

Topic :-LIMITS AND DERIVATIVES

1. The value of $\lim_{h \rightarrow 0} \frac{(a+h)^2 \sin(a+h) - a^2 \sin a}{h}$, is
 a) $2a \sin a + a^2 \cos a$ b) $2a \sin a - a^2 \cos a$ c) $2a \cos a + a^2 \sin a$ d) None of these

2. If $f(x)$ is differentiable function and $f''(0) = a$, then $\lim_{x \rightarrow 0} \frac{2f(x) - 3f(2x) + f(4x)}{x^2}$ is equal to
 a) $3a$ b) $2a$ c) $5a$ d) $4a$

3. The value of $\lim_{x \rightarrow 0} \frac{e^x + \log(1+x) - (1-x)^{-2}}{x^2}$ is equal to
 a) 0 b) -3 c) -1 d) Infinity

4. If for some real number k $\lim_{x \rightarrow 0} kx \operatorname{cosec}(x) = \lim_{x \rightarrow 0} x \operatorname{cosec}(kx)$, then the possible values of k are
 a) 1, -1 b) 0, 1 c) 1, 2 d) 0, π

5. The value of $\lim_{x \rightarrow 0} \frac{|x|}{x}$ is
 a) 1 b) -1 c) 0 d) None of these

6. $\lim_{x \rightarrow 0} x^2 \sin \frac{\pi}{x}$, us
 a) 1 b) 0 c) Non-existent d) ∞

7. The value of $\lim_{x \rightarrow \infty} \left(\frac{x^2 + bx + 4}{x^2 + ax + 5} \right)$ is
 a) $\frac{b}{a}$ b) 0 c) 1 d) $\frac{4}{5}$

8. If $f(x)$ is the integral function of the function $\frac{2 \sin x - \sin 2x}{x^3}$, $x \neq 0$, then $\lim_{x \rightarrow 0} f'(x)$ is equal to
 a) 0 b) 1 c) -1 d) None of these

9. The value of $\lim_{x \rightarrow \infty} \left(\frac{3x-4}{3x+4} \right)^{\left(\frac{x+1}{3} \right)}$, is
 a) $e^{-2/3}$ b) $e^{-1/3}$ c) e^{-2} d) e^{-1}

10. $\lim_{x \rightarrow 0} \frac{(1+x)^8 - 1}{(1+x)^2 - 1}$ is equal to
 a) 8 b) 6 c) 4 d) 2
11. The value of $\lim_{x \rightarrow \pi/4} \frac{2\sqrt{2} - (\cos x + \sin x)^3}{1 - \sin 2x}$, is
 a) $\frac{3}{\sqrt{2}}$ b) $\frac{\sqrt{2}}{3}$ c) $\frac{1}{\sqrt{2}}$ d) $\sqrt{2}$
12. $\lim_{x \rightarrow -\infty} (3x + \sqrt{9x^2 - x})$ equals
 a) 1/3 b) 1/6 c) -1/6 d) -1/3
13. $\lim_{x \rightarrow 0} \frac{e^{5x} - e^{4x}}{x}$ is equal to
 a) 1 b) 2 c) 4 d) 5
14. Let $L = \lim_{x \rightarrow 0} \frac{a - \sqrt{a^2 - x^2} - x^2/4}{x^4}$, $a > 0$. If L is finite, then
 a) $a = 2, L = \frac{1}{64}$ b) $a = 1, L = \frac{1}{64}$ c) $a = 3, L = \frac{1}{32}$ d) $a = 1, L = \frac{1}{32}$
15. $\lim_{x \rightarrow 0} x \log_e(\sin x)$ is equal to
 a) -1 b) $\log_e 1$ c) 1 d) None of these
16. The value of $\lim_{x \rightarrow 0^+} x^m(\log x)^n$, m, n, N is
 a) 0 b) m/n c) mn d) n/m
17. The value of $\lim_{x \rightarrow \infty} \frac{\sqrt{1+x^4} - (1+x^2)}{x^2}$ is equal to
 a) 0 b) -1 c) 2 d) None of these
18. $\lim_{x \rightarrow 0} (\operatorname{cosec} x)^{1/\log x}$ is equal to
 a) 0 b) 1 c) $1/e$ d) None of these
19. If $f(1) = 2$ and $f'(1) = 1$, then value of $\lim_{x \rightarrow 1} \frac{2x - f(x)}{x - 1}$ is
 a) -1 b) 0 c) 1 d) 2
20. The value of $\lim_{x \rightarrow 0} \frac{1 - \cos(1 - \cos x)}{x^4}$ is
 a) $\frac{1}{2}$ b) $\frac{1}{4}$ c) $\frac{1}{6}$ d) $\frac{1}{8}$