CTQ - 2023

CTQ : Concept Through Questions **Year : 2023**

Topic : Limit I

1. $\lim_{x\to 0}\frac{\sin x^n}{(\sin x)^m}, (m<n)$ is equal to
   (a) 1 (b) 0
   (c) n/m (d) None of these Video Solution
2. If $f(9)=9, f'(9)=4$, then $\lim_{x\to 9}\frac{\sqrt{f(x)}-3}{\sqrt{x}-3}$ equals
   (a) 4 (b) 0
   (c) c (d) 9 Video Solution
3. The value of $\lim_{n\to\infty}\left(cos\frac{x}{n}\right)^n$, is
   (a) e (b) e^{-1}
   (b) 1 (d) None of these Video Solution
4. The value of $\lim_{x\to 0}\frac{\sqrt[3]{1+\sin x}-\sqrt[3]{1-\sin x}}{x}$, is
   (a) 2/3 (b) (-2)/3
   (c) 3/2 (d) (-3)/2 Video Solution
5. $\lim_{x\to 0}\frac{e^{\frac{1}{x}}}{e^{\frac{1}{x}}+1}$ is equal to
   (a) 0 (b) 1
   (c) Does not exist (d) None of these Video Solution
6. The value of $\lim_{x\to 0}\frac{\cos(\sin x)-\cos x}{x^4}$ is equal to
   (a) 1/5 (b) 1/6
   (c) 1/4 (d) 1/2 Video Solution
7. $\lim_{x\to 0}\frac{3x+|x|}{7x-|x|}$, is
   (a) 2 (b) 1/6
   (c) 0 (d) None of these Video Solution
8. The value of $\lim_{x\to 0}\frac{x^2\sin\left(\frac{1}{x}\right)}{\sin x}$, is
   (a) 1 (b) 0
   (c) 1/2 (d) None of these Video Solution
9. $\lim_{x\to\infty}\left(\frac{3x^2+2x+1}{x^2+x+2}\right)^{\frac{6x+1}{3x+2}}$ is equal to
   (a) 3 (b) 6
   (c) 9 (d) None of these Video Solution
10. If $x_1=3$ and $x_{n+1}=\sqrt{2+x_n}$, n≥1, then $\lim_{n\to\infty} x_n$ is equal to

(a) -1 (b) 2
(c) $\sqrt{5}$ (d) 3 Video Solution

11. Let $f: R \to R$ be a differentiable function and $f(1) = 4$. Then, the value of $\lim_{x\to 1} \frac{\int_4^{f(x)} 2t}{x-1} dt$, if $f'(1) = 2$ is
(a) 16 (b) 8
(c) 4 (d) 2 Video Solution

12. The value of $\lim_{x\to 0} \left\{\frac{\sin x - x + \frac{x^3}{6}}{x^5}\right\}$ is
(a) 0 (b) 1
(c) 1/60 (d) 1/120 Video Solution

13. If $a_1 = 1$ and $a_{n+1} = \frac{(4+3a_n)}{3+2a_n}, n \geq 1$ and if $\lim_{n\to\infty} a_n = a$, then the value of a is
(a) $\sqrt{2}$ (b) $-\sqrt{2}$
(c) 2 (d) None of these Video Solution

14. If $\lim_{x\to\infty} \{\sqrt{x^2 - x + 1} - ax - b\} = 0$, then
(a) $a = 1, b = 1/2$ (b) $a = 1, b = -1/2$
(c) $a = -1, b = 1/2$ (d) None of these Video Solution

15. $\lim_{x\to 0} \frac{x \tan 2x - 2x \tan x}{(1-\cos 2x)^2}$, is
(a) 2 (b) -2
(c) 1/2 (d) -1/2 Video Solution

16. $\lim_{n\to\infty} \left\{\frac{1}{1-n^2} + \frac{2}{1-n^2} + \frac{3}{1-n^2} + \cdots + \frac{n}{1-n^2}\right\}$ is equal to
(a) 0 (b) -1/2
(c) 1/2 (d) 1 Video Solution

17. The value of $\lim_{n\to\infty} \frac{\sqrt{n^2+1}+\sqrt{n}}{\sqrt[4]{n^3+n}-\sqrt[4]{n}}$, is
(a) 0 (b) 1
(c) -1 (d) None of these Video Solution

18. Let α and β be the roots of a $x^2 + bx + c = 0$, then $\lim_{x\to a} \frac{1-\cos(a x^2+bx+c)}{(x-\alpha)^2}$ is equal to
(a) 0 (b) $\frac{1}{2}(\alpha - \beta)^2$
(c) $\frac{\alpha^2}{2}(\alpha - \beta)^2$ (d) $-\frac{\alpha^2}{2}(\alpha - \beta)^2$ Video Solution

19. If $\lim_{x\to 1} \frac{ax^2+bx+c}{(x-1)^2} = 2$, then (a, b, c) is
(a) (2, -4, 2) (b) (2, 4, 2)
(c) (2, 4, -2) (d) (2, -4, -2) Video Solution

