# CDS-AFCAT 1 2025

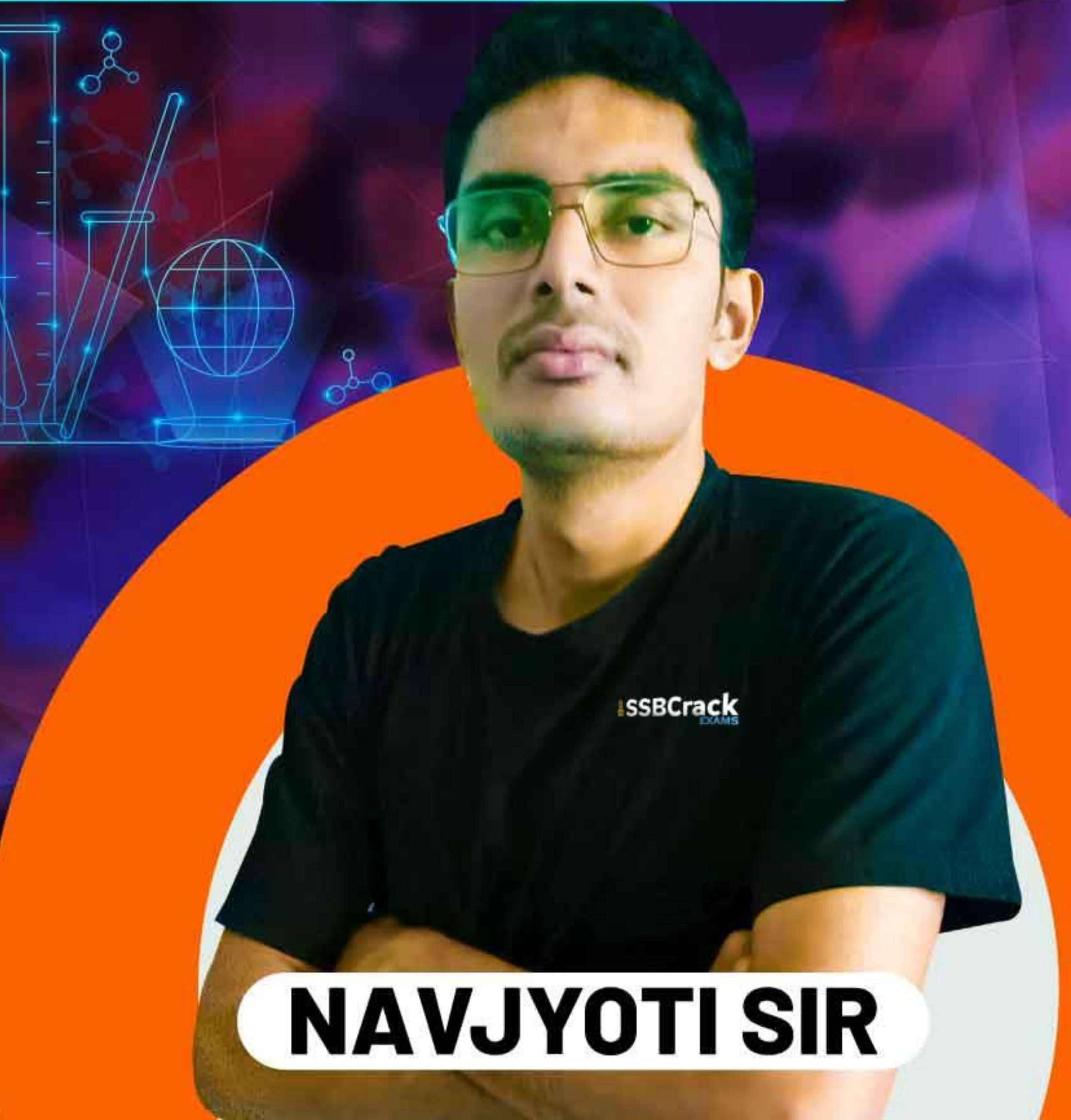
SSBCrack EXAMS

LIVE

# MATHS

## NUMBER SYSTEM

CLASS 4



NAVJYOTI SIR

# 22 Oct 2024 Live Classes Schedule

| | | |
|---|---|---|
| 8:00AM | 22 OCTOBER 2024 DAILY CURRENT AFFAIRS | RUBY MA'AM |
| 9:00AM | 22 OCTOBER 2024 DAILY DEFENCE UPDATES | DIVYANSHU SIR |

