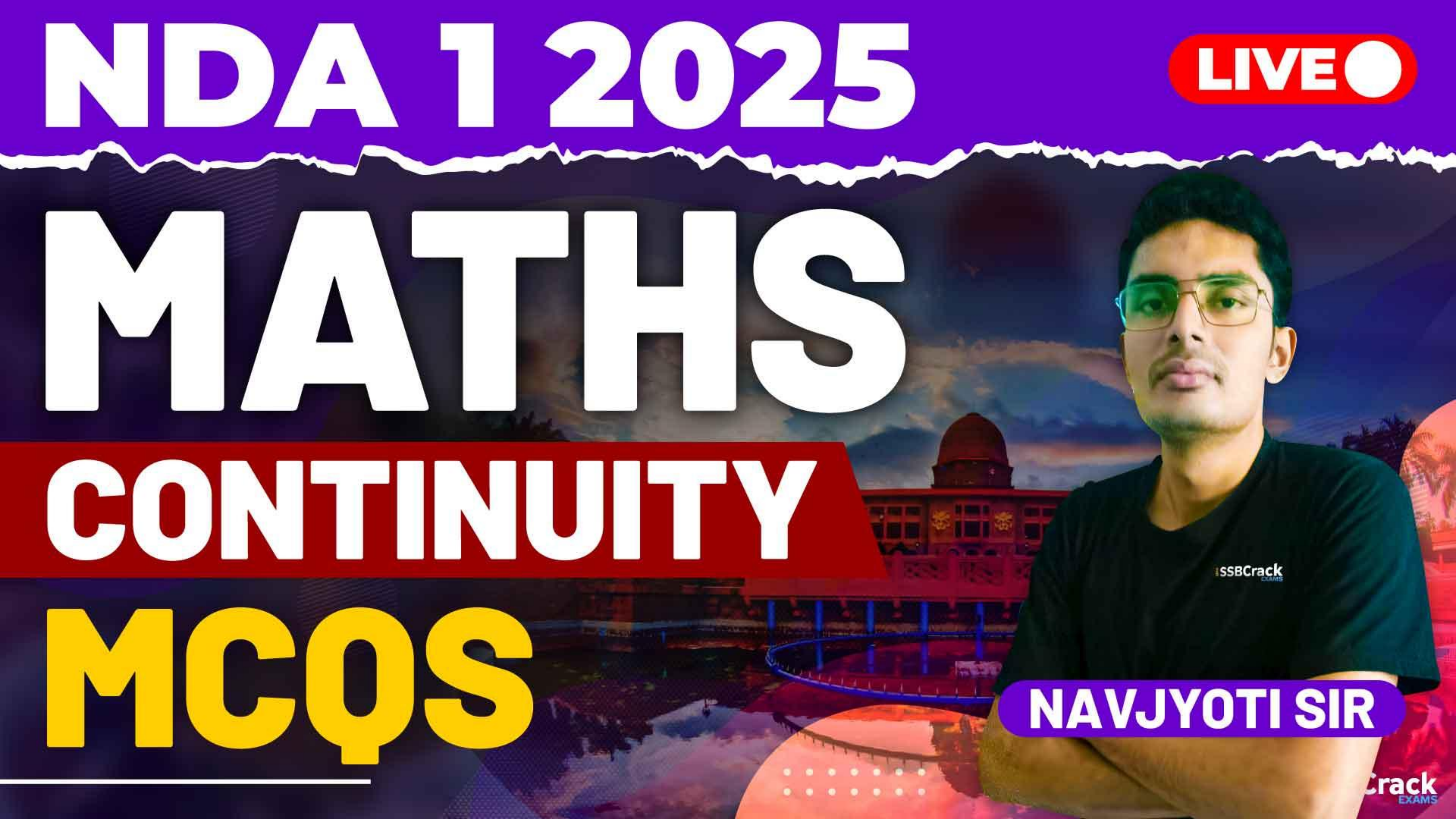

NDA 1 2025
LIVE
MATHS
CONTINUITY
MCQS
SSBCrack EXAMS
NAVJYOTI SIR
Crack EXAMS

SSBCrack EXAMS

14 Feb 2025 Live Classes Schedule

9:00AM	14 FEBRUARY 2025 DAILY DEFENCE UPDATES	DIVYANSHU SIR
10:00AM	14 FEBRUARY 2025 DAILY CURRENT AFFAIRS	RUBY MA'AM

SSB INTERVIEW LIVE CLASSES

9:30AM	OVERVIEW OF GPE & PRACTICE	ANURADHA MA'AM

AFCAT 1 2025 LIVE CLASSES

3:00PM	STATIC GK - STRAITS & INTERNATIONAL BORDERS	DIVYANSHU SIR
4:30PM	ENGLISH - COMPREHENSION - CLASS 2	ANURADHA MA'AM

NDA 1 2025 LIVE CLASSES

10:00AM	MATHS - CONTINUITY	NAVJYOTI SIR
1:00PM	BIOLOGY - CLASS 5	SHIVANGI MA'AM
4:30PM	ENGLISH - COMPREHENSION - CLASS 2	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

1:00PM	BIOLOGY - CLASS 5	SHIVANGI MA'AM
4:30PM	ENGLISH - COMPREHENSION - CLASS 2	ANURADHA MA'AM
5:30PM	MATHS - TRIGONOMETRY - CLASS 2	NAVJYOTI SIR

PYQ – 2024 - I

Let $f(x) = |x| + 1$ and $g(x) = [x] - 1$, where $[.]$ is the greatest integer function.

Let $h(x) = \dfrac{f(x)}{g(x)}$

What is $\lim_{x\to 0-} h(x) + \lim_{x\to 0+} h(x)$ equal to ?

(a) $-\frac{3}{2}$

(b) $-\frac{1}{2}$

(c) $\frac{1}{2}$

