Multiple Choice Questions

[MHT-CET 2022]
(online shift)
(Memory Based Questions)

1. $\lim\limits_{x \to 0} \dfrac{2x}{|x|+x^2} =$

a) 2
b) limit exists
c) limit does not exist
d) -2

2. $\lim\limits_{x \to 0} \left(\dfrac{1+\tan x}{1+\sin x}\right)^{\operatorname{cosec} x} =$

a) 0 b) e c) 1 d) $\dfrac{1}{e}$

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

a) $(\log 2)^2$ b) $\dfrac{1}{2}(\log 2)^2$ c) $2\log 2$ d) $2(\log 2)^2$

4. $\lim\limits_{x \to 0} \dfrac{\sin^2 x}{\sqrt{2}-\sqrt{1+\cos x}} =$

a) 4 b) $\sqrt{2}$ c) $4\sqrt{2}$ d) $2\sqrt{2}$

5. Let $f(x) = 5 - |x-2|$ and $g(x) = |x+1|$, $x \in R$. If $f(x)$ attains maximum value at α and $g(x)$ attains minimum value at β, then

$\lim\limits_{x \to -\alpha\beta} \dfrac{(x-1)\left(x^2-5x+6\right)}{x^2-6x+8} =$

a) $\dfrac{1}{2}$ b) $\dfrac{3}{4}$ c) $\dfrac{7}{2}$ d) $\dfrac{8}{3}$

6. $\lim\limits_{x \to 0} \dfrac{27^x-9^x-3^x+1}{\sqrt{5}-\sqrt{4+\cos x}} =$

a) $8\sqrt{5}\log 3$ b) $\sqrt{5}(\log 3)^2$ c) $8\sqrt{5}(\log 3)^2$ d) $16\sqrt{5}(\log 3)$

7. $\lim\limits_{x \to \infty} \left[\dfrac{8x^2+5x+3}{2x^2-7x-5}\right]^{\frac{4x+3}{8x-1}} =$

a) 4 b) $\sqrt{2}$ c) 2 d) $\dfrac{1}{2}$

16. $\lim_{x\to 5} \frac{x^K - 5^K}{x-5} = 500$, then the value of K, where $K \in N$ is

a) 5 b) 3 c) 4 d) 6

17. $\lim_{x\to 0} \frac{\cos(mx)-\cos(nx)}{x^2} =$

a) $\frac{m^2-n^2}{2}$ b) m^2-n^2 c) $\frac{n^2-m^2}{2}$ d) n^2-m^2

18. $\lim_{x\to 2} (x-1)^{\frac{1}{3x-6}} =$

a) e^2 b) e^3 c) $e^{\frac{1}{3}}$ d) $e^{\frac{1}{2}}$

19. $\lim_{x\to 1} \left[\frac{\sqrt{x}-1}{\log x}\right] =$

a) $\frac{1}{2}$ b) 2 c) -2 d) $-\frac{1}{2}$

20. $\lim_{x\to 1} \frac{ab^x - a^x b}{x^2-1} =$

a) $-\frac{ab}{2}\log\left(\frac{b}{a}\right)$ b) $\frac{ab}{2}\log\left(\frac{b}{a}\right)$ c) $ab\log\left(\frac{b}{a}\right)$ d) $-ab\log\left(\frac{b}{a}\right)$

21. $\lim_{x\to 0} \frac{\sqrt{1-\cos x^2}}{1-\cos x} =$

a) $\sqrt{2}$ b) $\frac{1}{\sqrt{2}}$ c) 0 d) $\frac{1}{2}$

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22. Let $f(x) = 5 - |x-2|$ and $g(x) = |x+1|$, $x \in R$. If $f(x)$ attains maximum value at α and $g(x)$ attains minimum value at β, then $\lim_{x\to -\alpha\beta}\left(\frac{(x-1)(x^2-5x+6)}{x^2-6x+8}\right) =$

a) $-\frac{1}{2}$ b) $-\frac{3}{2}$ c) $\frac{1}{2}$ d) $\frac{3}{2}$

32. $\lim_{n\to\infty}\left(\left(2^{\frac{1}{2}}-2^{\frac{1}{3}}\right)\left(2^{\frac{1}{2}}-2^{\frac{1}{5}}\right)\ldots\left(2^{\frac{1}{2}}-2^{\frac{1}{2n+1}}\right)\right)=$

a) 1 b) 0 c) $\sqrt{2}$ d) $\frac{1}{\sqrt{2}}$

33. $\lim_{x\to\infty} x^3\left(\sqrt{x^2+\sqrt{1+x^4}}-x\sqrt{2}\right)=$

a) $\frac{1}{\sqrt{2}}$ b) $\frac{1}{4\sqrt{2}}$ c) $-\frac{1}{\sqrt{2}}$ d) $-\frac{1}{4\sqrt{2}}$