## NDA 1 2025 LIVE CLASSES

| | | |
|---|---|---|
| 11:30AM | GK - POLITY - EXECUTIVE | RUBY MA'AM |
| 1:00PM | CHEMISTRY - ATOMIC STRUCTURE | SHIVANGI MA'AM |
| 4:00PM | MATHS - ANALYTICAL GEOMETRY 2D - CLASS 2 | NAVJYOTI SIR |
| 5:30PM | ENGLISH - IDIOMS & PHRASES - CLASS 2 | ANURADHA MA'AM |

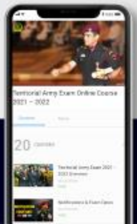
## CDS 1 2025 LIVE CLASSES

| | | |
|---|---|---|
| 11:30AM | GK - POLITY - EXECUTIVE | RUBY MA'AM |
| 1:00PM | CHEMISTRY - ATOMIC STRUCTURE | SHIVANGI MA'AM |
| 5:30PM | ENGLISH - IDIOMS & PHRASES - CLASS 2 | ANURADHA MA'AM |
| 7:00PM | MATHS - NUMBER SYSTEM - CLASS 3 | NAVJYOTI SIR |

## AFCAT 1 2025 LIVE CLASSES

| | | |
|---|---|---|
| 4:00PM | STATIC GK - SCIENTIFIC INVENTIONS | DIVYANSHU SIR |
| 5:30PM | ENGLISH - IDIOMS & PHRASES - CLASS 2 | ANURADHA MA'AM |
| 7:00PM | MATHS - NUMBER SYSTEM - CLASS 3 | NAVJYOTI SIR |





# HCF

Highest common factor. (Greatest common divisor)

12    16

1, 2, 3, 4, 6, 12    1, 2, 4, 8, 16

common factors = 1, 2, 4

HCF = 4

# CALCULATING HCF

prime factorisation

difference method

long division method

Prime factorisation

112, 140, 72

$112 = 2^4 \times 7$

$140 = 2^2 \times 5 \times 7$

$72 = 2^3 \times 3^2$

$HCF = 2^2 = 4$

(Lowest power of common factor)

60, 36, 90

$60 = 2^2 \times 3 \times 5$

$36 = 2^2 \times 3^2$

$90 = 2 \times 3^2 \times 5$

$HCF = 2^1 \times 3^1 = 6$

SSBCrack EXAMS

# DIFFERENCE METHOD

$a, b$ , let HCF $= H$

$a = Hx$ $b = Hy$

$a - b = H(x-y)$

if $x - y = 1$

HCF $= 1$

if $(x-y) > 1$

HCF = difference of a & b.

SSBCrack EXAMS

# DIFFERENCE METHOD

- 306 and 391

306    391

diff. = 85 — $17 \times 5$ → HCF = 17

- 323,456 and 703

456 − 323 = 133

19    7

(also divides 703)

HCF = 19

# LONG DIVISION METHOD

- **693 and 945**

693 ) 945 ( 1
-693
252 ) 693 ( 2
-504
189 ) 252 ( 1
-189
63 ) 189 ( 3
-189
00 ✓

HCF = Last divisor

# LCM

→ Lowest common multiple.

$\underbrace{\text{Prime Factorisation}}$

14, 21, 56

$14 = 2 \times 7$

$21 = 3 \times 7$

$56 = 2^3 \times 7$

$(\underline{2^3, 3^1, 7^1})$

{All factors — highest powers}

$LCM = 2^3 \times 3^1 \times 7^1 = 8 \times 3 \times 7 = 24 \times 7$

# CALCULATING LCM

- **24, 30 and 36**

$\underbrace{\text{commm division}}$

$$
\begin{array}{r|l}
2 & 24,\ 30,\ 36 \\ \hline
2 & 12,\ 15,\ 18 \\ \hline
2 & 6,\ 15,\ 9 \\ \hline
3 & 3,\ 15,\ 9 \\ \hline
3 & 1,\ 5,\ 3 \\ \hline
5 & 1,\ 5,\ 1 \\ \hline
 & 1,\ 1,\ 1
\end{array}
$$

$$
\begin{aligned}
LCM &= 2\times2\times2\times3\times3\times5 \\
&= 8\times9\times5 \\
&= 72\times5 \\
&= \underline{360}
\end{aligned}
$$

