

CHAPTER-13
LIMITS & DERIVATIVES
01 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	$\lim_{x \rightarrow 0} \frac{(1+x)^n - 1}{x}$ is ----- (a)n (b)1 (c)-n (d)0	1
2.	$\lim_{x \rightarrow 3^+} \frac{x}{[x]}$ is ----- (a)3 (b)-3 (c)(1) (d) -1	1
3.	$\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sec^2 x - 2}{\tan x - 1}$ is ----- (a)0 (b)1 (c)2 (d)-1	1
4.	$\lim_{x \rightarrow 0} x \sin \frac{1}{x}$ is ----- (a)0 (b)1 (c)x (d)not defined	1
5.	$\lim_{x \rightarrow 0} \frac{ x }{x}$ is equal to ----- (a)1 (b)-1 (c)0 (d)does not exists	1
6.	If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$, then $\frac{dy}{dx}$ at $x=1$ is ----- (a)0 (b)1 (c) $\frac{1}{2}$ (d) $\frac{1}{\sqrt{2}}$	1
7.	If $f(x) = \begin{cases} x^2 - 1, & 0 < x < 2 \\ 2x + 3, & 2 \leq x \leq 3 \end{cases}$, the quadratic equation whose roots are $\lim_{x \rightarrow 2^-} f(x)$ and $\lim_{x \rightarrow 2^+} f(x)$ is ----- (a) $x^2 - 6x + 9 = 0$ (b) $x^2 - 7x + 8 = 0$ (c) $x^2 - 14x + 49 = 0$ (d) $x^2 - 10x + 21 = 0$	1
8.	If $y = \frac{\sin x + \cos x}{\sin x - \cos x}$, then $\frac{dy}{dx}$ at $x = 0$ is ----- (a)-2 (b)0 (c) $\frac{1}{2}$ (d)does not exist	1
9.	If $f(x) = x \sin x$, then $f'(\frac{\pi}{2})$ is ----- (a)0 (b)-1 (c)1 (d)1/2	1
10.	Let $f(x) = \frac{x^n - a^n}{x - a}$, then $\frac{dy}{dx}$ at $x = a$ is ----- (a)1 (b)0 (c) $\frac{1}{2}$ (d)does not exist	1
11.	If $\lim_{x \rightarrow 5} \frac{x^k - 5^k}{x - 5} = 500$, then the positive integral value of k is	1

	a) 3 b) 4 c) 5 d) 6	
12.	$\lim_{x \rightarrow 1} \frac{\sqrt{x^2-1} + \sqrt{x-1}}{\sqrt{x^2-1}} =$ a) $1 + \frac{1}{\sqrt{2}}$ b) $1 - \frac{1}{\sqrt{2}}$ c) $-1 + \frac{1}{\sqrt{2}}$ d) $-1 - \frac{1}{\sqrt{2}}$	1
13.	If $f : R \rightarrow R$ is defined by $f(x) = [x-3] + x-4 $, for $x \in R$ (where $[\]$ is greatest integer function), then $\lim_{x \rightarrow 3^-} f(x) =$ a) -2 b) -1 c) 0 d) 2	1
14.	$\lim_{x \rightarrow 2} \frac{7x^2 - 11x - 6}{3x^2 - x - 10} =$ a) $\frac{17}{11}$ b) $\frac{11}{17}$ c) $\frac{17}{14}$ d) $-\frac{17}{11}$	1
15.	If $y = \frac{1 + \frac{1}{x^2}}{1 - \frac{1}{x^2}}$, then $\frac{dy}{dx} =$	1

	<p>a) $\frac{-4x}{(x^2-1)^2}$</p> <p>b) $\frac{-4x}{(x^2-1)}$</p> <p>c) $\frac{1-x^2}{4x}$</p> <p>d) $\frac{4x}{x^2-1}$</p>	
16.	<p>The derivative of $(\sec^2 x - \tan^2 x)$ is</p> <p>a) 1</p> <p>b) 0</p> <p>c) $2 \sec x \tan x (1 - \sec x)$</p> <p>d) $2(\sec x - \tan x)$</p>	1
17.	<p>If $y = \frac{\sin x + \cos x}{\sin x - \cos x}$, then $\frac{dy}{dx}$ at $x = 0$.</p> <p>a) -2</p> <p>b) 0</p> <p>c) $\frac{1}{2}$</p> <p>d) Does not exist.</p>	1
18.	<p>If $f(x) = x^{100} + x^{99} + \dots + x + 1$, then $f'(1)$ is equal to</p> <p>a) 5049</p> <p>b) 5050</p> <p>c) 5051</p> <p>d) 50050</p>	1
19.	<p>The value of $\lim_{x \rightarrow \frac{\pi}{2}} (\sec x - \tan x)$ is</p> <p>a) 2</p> <p>b) -1</p> <p>c) 1</p>	1

