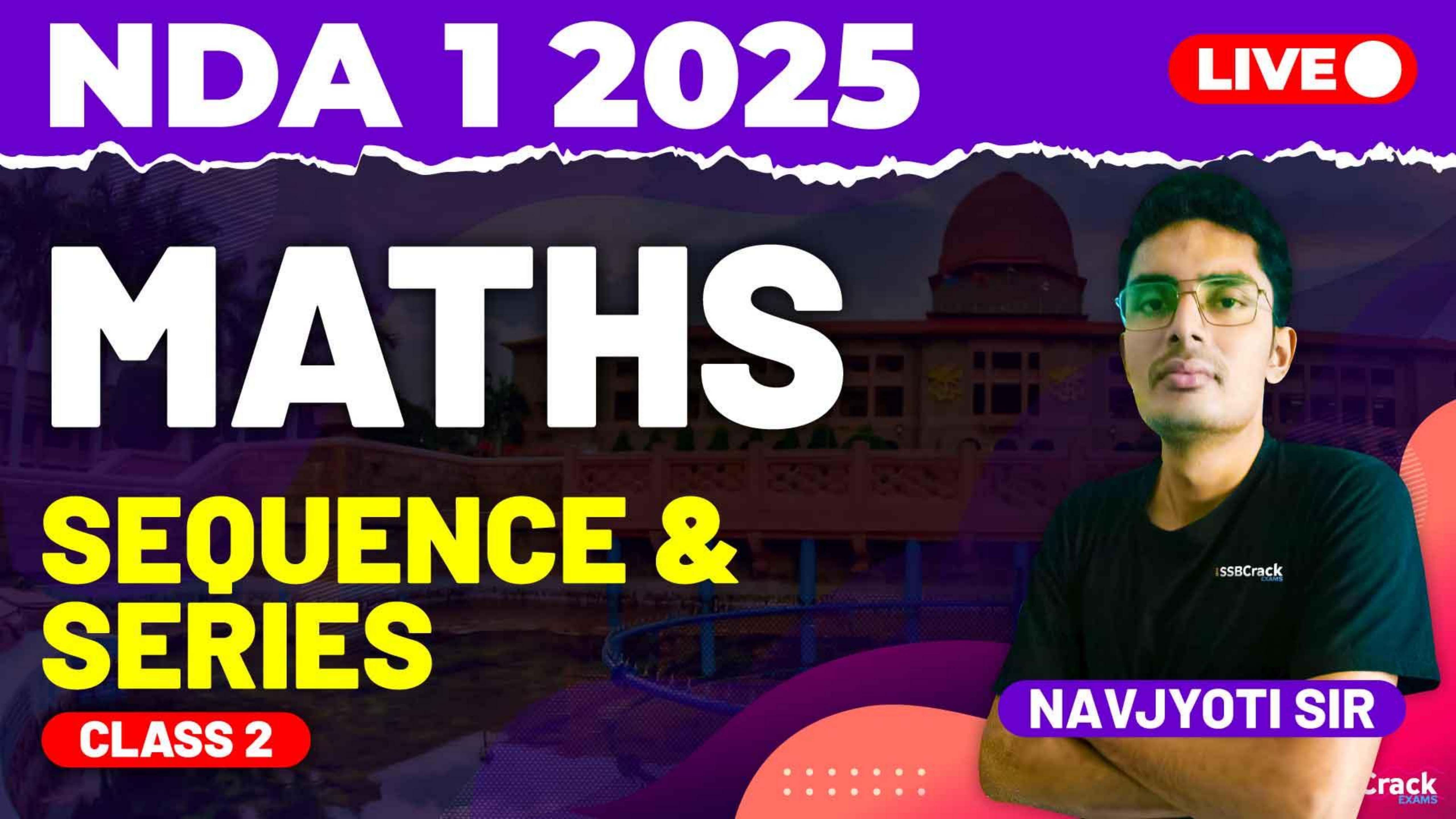

NDA 1 2025
LIVE
MATHS
SEQUENCE &
SERIES
CLASS 2
NAVJYOTI SIR
SSBCrack
EXAMS
Crack
EXAMS

14 Nov 2024 Live Classes Schedule

8:00AM	14 NOVEMBER 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	14 NOVEMBER 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