(d) $\frac{3}{2}$

$$\lim_{x\to 0^-} \frac{|x|+1}{[x]-1}$$

$$\lim_{h\to 0} \frac{|0-h|+1}{[0-h]-1} = \frac{1}{-1-1} = -\frac{1}{2}$$

$[0-h] \to -1$, $h \to 0$

$$\left(-\frac{1}{2}\right) + (-1) = -\frac{3}{2}$$

$$\lim_{x\to 0^+} \frac{|x|+1}{[x]-1}$$

$$\lim_{h\to 0} \frac{|0+h|+1}{[0+h]-1} = \frac{1}{0-1} = -1$$

$[0+h] \to 0$, $h \to 1$

Let $f(x) = |x| + 1$ and $g(x) = [x] - 1$, where [.] is the greatest integer function.

PYQ – 2024 - I

Let $h(x) = \dfrac{f(x)}{g(x)}$

What is $\lim_{x \to 0-} h(x) + \lim_{x \to 0+} h(x)$ equal to ?

(a) $-\dfrac{3}{2}$

(b) $-\dfrac{1}{2}$

(c) $\dfrac{1}{2}$

(d) $\dfrac{3}{2}$

Ans: (a)

What is $\lim_{x \to \frac{\pi}{2}} (\sec\theta - \tan\theta)$ equal to?

PYQ – 2024 - II

(a) -1

(b) 0

(c) $1/2$

(d) 1

$$\lim_{x \to \frac{\pi}{2}} (\sec\theta - \tan\theta) \longrightarrow \frac{\infty}{\infty}$$

L- Hospital rule,

$$\lim_{x \to \frac{\pi}{2}} \left(\frac{1}{\cos\theta} - \frac{\sin\theta}{\cos\theta}\right) = \lim_{x \to \frac{\pi}{2}} \left(\frac{-\cos\theta}{-\sin\theta}\right) = \frac{0}{1} = 0$$

What is $\lim_{x \to \frac{\pi}{2}} (\sec\theta - \tan\theta)$ equal to?