34. Let $a_1, a_2, a_3, \ldots, a_n$ be n positive consecutive terms of an arithmetic progression. If $d>0$ is its common difference, then $\lim_{n\to\infty}\sqrt{\frac{d}{n}}\left(\frac{1}{\sqrt{a_1}+\sqrt{a_2}}+\frac{1}{\sqrt{a_2}+\sqrt{a_3}}+\ldots+\frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}}\right)$ is

a) $\frac{1}{\sqrt{d}}$ b) $\sqrt{d}$ c) 1 d) 0

[MHT-CET 2024]
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35. If $\lim_{x\to1}\left(\frac{x^2-ax+b}{x-1}\right)=7$, then $(a+b)$ equal to

a) -11 b) -1 c) 1 d) 11

36. $\lim_{x\to2}\left(\frac{5^x+5^{3-x}-30}{5^{3-x}-5^{\frac{x}{2}}}\right)=$

a) $-\frac{16}{3}$ b) $-\frac{8}{3}$ c) $\frac{8}{3}$ d) $\frac{16}{3}$

37. $\lim_{x\to1}\left(\frac{2x-2}{\sqrt[3]{26+x}-3}\right)=$

a) 6 b) 9 c) 27 d) 54

38. 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 $\lim_{a\to0^+}\alpha(a)$ and $\lim_{a\to0^+}\beta(a)$ respectively are

a) -1 and $-\frac{1}{2}$ b) 1 and $-\frac{5}{2}$ c) 2 and $-\frac{7}{2}$ d) 3 and $-\frac{9}{2}$

39. $\lim_{y\to0}\left(\frac{\sqrt{1+\sqrt{1+y^4}}-\sqrt{2}}{y^4}\right)=$

a) exists and equals $\frac{1}{4\sqrt{2}}$

b) does not exist

c) exists and equals $\frac{1}{2\sqrt{2}}$

d) exists and equals $\frac{1}{2\sqrt{2}\left(\sqrt{2}+1\right)}$

40. If $L = \lim_{x \to 0}\left(\frac{x}{|x|+x^2}\right)$, then the value of L is

a) -1 b) 1 c) 2 d) non-existant

41. For each $x \in R$, let $[x]$ represent greatest integer function, the

$\lim_{x \to 0^-}\left(\frac{x\left([x]+|x|\right)\sin[x]}{|x|}\right) =$

a) 0 b) 1 c) $-\sin 1$ d) $\sin 1$

42. $\lim_{x \to 0}\left(\frac{\sin\left(\pi\cos^2 x\right)}{x^2}\right) =$

a) π b) $-\pi$ c) $\frac{\pi}{2}$ d) $-\frac{\pi}{2}$

43. $\lim_{x \to 0}\left(\frac{x\cot 4x}{\sin^2 x \cdot \cot^2 2x}\right) =$

a) 0 b) $\frac{1}{4}$ c) 1 d) 4

44. $\lim_{x \to 0}\left(\frac{x\tan 2x - 2x\tan x}{(1-\cos 2x)^2}\right) =$

a) -2 b) 2 c) $-\frac{1}{2}$ d) $\frac{1}{2}$

45. The value of $\lim_{x \to 0}\left((\sin x)^{\frac{1}{x}} + \left(\frac{1}{x}\right)^{\sin x}\right)$, where $x > 0$ is

a) -1 b) 0 c) 1 d) 2

46. $\lim_{x \to \frac{\pi}{2}}\left(\frac{(1-\sin x)\cos x\left(8x^3-\pi^3\right)}{(\pi-2x)^4}\right) =$

a) $-\frac{3\pi^2}{16}$ b) $-\frac{\pi^2}{16}$ c) $\frac{\pi^2}{16}$ d) $\frac{3\pi^2}{16}$

47. $\lim_{x \to \frac{\pi}{2}}\left(\frac{\left(1-\tan\left(\frac{x}{2}\right)\right)(1-\sin x)}{\left(1+\tan\left(\frac{x}{2}\right)\right)(\pi-2x)^3}\right) =$

a) 0 b) $\frac{1}{8}$ c) $\frac{1}{16}$ d) $\frac{1}{32}$