	d) 0	
20.	Let $f(x) = x - [x]$, where $[x]$ is the greatest integer function, then $f^{-1}\left(\frac{1}{3}\right) =$ a) 0 b) -1 c) 1 d) does not exist.	1
21.	$\lim_{x \rightarrow 0} \frac{(1+x)^{16} - 1}{(1+x)^4 - 1}$ is equal to A) 0 B) 4 C) 8 D) 16	1
22.	$\lim_{x \rightarrow 0} \frac{ax + \sin x}{\tan x + bx^2}$ is equal to A) $a + 1$ B) a C) $\frac{a}{b}$ D) $\frac{a+1}{b+1}$	1
23.	$\lim_{x \rightarrow \pi} \frac{\sin x}{x - \pi}$ is equal to A) 1 B) 2 C) -1 D) -2	1
24.	$\lim_{x \rightarrow 0} \frac{ x }{x}$ is equal to A) 1 B) -1 C) 0 D) does not exist	1
25.	$\lim_{x \rightarrow 0} [x - 1]$, where $[.]$ is the greatest integer function, is equal to A) 1 B) 2 C) 0 D) does not exist	1
26.	Derivative of $f(x) = 1 + x + x^2 + x^3 + x^4 + \dots + x^{50}$ at $x = 1$ is A) 1725 B) 1275 C) 50 D) 0	1
27.	If $y = \frac{x-1}{x+1}$, then $\frac{dy}{dx}$ is equal to A) $2(x+1)^2$ B) $\frac{1}{1+y^2}$ C) $\frac{2}{(1+x)^2}$ D) $-\frac{2}{(1+x)^2}$	1
28.	If $f(x) = x \sin x$, then $f'\left(\frac{\pi}{2}\right)$ is equal to A) 0 B) 1 C) -1 D) $\frac{1}{2}$	1
29.	ASSERTION-REASON BASED QUESTIONS In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices. (A) Both A and R are true and R is the correct explanation of A. (B) Both A and R are true but R is not the correct explanation of A.	1

	<p>(C) A is true but R is false. (D) A is false but R is true.</p> <p>9) Assertion(A) : $\lim_{z \rightarrow 1} \frac{z^{\frac{1}{3}} - 1}{z^{\frac{1}{6}} - 1} = 2$ Reason(R) : $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$</p>	
30.	<p>Assertion(A) : $\frac{d}{dx}(x^5 - 2x^4 - 2) = 5x^4 - 8x^3 - 2$ Reason(R) : Differentiation of x^n with respect to x is nx^{n-1}</p>	1
31.	<p>$\lim_{x \rightarrow 0} x \sin \frac{1}{x}$ is equal to</p> <p>(a) 0 (b) 1 (c) 2 (d) does not exist</p>	1
32.	<p>If $f(x) = x^{100} + x^{99} + \dots + x + 1$, then $f'(1)$ is equal to</p> <p>(a) 5050 (b) 5049 (c) 5051 (d) 50051</p>	1
33.	<p>If $y = \frac{\sin(x+9)}{\cos x}$, then $\frac{dy}{dx}$ at $x = 0$ is</p> <p>(a) $\cos 9$ (b) $\sin 9$ (c) 0 (d) 1</p>	1
34.	<p>$\lim_{x \rightarrow 0} \frac{(1 - \cos x)}{\sqrt{1+x} - 1}$ is equal to</p> <p>(a) 0 (b) 1 (c) $\frac{1}{2}$ (d) $\sqrt{2}$</p>	1
35.	<p>$\lim_{x \rightarrow 0} \frac{\sin x - x}{x^3}$ is equal to</p> <p>(a) 0 (b) $-\frac{1}{6}$ (c) $\frac{1}{6}$ (d) $-\frac{1}{3}$</p>	1
36.	<p>Derivative of $\tan \sqrt{x^2 + 1}$ w.r.t $\sqrt{x^2 + 1}$ is</p> <p>(a) $\frac{2x}{\sqrt{1+x^2}} \sec^2 x$ (b) $\sec^2 x$ (c) $\sec^2 \sqrt{x^2 + 1}$ (d) $\sec^2 \frac{x}{\sqrt{x^2+1}}$</p>	1
37.	<p>Derivatives of the function $\sin x \cos x$ is equal to</p> <p>(a) $-\cos 2x$ (b) $\sin 2x$ (c) $\cos 2x$ (d) $-\sin 2x$</p>	1
38.	<p>$\lim_{x \rightarrow 0} \frac{ax+b}{cx+1}$ is equal to</p>	1