PYQ – 2024 - II

(a) -1

(b) 0

(c) $1/2$

(d) 1

Ans: (b)

Q) $\lim_{x \to 0} \dfrac{x\cot(4x)}{\sin^2 x \cot^2(2x)}$ is equal to

(a) 0 (b) 1 (c) 4 (d) 2

$$\lim_{x \to 0} \frac{x}{\tan 4x} \times \frac{1}{\sin^2 x} \times \tan^2 2x$$

$$\lim_{x \to 0} \frac{1}{4}\left(\frac{4x}{\tan 4x}\right) \times \left(\frac{x^2}{\sin^2 x}\right) \times \frac{1}{x^2} \times \frac{\tan^2 2x}{(2x)^2} \times (2x)^2$$

$$\frac{1}{4} \times 1 \times 1^2 \times 1^2 \times 4 = 1$$

$$\lim_{x \to 0} \frac{\sin x}{x} = 1$$

$$\lim_{x \to 0} \frac{\tan x}{x} = 1$$

Q) $\lim\limits_{x \to 0} \dfrac{x \cot(4x)}{\sin^2 x \cot^2(2x)}$ is equal to

(a) 0 (b) 1 (c) 4 (d) 2

Ans: (b)

Q) The value of $\lim_{x \to 0} \frac{\sqrt{\frac{1}{2}(1 - \cos^2 x)}}{x}$ is

(a) 1 (b) –1

(c) 0 (d) None of these

$$\frac{\sqrt{\frac{1}{2}(\sin^2 x)}}{x} = \frac{1}{\sqrt{2}\,x} \pm \sin x$$

$+\sin x, \quad x > 0$

$-\sin x, \quad x < 0$

LHL

$$\lim_{x \to 0} \frac{1}{\sqrt{2}}\left(-\frac{\sin x}{x}\right) = -\frac{1}{\sqrt{2}}$$

RHL

$$\lim_{x \to 0} \frac{1}{\sqrt{2}}\left(+\frac{\sin x}{x}\right) = \frac{1}{\sqrt{2}}$$

Q) The value of $\lim_{x \to 0} \frac{\sqrt{\frac{1}{2}(1 - \cos^2 x)}}{x}$ is

(a) 1

(b) -1

(c) 0

(d) None of these

Ans: (d)

SSBCrack EXAMS

Q) $\lim_{n\to\infty}\left(\frac{1}{1-n^2}+\frac{2}{1-n^2}+\ldots+\frac{n}{1-n^2}\right)$ is equal to

(a) 0

(b) $-\frac{1}{2}$

(c) $\frac{1}{2}$

(d) None of these

$$\lim_{n\to\infty}\frac{\frac{n(n+1)}{2}}{(1+n)(1-n)} = \lim_{n\to\infty}\frac{n}{2(1-n)} = \lim_{n\to\infty}\frac{1}{2\left(\frac{1}{n}-1\right)} = \frac{1}{2(0-1)} = \frac{-1}{2}$$

$$\frac{n}{2n\left(\frac{1}{n}-1\right)} = \frac{1}{2\left(\frac{1}{n}-1\right)}$$

If $n\to\infty$, $\frac{1}{n}\to 0$

Q) $\lim_{n \to \infty} \left(\frac{1}{1-n^2} + \frac{2}{1-n^2} + \ldots + \frac{n}{1-n^2} \right)$ is equal to

(a) 0

(b) $-\frac{1}{2}$

(c) $\frac{1}{2}$

(d) None of these

Ans: (b)

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

(a) $-\frac{2}{3}$ (b) 0 (c) $-\frac{1}{3}$ (d) $\frac{2}{3}$

$\frac{0}{0}$ form,

$$\lim_{x\to 0} \frac{1}{3+x} - \frac{1}{3-x}(-1) = \frac{2}{3+x}$$

$$k = \frac{2}{3}$$

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

(a) $-\dfrac{2}{3}$ (b) 0 (c) $-\dfrac{1}{3}$ (d) $\dfrac{2}{3}$

Ans: (d)

SSBCrack EXAMS

Q) If $\lim_{x \to a}\left[\frac{f(x)}{g(x)}\right]$ exists, then which one of the following correct ?