20. If [x] denotes the greatest integer less than or equal to x, then the value of $\lim_{x\to 1}\{1 - x + [x - 1] + [1 - x]\}$ is
(a) 0 (b) 1
(c) -1 (d) None of these Video Solution

21. Let $f: R \to R$ be a differentiable function having $f(2) = 6, f'(2) = \left(\frac{1}{48}\right)$. Then, $\lim_{x\to 2} \frac{\int_6^{f(x)} 4t^3\, dt}{x-2}$ is equals

(a) 18 (b) 12
(c) 36 (d) 24 Video Solution

22. If $f(x) = \sqrt{\frac{x-\sin x}{x+\cos^2 x}}$, then $\lim_{x\to\infty} f(x)$ is
(a) 0 (b) ∞
(c) 1 (d) None of these Video Solution

23. $\lim_{x\to 0}\left\{\frac{1^x+2^x+3^x+\cdots+n^x}{n}\right\}^{\frac{1}{x}}$ is equal to
(a) $(n!)^n$ (b) $(n!)^{\frac{1}{n}}$
(c) n! (d) $ln\ n!$ Video Solution

24. 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:
(a) 1 (b) 2
(c) 3 (d) 4 Video Solution
[NIMCET 2008]

25. If f(x)=$\begin{cases} x\sin\left(\frac{1}{x}\right) & for\ x\neq 0 \\ 0 & for\ x=0 \end{cases}$ then
(a) f is a continuous function at x=0
(b) $f'(0^+)$ exists but $f'(0^-)$ does not exist
(c) $f'(0^+)\neq f'(0^-)$
(d) $f'(0^+)$ and $f'(0^-)$ do not exist Video Solution
[NIMCET 2010]

26. $\lim_{x\to 0}\left[\frac{\tan x-x}{x^2\tan x}\right]$ is equal to
(a) 0 (b) 1
(c) 1/2 (d) 1/3 Video Solution
[NIMCET 2013]

27. If $f(x) = \begin{cases} \frac{\sin[x]}{[x]}, & [x]\neq 0 \\ 0, & [x]=0 \end{cases}$, where [x] is the largest integer but not larger than x, then $\lim_{x\to 0} f(x)$ is
(a) – 1 (b) 0
(c) 1 (d) None of these Video Solution
[NIMCET 2014]

28. The value of $\lim_{x\to a}\frac{\sqrt{a+2x}-\sqrt{3x}}{\sqrt{3a+x}-2\sqrt{x}}$ is
(a) 2/3 (b) $2/\sqrt{3}$
(c) $(3\sqrt{3})/2$ (d) $2/(3\sqrt{3})$ Video Solution
[NIMCET 2015]

29. Consider the function f defined by $f(x) = \begin{cases} x^2-1 & x<3 \\ 2ax & x\geq 3 \end{cases}$ for all real numbers x. If f is continuous at x=3, then value of a
(a) 8 (b) 3/4
(c) 1/8 (d) 4/3 Video Solution

[NIMCET 2017]

30. Evaluate $\lim_{x\to 0} \frac{x \tan x}{(1-\cos x)}$

(a) 1/2 (b) -1/2
(c) -2 (d) 2 Video Solution

[NIMCET 2017]

31. Let f(x) be a polynomial of degree four, having extreme value at x=1 and $x = 2$. If $\lim_{x\to 0}\left[1+\frac{f(x)}{x^2}\right] = 3$, then $f(2) =$

(a) 0 (b) 4
(c) – 8 (d) – 4 Video Solution

[NIMCET 2017]

32. $f(x) = x + |x|$ is continuous for

(a) $x \in (-\infty, \infty)$ (b) $x \in (-\infty, \infty) - \{0\}$
(c) Only x>0 (d) No value of x Video Solution

[NIMCET 2018]

33. If $\lim_{x\to\infty}\left(1+\frac{a}{x}+\frac{b}{x^2}\right)^{2x} = e^2$, then the value of a and b are

(a) $a \in R, b = 2$ (b) $a = 1, b \in R$
(c) $a \in R, b \in R$ (d) None of these Video Solution

[NIMCET 2018]

34. The set of points, where $f(x) = \frac{x}{1+|x|}$ is differentiable, is

(a) (-,∞-1)∪(-1,-∞) (b) (-∞,∞)
(c) (0,∞) (d) (-∞,0)∪(0,∞) Video Solution

[NIMCET 2018]

35. $\lim_{x\to 3} \frac{\sqrt{3x}-3}{\sqrt{2x-4}-\sqrt{2}}$ is equal to

(a) $\sqrt{3}$ (b) $\frac{\sqrt{3}}{2}$
(c) $\frac{1}{2\sqrt{2}}$ (d) $1/\sqrt{2}$ Video Solution

[NIMCET 2019]

Answer Key

Ques.	1	2	3	4	5	6	7	8	9	10
Ans.	B	A	C	A	D	B	D	B	C	B
Ques.	11	12	13	14	15	16	17	18	19	20
Ans.	A	D	A	B	C	B	D	C	A	C
Ques.	21	22	23	24	25	26	27	28	29	30
Ans.	A	C	B	C	A	D	A	D	D	D
Ques.	31	32	33	34	35					
Ans.	A	A	B	B	D					