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

NDA 1 2025 LIVE CLASSES

11:30AM	GK - MODERN HISTORY - CLASS 5	RUBY MA'AM
1:00PM	CHEMISTRY MCQ - CLASS 7	SHIVANGI MA'AM
4:00PM	MATHS - SEQUENCE & SERIES - CLASS 2	NAVJYOTI SIR
5:30PM	ENGLISH - SENTENCE COMPLETION - CLASS 1	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	GK - MODERN HISTORY - CLASS 5	RUBY MA'AM
1:00PM	CHEMISTRY MCQ - CLASS 7	SHIVANGI MA'AM
5:30PM	ENGLISH - SENTENCE COMPLETION - CLASS 1	ANURADHA MA'AM
7:00PM	MATHS - MENSURATION 3D - CLASS 2	NAVJYOTI SIR

QUESTION

If the sum of n terms of an A.P. is given by

$S_n = 3n + 2n^2$, then the common difference of the A.P. is

(A) 3 (B) 2 (C) 6 (D) 4 ✓

$S_1 = 3 \times 1 + 2 \times (1)^2 = 5 = a$ (first term)

$S_2 = 3 \times 2 + 2 \times (2)^2 = 6 + 8 = 14 = a_1 + a_2 \Rightarrow a_2 = 14 - 5 = 9$

$a + d = 9$

$5 + d = 9$

$\boxed{d = 4}$

QUESTION

The third term of G.P. is 4. The product of its first 5 terms is

(A) 4^3 (B) 4^4 (C) 4^5 (D) None of these

$ar^2 = 4$

$a_n = ar^{n-1}$

$a_1 \cdot a_2 \cdot a_3 \cdot a_4 \cdot a_5 = ?$

$a(ar)(ar^2)(ar^3)(ar^4)$

$a^5 r^{1+2+3+4} = a^5 r^{10} = (ar^2)^5$

$= \underline{4^5}$

SSBCrack EXAMS

QUESTION

If x, $2y$, $3z$ are in A.P., where the distinct numbers x, y, z are in G.P. then the common ratio of the G.P. is

(A) 3 (B) $\frac{1}{3}$ (C) 2 (D) $\frac{1}{2}$

common ratio

either $\frac{y}{x}$ or, $\frac{z}{y}$

$2(2y) = x + 3z$

$4y = x + 3z$

$4y - x = 3z$

$\frac{1}{3}(4y - x) = z$

$y^2 = xz$

$y^2 = \frac{x}{3}(4y - x)$

$3y^2 = 4xy - x^2$

$3y^2 + x^2 = 4xy$

$\frac{3y^2}{4xy} + \frac{x^2}{4xy} = 1$

$\frac{3}{4}\left(\frac{y}{x}\right) + \frac{1}{\frac{4xy}{x^2}} = 1$

$$\frac{3}{4}\left(\frac{y}{x}\right) + \frac{1}{\frac{4xy}{x^2}} = 1$$

$$\frac{3}{4}(r) + \frac{1}{4r} = 1$$

$$\frac{3r}{4} + \frac{1}{4r} = 1$$

$$\frac{3r^2+1}{4r} = 1$$

$$3r^2 - 4r + 1 = 0$$

(a) 3

(b) $\frac{1}{3}$ ✓

(c) 2

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

put options and check

HARMONIC PROGRESSION (HP)

→ If $a_1, a_2, a_3 \ldots a_n$ are in AP,

then $\frac{1}{a_1}, \frac{1}{a_2}, \frac{1}{a_3} \ldots \frac{1}{a_n}$ is in HP.

common difference $= \frac{1}{a_2} - \frac{1}{a_1}$

GENERAL TERM

$$\boxed{a_n = \frac{1}{a+(n-1)d}}$$

* If three numbers a, b, c are in HP, $\left(\frac{1}{b} - \frac{1}{a} = \frac{1}{c} - \frac{1}{b}\right)$

$$\boxed{b = \frac{2ac}{a+c}}$$

$$\frac{2}{b} = \frac{1}{a} + \frac{1}{c}$$

SSBCrack EXAMS

QUESTION

The fifth term of the H.P., $2, 2\frac{1}{2}, 3\frac{1}{3}, \ldots\ldots\ldots\ldots$ will be