(a) Both $\lim_{x \to a} f(x)$ and $\lim_{x \to a} g(x)$ must exist

(b) $\lim_{x \to a} f(x)$ need not exist but $\lim_{x \to a} g(x)$ must exist

(c) Both $\lim_{x \to a} f(x)$ and $\lim_{x \to a} g(x)$ need not exist

(d) $\lim_{x \to a} f(x)$ must exist but $\lim_{x \to a} g(x)$ need not exist

$\lim_{x \to a}\left[f(x) \; \overset{+}{\underset{\div}{\underset{\times}{-}}} \; g(x)\right]$ exists, then $\lim_{x \to a} f(x)$ & $\lim_{x \to a} g(x)$ should exist.

(Algebra of limits) & vice-versa.

Q) If $\lim_{x\to a}\left[\frac{f(x)}{g(x)}\right]$ exists, then which one of the following correct ?

(a) Both $\lim_{x\to a} f(x)$ and $\lim_{x\to a} g(x)$ must exist

(b) $\lim_{x\to a} f(x)$ need not exist but $\lim_{x\to a} g(x)$ must exist

(c) Both $\lim_{x\to a} f(x)$ and $\lim_{x\to a} g(x)$ need not exist

(d) $\lim_{x\to a} f(x)$ must exist but $\lim_{x\to a} g(x)$ need not exist

Ans: (a)

Q) What is $\lim_{x \to 0} \frac{a^x - b^x}{x}$?

(a) $\log\left(\frac{a}{b}\right)$

(b) $\log\left(\frac{b}{a}\right)$

(c) ab

(d) log (ab)

$\frac{0}{0}$ form,

$$\lim_{x \to 0} \frac{a^x \log a - b^x \log b}{1} = \log a - \log b = \log\left(\frac{a}{b}\right)$$

SSBCrack EXAMS

Q) What is $\lim_{x \to 0} \frac{a^x - b^x}{x}$?

(a) $\log\left(\frac{a}{b}\right)$

(b) $\log\left(\frac{b}{a}\right)$

(c) ab

(d) $\log(ab)$

Ans: (a)

Q) What is $\lim_{x \to 0} e^{-\frac{1}{x^2}}$ equal to?

(a) 0
(b) 1
(c) –1
(d) Limit does not exist

$$\lim_{x \to 0} e^{\frac{-1}{x^2}} = e^{\frac{-1}{0^2}} = e^{-\infty} = 0$$

$$e^{-\infty} = \frac{1}{e^{\infty}} \rightarrow \frac{1}{\infty} \sim 0$$

$e > 1$

SSBCrack EXAMS

Q) What is $\lim_{x \to 0} e^{-\frac{1}{x^2}}$ equal to?

(a) 0
(b) 1
(c) –1
(d) Limit does not exist

Ans: (a)

Q) The function $f(x)$ is given by

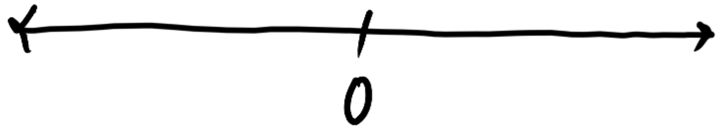
$$f(x) = \begin{cases} x^2, & \text{if } x \text{ is rational} \\ -x^2, & \text{if } x \text{ is irrational} \end{cases}$$ then, it is

(a) continuous at $x = 0$

(b) continuous at $x = \frac{1}{2}$

(c) discontinuous at $x = 0$

(d) None of the above



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(a) continuous at $x = 0$

(b) continuous at $x = \frac{1}{2}$

(c) discontinuous at $x = 0$

(d) None of the above

Ans: (a)

Q) If the function $f(x)=\dfrac{2x-\sin^{-1}x}{2x+\tan^{-1}x},(x\neq 0)$ is continuous at each point of its domain, then the value of $f(0)$ is