# CALCULATING LCM

- 55, 66 and 60

# OTHER FORMULAS IN LCM

**The number which when divided by a, b, c leaves remainder 'r' in each case**

**$= \text{LCM}(a,b,c) \times k + r$**

**The least multiple of 13 which on dividing by 4,5,6,7 and 8 leaves remainder 2 in each case.**

$LCM(4, 5, 6, 7, 8) = 2^3 \times 3 \times 5 \times 7$

$= 120 \times 7 = \underline{840}$

$(\underline{840} \times k) + 2 \longrightarrow 13m$

$\boxed{2522}$

$k = 1 \longrightarrow 842 \longrightarrow \times$

$k = 2 \longrightarrow 1682 \longrightarrow \times$

$k = 3 \longrightarrow \underline{2522} \longrightarrow \checkmark$

# WHEN REMAINDERS ARE DIFFERENT

**The number which when divided by a, b, c respectively gives remainder x, y, z**

$$a - x = b - y = c - z = d \text{ (difference)}$$

$$= LCM(a, b, c)\, K - d$$

**Find the least number which when divided by 35,45 and 55 leaves 18, 28 and 38.**

$\frac{35 - 18}{17}$ $\frac{45 - 28}{17}$ $\frac{55 - 38}{17}$

$LCM(35, 45, 55) - 17$

# LCM(a, b) x HCF(a, b) = a x b

24, 18

$LCM = 2^3 \times 3^2 = 72$

$HCF = 6$

$72 \times 6 = 432$

$$\begin{array}{r} 24 \\ \times 18 \\ \hline 432 \\ \hline \end{array}$$

7

# LCM AND HCF FOR FRACTIONS

$$\text{LCM}\left[\frac{a}{b},\frac{c}{d},\frac{e}{f}\right] \rightarrow \frac{\text{LCM}(a,c,e)}{\text{HCF}(b,d,f)}$$

$$\text{HCF}\left[\frac{a}{b},\frac{c}{d},\frac{e}{f}\right] \rightarrow \frac{\text{HCF}(a,c,e)}{\text{LCM}(b,d,f)}$$

# LAW OF INDICES

$a \times a \times a \times \ldots$ n times $= a^n$

$a^m \times a^n \times a^p = a^{m+n+p}$ $(a \neq 0)$

$\dfrac{a^m}{a^n} = a^{m-n}$ $(m > n)$

$a^{-4} = \dfrac{1}{a^4}$

$= \dfrac{1}{a^{n-m}}$ $(n > m)$

$(a^0 = 1)$

$= 1$ $(m = n)$

$(a^m)^n = a^{m \times n} = a^{n \times m} = (a^n)^m$

$(abc)^n = a^n \times b^n \times c^n$

$\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$ $(b \neq 0)$

$(a^m)^n \neq a^{m^n}$.

$(a^m)^n = a^{m \times n}$

# LAW OF INDICES

$$a^{\frac{p}{q}} = a^{\frac{1}{q}\times p} = \left(a^{\frac{1}{q}}\right)^p = (a^p)^{\frac{1}{q}}$$

If $a^m = a^n$ then $m = n$

If $a^m = b^m$ then $a = b$

$a^o = 1$

$$a^{-1} = \frac{1}{a} (a \neq 0)$$

$$a^{-n} = \frac{1}{a^n} \ \& \ a^n = \frac{1}{a^{-n}}$$

$$\left(\frac{a}{b}\right)^m = \left(\frac{b}{a}\right)^{-m}$$

$(-1)^n = +1$ (n = even)

$= -1$ (n = odd)

# LAW OF SURDS

$$\sqrt[n]{a} = a^{\frac{1}{n}}$$

$$\sqrt[n]{ab} = \sqrt[n]{a} \times \sqrt[n]{b} = a^{\frac{1}{n}} \times b^{\frac{1}{n}} = (ab)^{\frac{1}{n}}$$

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \left(\frac{a}{b}\right)^{\frac{1}{n}}$$

$$\sqrt{a} = \sqrt[2]{a} = a^{\frac{1}{2}}$$

$$\sqrt[4]{\left(\frac{8}{3}\right)} = \frac{8^{\frac{1}{4}}}{3^{\frac{1}{4}}}$$

$$= \left(\frac{8}{3}\right)^{\frac{1}{4}}$$

$$\sqrt[3]{7} = (7)^{\frac{1}{3}}$$

$$\sqrt{6 \times 4} = (24)^{\frac{1}{2}}$$

# LAW OF SURDS

1. $\left(\sqrt[n]{a}\right)^m = a^{\frac{m}{n}} = \sqrt[n]{a^m}$

2. $\left(\sqrt[n]{a}\right)^n = a^{\frac{n}{n}} = a^1 = a$

3. $\sqrt[n]{\sqrt[m]{a}} = \sqrt[n]{a^{\frac{1}{m}}} = a^{\frac{1}{mn}}$

4. $\left(\sqrt[z]{\left(\sqrt[y]{\left(\sqrt[x]{a}\right)^m}\right)^n}\right)^o = a^{\frac{mno}{xyz}}$

