $a = 1$ and $b = 2$

8. Let α and β be the distinct roots of $ax^2 + bx + c = 0$, then $\lim_{x\to\alpha}\frac{1-\cos(ax^2+bx+c)}{(x-\alpha)^2}$ is equal to-

[AIEEE - 2005]

(1) $\frac{a^2}{2}(\alpha-\beta)^2$ (2) 0

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

9. Let $f : R \to R$ be a positive increasing function with $\lim_{x\to\infty}\frac{f(3x)}{f(x)} = 1$. Then $\lim_{x\to\infty}\frac{f(2x)}{f(x)} =$

[AIEEE-2010]

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

10. $\lim_{x\to 2}\left(\frac{\sqrt{1-\cos\{2(x-2)\}}}{x-2}\right)$ **[AIEEE-2011]**

(1) equals $-\sqrt{2}$ (2) equals $\frac{1}{\sqrt{2}}$

(3) does not exist (4) equals $\sqrt{2}$

11. Let $f : R \to [0, \infty)$ be such that $\lim_{x\to 5} f(x)$ exists and $\lim_{x\to 5}\frac{(f(x))^2-9}{\sqrt{|x-5|}} = 0$. Then $\lim_{x\to 5} f(x)$ equal:

[AIEEE-2011]

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

12. $\lim_{x\to 0}\left(\frac{x-\sin x}{x}\right)\sin\left(\frac{1}{x}\right)$ **[AIEEE-2012(Online)]**

(1) Equals –1 (2) Equals 1

(3) Does not exist (4) Equals 0

13. If $f(x) = 3x^{10} - 7x^8 + 5x^6 - 21x^3 + 3x^2 - 7$, then $\lim_{\alpha\to 0}\frac{f(1-\alpha)-f(1)}{\alpha^3+3\alpha}$ is **[AIEEE-2012(Online)]**

(1) $\frac{-53}{3}$ (2) $\frac{55}{3}$ (3) $\frac{53}{3}$ (4) $\frac{-55}{3}$

14. $\lim_{x\to 0}\frac{(1-\cos 2x)(3+\cos x)}{x\tan 4x}$ is equal to

[JEE(MAIN)-2013, 2015]

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

15. The value of $\lim_{x\to 0}\frac{1}{x}\left[\tan^{-1}\left(\frac{x+1}{2x+1}\right)-\frac{\pi}{4}\right]$ is :

[JEE(Main)-2013(Online)]

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

16. $\lim_{x\to 0}\frac{\sin(\pi\cos^2 x)}{x^2}$ is equal to :

[JEE Mains Offline-2014]

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

17. If $\lim_{x\to 2}\frac{\tan(x-2)\{x^2+(k-2)x-2k\}}{x^2-4x+4}=5$ then k is equal to **[JEE Mains Online-2014]**

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

18. Let $p=\lim_{x\to 0+}\left(1+\tan^2\sqrt{x}\right)^{\frac{1}{2x}}$ then log p is equal to-

[JEE(Main)-2016]

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

19. $\lim_{x\to\frac{\pi}{2}}\frac{\cot x-\cos x}{(\pi-2x)^3}$ equals **[JEE(Main)-2017]**

(1) $\frac{1}{4}$ (2) $\frac{1}{24}$ (3) $\frac{1}{16}$ (4) $\frac{1}{8}$

20. $\lim_{x\to 0}\frac{a^{\tan x}-a^{\sin x}}{\tan x-\sin x}$, a > 0 equals **[REE 2001]**

(1) 1 (2) 2 (3) ℓna (4) aℓna

21. $\lim_{x\to 0}\left(\tan\left(\frac{\pi}{4}+x\right)\right)^{1/x}$ = **[IIT - 1993]**

(1) 1 (2) –1 (3) e^2 (4) e

22. $\lim_{x\to 0}\left(\frac{1+5x^2}{1+3x^2}\right)^{1/x^2}$ = **[IIT - 1996]**

(1) e^2 (2) e (3) e^{-2} (4) e^{-1}

23. The value of $\lim_{h\to 0}\frac{\ell n(1+2h)-2\ell n(1+h)}{h^2}$ is **[IIT - 1997]**

(1) 1 (2) –1 (3) 0 (4) none

24. $\lim_{x\to 0}\frac{x\tan 2x-2x\tan x}{(1-\cos 2x)^2}$ is **[IIT - 1999]**

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

25. The integer n for which $\lim_{x\to 0}\frac{(\cos x-1)(\cos x-e^x)}{x^n}$ is a finite non-zero number is :- **[IIT 2002 (screening)]**

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

26. If $\lim_{x\to 0}\frac{\sin(nx)[(a-n)nx-\tan x]}{x^2}=0$ (n > 0) then the value of 'a' is equal to :- **[IIT 2003 (screening)]**

(1) $\frac{1}{n}$ (2) n^2+1 (3) $\frac{n^2+1}{n}$ (4) None

27. If $\lim_{x\to 0}\left[1+x\ell n(1+b^2)\right]^{\frac{1}{x}}=2b\sin^2\theta, b>0$ and $\theta\in(-\pi,\pi]$, then the value of θ is- **[IIT 2011]**

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

28. If $\lim_{x\to\infty}\left(\frac{x^2+x+1}{x+1}-ax-b\right)=4$, then - **[IIT 2012]**

(1) a = 1, b = 4 (2) a = 1, b = –4
(3) a = 2, b = –3 (4) a = 2, b = 3

29. Let $\alpha(a)$ and $\beta(a)$ be the roots of the equation $\left(\sqrt[3]{1+a}-1\right)x^2+\left(\sqrt{1+a}-1\right)x+\left(\sqrt[6]{1+a}-1\right)=0$ where a > –1. Then $\lim_{a\to 0^+}\alpha(a)$ and $\lim_{a\to 0^+}\beta(a)$ are **[IIT 2012]**

(1) $-\frac{5}{2}$ and 1 (2) $-\frac{1}{2}$ and –1

(3) $-\frac{7}{2}$ and 2 (4) $-\frac{9}{2}$ and 3

30. The largest value of the non-negative integer a for which $\lim_{x\to 1}\left\{\frac{-ax+\sin(x-1)+a}{x+\sin(x-1)-1}\right\}^{\frac{1-x}{1-\sqrt{x}}}=\frac{1}{4}$ is **[JEE(Advanced)-2014]**

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

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