(a) 2 (b) 1/3 (c) 2/3 (d) –1/3

$$f(0)=\lim_{x\to 0}\frac{2x-\sin^{-1}x}{2x+\tan^{-1}x}\longrightarrow\frac{0}{0}\text{ form}$$

$$\lim_{x\to a}\frac{f(x)}{g(x)}=\lim_{x\to a}\frac{f'(x)}{g'(x)}$$

$$f(0)=\lim_{x\to 0}\frac{2-\frac{1}{\sqrt{1-x^2}}}{2+\frac{1}{1+x^2}}=\frac{2-\frac{1}{1}}{2+1}=\frac{1}{3}$$

Q) If the function $f(x) = \dfrac{2x - \sin^{-1} x}{2x + \tan^{-1} x}, (x \neq 0)$ is continuous at each point of its domain, then the value of $f(0)$ is

(a) 2 (b) 1/3 (c) 2/3 (d) –1/3

Ans: (b)

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Q) What is $\lim_{\theta \to 0} \frac{\sqrt{1 - \cos\theta}}{\theta}$ equal to?

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

$$\lim_{\theta \to 0} \frac{\sqrt{2\sin^2\frac{\theta}{2}}}{\theta} \qquad \frac{\sqrt{2}\sin\frac{\theta}{2}}{\frac{\theta}{2} \times 2}$$

$$= \lim_{\frac{\theta}{2} \to 0} \frac{\sqrt{2}}{2}\left(\frac{\sin\frac{\theta}{2}}{\frac{\theta}{2}}\right) = \frac{1}{\sqrt{2}}(1) = \frac{1}{\sqrt{2}}$$

SSBCrack EXAMS

Q) What is $\lim_{\theta \to 0} \frac{\sqrt{1 - \cos\theta}}{\theta}$ equal to?

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

Ans: (c)

Q) $f(x) = \cos(|x|)$ is a continuous function because

(a) composition of continuous functions is a continuous function

(b) product of continuous functions is a continuous function

(c) cosine is an even function

(d) sum of continuous functions is continuous

SSBCrack EXAMS

Q) $f(x) = \cos(|x|)$ is a continuous function because

(a) composition of continuous functions is a continuous function

(b) product of continuous functions is a continuous function

(c) cosine is an even function

(d) sum of continuous functions is continuous

Ans: (a)

Q) What is $\lim_{x \to -1} \dfrac{x^3 + x^2}{x^2 + 3x + 2}$ equal to?

(a) 0 (b) 1 (c) 2 (d) 3

Q) What is $\lim_{x \to -1} \dfrac{x^3 + x^2}{x^2 + 3x + 2}$ equal to?

(a) 0 (b) 1 (c) 2 (d) 3

Ans: (b)

SSBCrack EXAMS

Q) Let $f(x)$ be defined as follows

$$f(x) = \begin{cases} 2x+1, & -3 < x < -2 \\ x-1, & -2 \le x < 0 \\ x+2, & 0 \le x < 1 \end{cases}$$

Which one of the following statements is correct in respect of the above function?

(a) It is discontinuous at $x = -2$ but continuous at every other point.

(b) It is continuous only in the interval $(-3, -2)$.

(c) It is discontinuous at $x = 0$ but continuous at every other point.

(d) It is discontinuous at every point.

Q) Let $f(x)$ be defined as follows

$$f(x)=\begin{cases} 2x+1, & -3<x<-2 \\ x-1, & -2\le x<0 \\ x+2, & 0\le x<1 \end{cases}$$

Which one of the following statements is correct in respect of the above function?

(a) It is discontinuous at $x = -2$ but continuous at every other point.

(b) It is continuous only in the interval $(-3, -2)$.

(c) It is discontinuous at $x = 0$ but continuous at every other point.

(d) It is discontinuous at every point.