① $\left(\sqrt[n]{a}\right)^m = \left(a^{\frac{1}{n}}\right)^m$

$= a^{\frac{m}{n}} = \left(a^m\right)^{\frac{1}{n}} = \sqrt[n]{a^m}$

③ $\sqrt[n]{\sqrt[m]{a}} = \sqrt[n]{a^{\frac{1}{m}}} = \left(a^{\frac{1}{m}}\right)^{\frac{1}{n}} = a^{\frac{1}{mn}}$

$\left(\sqrt[z]{\left(\sqrt[y]{a^{\frac{m}{x}}}\right)^n}\right)^o = \left(\sqrt[z]{\left(a^{\frac{mn}{xy}}\right)}\right)^o$

$= a^{\frac{mno}{xyz}}$

$$\sqrt[2]{a\sqrt[2]{a\sqrt[2]{a\sqrt{a\ldots\infty}}}} = a$$

$$\sqrt{a\sqrt{a\sqrt{a\ldots n\,\text{times}}}} = a^{1-\frac{1}{2^n}} = a^{\frac{2^n-1}{2^n}}$$

$$\sqrt{3\sqrt{3\sqrt{8}}}$$

$$= 3^{\frac{2^3-1}{2^3}}$$

$$= 3^{\frac{7}{8}}$$

$$\sqrt[3]{a\sqrt[3]{a\sqrt[3]{a\ldots\infty}}} = \sqrt{a} \rightarrow \sqrt[n]{a\sqrt[n]{a\sqrt[n]{a\ldots\infty}}} = \sqrt[n-1]{a}$$

$$\sqrt{a+\sqrt{a+\sqrt{a+\ldots\ldots}}}\ \infty$$

$$\sqrt{a-\sqrt{a-\sqrt{a-\ldots\ldots}}}\ \infty$$

$$\sqrt{56+\sqrt{56+\sqrt{56+\ldots}}}\ \infty = \underbrace{8}$$

(Larger one)

$$\sqrt{72-\sqrt{72-\sqrt{72}}}\ \ldots\infty = 8$$

(smaller one)

(56)

8 7

72

8 9

factors having difference as $\underbrace{1}$.

# COMPARING SURDS

$\sqrt[2]{2}$ , $\sqrt[3]{3}$ , $\sqrt[4]{5}$

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

$(2)^{\frac{1}{2}}$ $(3)^{\frac{1}{3}}$ $(5)^{\frac{1}{4}}$

LCM of 2, 3, 4 = 12

$\left((2)^{\frac{1}{2}}\right)^{12}$ $\left(3^{\frac{1}{3}}\right)^{12}$ $\left(5^{\frac{1}{4}}\right)^{12}$

$2^6$ $3^4$ $5^3$

64 81 125

$5^{\frac{1}{4}} < 3^{\frac{1}{3}} < 2^{\frac{1}{2}}$

$\sqrt[4]{5} < \sqrt[3]{3} < \sqrt{2}$

# APPROXIMATE SQUARE ROOT VALUE

$\sqrt{15}$

$\sqrt{9}$ $\sqrt{15}$ $\sqrt{16}$

$3 + \frac{15-9}{16-9} = 3 + \frac{6}{7} = 3.8$

$\sqrt{73}$

$\sqrt{64}$ $\sqrt{73}$ $\sqrt{81}$

$\sqrt{73} = 8 + \frac{73-64}{81-64} =$

SSBCrack EXAMS

# DECIMAL EXPANSIONS TO FRACTIONS

Repeating $\longrightarrow$ $0.3333\ldots = 0.\overline{3} = \frac{3}{9} = \frac{1}{3}$

$0.888\ldots = 0.\overline{8} = \frac{8}{9}$

$0.3434\ldots = 0.\overline{34} = \frac{34}{99}$

SSBCrack EXAMS

# DECIMAL EXPANSIONS TO FRACTIONS

$$0.1323232\ldots = 0.1\overline{32} = \frac{132 - 1}{\underbrace{990}}$$

(no. of zeroes = non-repeating digits)

$$0.437777 = 0.43\overline{7} = \frac{437 - 43}{900}$$

# BODMAS RULE

B — Bracket

O — Open (Multiplying)