	(a) a (b) b (c) a+b(d) c+1	
39.	$\lim_{x \rightarrow 0} \frac{\cos x}{\pi - x}$ is equal to (a) 1 (b) $\frac{1}{\pi}$ (c) π (d) $\frac{\pi}{2}$	1
40.	Derivative of $\sqrt{\sin 2x}$ is equal to (a) $\frac{\cos 2x}{\sqrt{\cos 2x}}$ (b) $\frac{\sqrt{\cos 2x}}{\cos 2x}$ (c) $\frac{\sin 2x}{\sqrt{\sin 2x}}$ (d) $\frac{\sqrt{\sin 2x}}{\sin 2x}$	1
41.	$\lim_{x \rightarrow 0} \frac{\sin 2x}{x}$ is equal to a) 0 b) 1 c) $\frac{1}{2}$ d) 2	1
42.	If $n \in Q$, then the value of $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$ will be a) na^n b) na^{n-1} c) a^{n-1} d) na^{n+1}	1
43.	Which of the following is an example of non-algebraic limits: a) $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x - 1}$ b) $\lim_{x \rightarrow 0} \frac{2^x - 3^x}{x}$ c) $\lim_{x \rightarrow 2} \frac{x^5 - 32}{x - 2}$ d) $\lim_{x \rightarrow \infty} \frac{x^2 + x + 1}{2x^2 + 5}$	1
44.	$\lim_{x \rightarrow 0} \frac{ x }{x}$ is equal to a) 1 b) -1 c) 0 d) Does not exist	1
45.	$\lim_{x \rightarrow 0} \frac{\operatorname{cosec} x - \cot x}{x}$ is equal to a) $-\frac{1}{2}$	1

	b) 1 c) $\frac{1}{2}$ d) 1	
46.	If $f(x) = x^{100} + x^{99} + \dots + x + 1$, then $f'(1)$ is equal to a) 5050 b) 5049 c) 5051 d) 50051	1
47.	A function $f(x)$ is differential at $x = c$ iff a) $\lim_{x \rightarrow c} \frac{f(x) - f(c)}{x - c}$ exists finitely b) $\lim_{x \rightarrow c} \frac{f(x) + f(c)}{x - c}$ exists finitely c) $\lim_{x \rightarrow c} \frac{f(x) + f(c)}{x + c}$ exists finitely d) $\lim_{x \rightarrow c} \frac{f(x) - f(c)}{x + c}$ exists finitely	1
48.	Geometrically the derivative of a function $y = f(x)$ at a point $x = c$ is a) The slope of the curve $y = f(x)$ at point $(c, f(c))$. b) The slope of the perpendicular to the curve $y = f(x)$ at point $(c, f(c))$. c) The slope of the tangent to the curve $y = f(x)$ at point $(c, f(c))$. d) None of these	1
49.	If $f(x) = x \sin x$, then $f' \left(-\frac{\pi}{2} \right)$ is equal to a) 0 b) 1 c) -1 d) $\frac{1}{2}$	1
50.	The differentiation of a constant function is a) That constant itself b) Any non-zero number c) Zero d) None of these	1

ANSWERS:

Q. NO	ANSWER	MARKS
1.	(a)n	1
2.	(c)1	1
3.	(c) 2	1
4.	(a)0	1
5.	(d)does not exists	1
6.	(a)0	1
7.	(d) $x^2-10x+21=0$	1
8.	(a)-2	1
9.	(c)1	1
10.	(d) does not exist	1
11.	b) 4	1
12.	a) $1+\frac{1}{\sqrt{2}}$	1
13.	c) 0	1
14.	a) $\frac{17}{11}$	1
15.	a) $\frac{-4x}{(x^2-1)^2}$	1
16.	b) 0	1
17.	a) -2	1
18.	b) 5050	1
19.	d) 0	1
20.	c) 1	1
21.	(B) 4	1
22.	A)a+1	1
23.	C) -1	1
24.	D)Does not exist	1

25.	D)Does not exist	1
26.	B)1275	1
27.	D)	1
28.	B)	1
29.	B)	1
30.	D)	1
31.	a	1
32.	a	1
33.	a	1
34.	a	1
35.	b	1
36.	c	1
37.	c	1
38.	b	1
39.	b	1
40.	a	1
41.	d	1
42.	b	1
43.	b	1
44.	d	1
45.	c	1
46.	a	1
47.	a	1
48.	c	1
49.	b	1
50.	c	1