Ans: (c)

Q) If $f(x) = \begin{cases} \dfrac{3x + 4\tan x}{x}; & x \neq 0 \\ k; & x = 0 \end{cases}$ is continuous at $x = 0$,

then the value of k is

(a) 7
(b) 6
(c) – 5
(d) – 1

Q) If $f(x) = \begin{cases} \dfrac{3x + 4\tan x}{x}; x \neq 0 \\ k; \quad x = 0 \end{cases}$ is continuous at $x = 0$,

then the value of k is

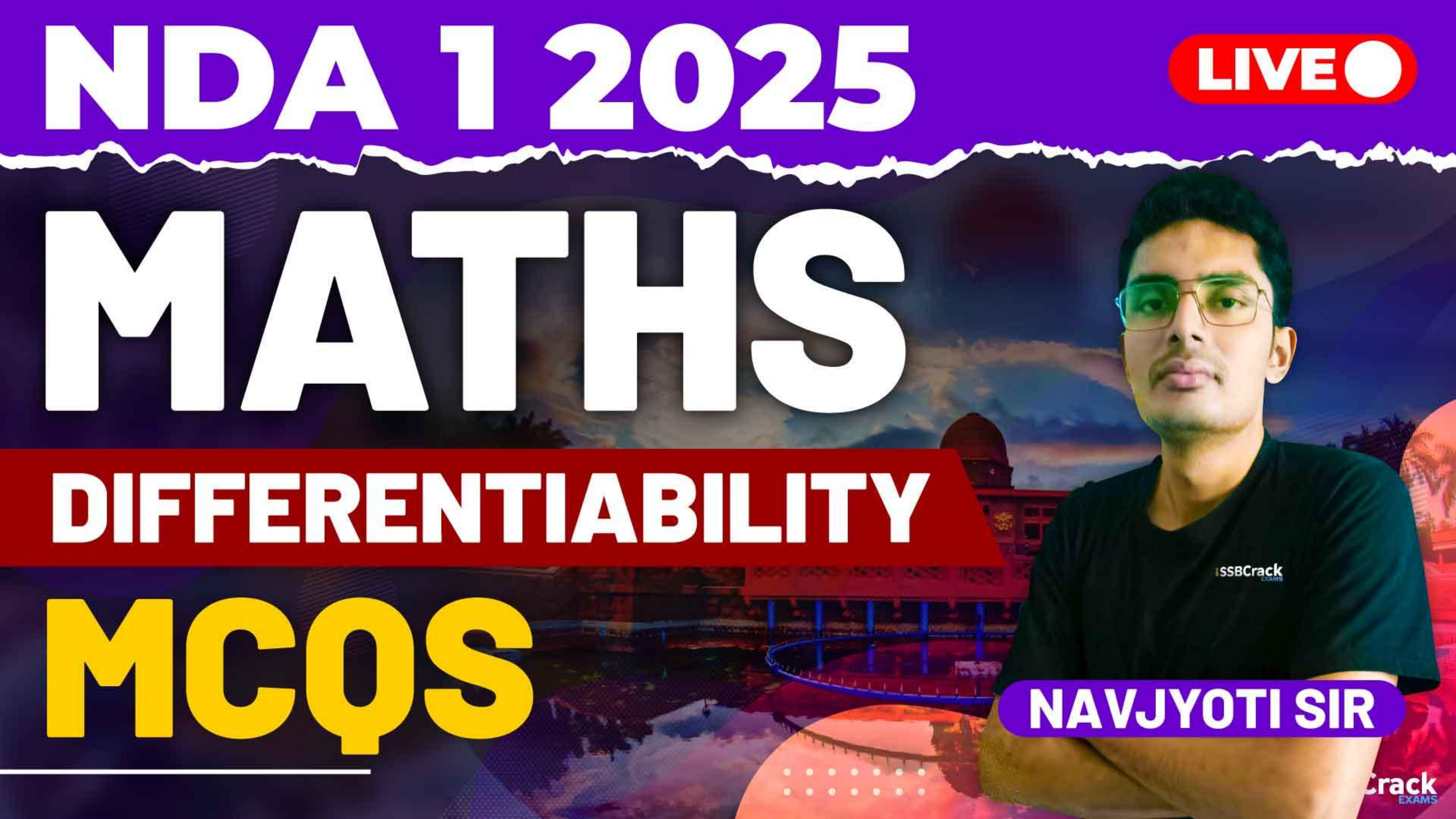
(a) 7

(b) 6

(c) – 5

(d) – 1

Ans: (a)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