D — Division

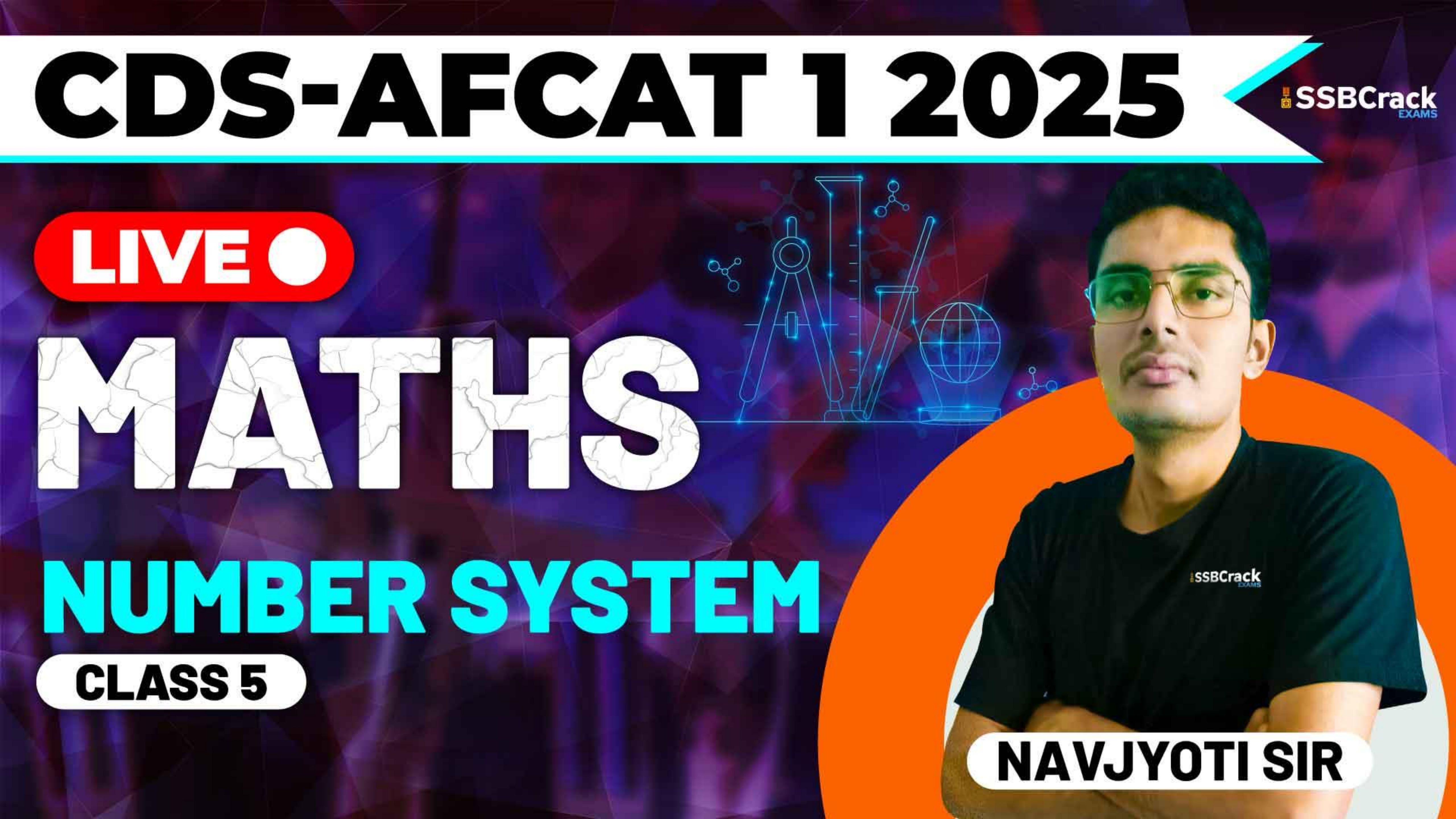
M — Multiplication

A — Addition

S — Subtraction

$\longrightarrow$ order of solving $\longrightarrow$

[ ] { } ( )


CDS-AFCAT 1 2025
SSBCrack EXAMS
LIVE
MATHS
NUMBER SYSTEM
CLASS 5
NAVJYOTI SIR