(a) $5\frac{1}{5}$ (b) $3\frac{1}{5}$ (c) $\frac{1}{10}$ (d) 10 ✓

HP $\longrightarrow$ $2, \frac{5}{2}, \frac{10}{3}, \ldots$

AP $\longrightarrow$ $\frac{1}{2}, \frac{2}{5}, \frac{10}{3} \ldots$

$a = \frac{1}{2}$; $d = \frac{2}{5} - \frac{1}{2} = \frac{4-5}{10} = \left(-\frac{1}{10}\right)$

Fifth term of AP

$a + 4d$

$\frac{1}{2} + 4\left(-\frac{1}{10}\right) = \frac{1}{2} - \frac{2}{5}$

$= \frac{5-4}{10} = \frac{1}{10}$

reciprocal will be term in HP

HARMONIC MEAN (HM)

For two positive numbers a & b,

$$HM = \frac{2ab}{a+b}$$

AM, GM AND HM

For 2 numbers a and b,

$$\frac{a+b}{2} > \sqrt{ab} > \frac{2ab}{a+b}$$

(AM) (GM) (HM)

$$\boxed{AM > GM > HM}$$

SSBCrack EXAMS

SPECIAL SERIES AND SUM

(1) Sum of first 'n' terms :

$$1 + 2 + 3 + 4 + \ldots n = \frac{n(n+1)}{2}$$

$$1 + 2 + 3 + 4 \ldots 10 = \frac{10(11)}{2} = 55$$

(2) sum of first 'n' squares :

$$1^2 + 2^2 + 3^2 + 4^2 \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

$$1^2 + 2^2 + 3^2 + 4^2 = \frac{4(5)(9)}{6} = 30$$

③ Sum of first 'n' cubes :

$$1^3 + 2^3 + 3^3 + \dots n^3 = \frac{n^2(n+1)^2}{4} = \left[\frac{n(n+1)}{2}\right]^2$$

(square of sum for first 'n' terms)

$$1^3 + 2^3 + 3^3 = 36 = \left[\frac{3(4)}{2}\right]^2 = 6^2 = 36$$

$$5^2 + 6^2 + 7^2 + 8^2$$

$$= (1^2 + 2^3 + 3^2 + \dots 8^2) - (1^2 + 2^2 + 3^2 + 4^2)$$

$$= \frac{8(9)(17)}{6} - \frac{4(5)(9)}{6} =$$

SPECIAL SERIES AND SUM

SSBCrack EXAMS

→ Find a_n for series.

$$S_n = \sum a_n$$

$$a_n = pn^3 + qn^2 + cn + d$$

$$S_n = \sum a_n = \sum (pn^3 + qn^2 + cn + d)$$

$$= p\sum n^3 + q\sum n^2 + c\sum n + d\sum 1$$

$$= p\left(\frac{n(n+1)}{2}\right)^2 + q\frac{n(n+1)(2n+1)}{6} + c\frac{n(n+1)}{2} + \underline{dn}$$

QUESTION

PYQ – 2020

If p^2, q^2 and r^2 (where $p, q, r > 0$) are in GP, then which of the following is/are correct?

1. p, q and r are in GP.
2. $\ln p$, $\ln q$ and $\ln r$ are in AP. ✓

Select the correct answer using the code given below :

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

$$\frac{q^2}{p^2} = \frac{r^2}{q^2} \Rightarrow \left(\frac{q}{p}\right)^2 = \left(\frac{r}{q}\right)^2 \Rightarrow \frac{q}{p} = \frac{r}{q} \quad \left(\frac{q}{p} \neq -\frac{r}{q} \text{ as } p, q, r > 0\right)$$

$$\Rightarrow q^2 = pr \longrightarrow p, q, r \text{ are in GP},$$

$\ln p \qquad \ln q \qquad \ln r$

a, b, c in AP

$\ln q - \ln p = \ln r - \ln q \quad (\underline{b - a = c - b})$

$\ln\left(\frac{q}{p}\right) = \ln\left(\frac{r}{q}\right)$

$\ln x - \ln y = \ln\left(\frac{x}{y}\right)$

$\frac{q}{p} = \frac{r}{q}$

$q^2 = pr \Rightarrow p, \underline{q, r \text{ in}}$ GP $\Rightarrow p^2, q^2$ $\underline{\text{and } r^2 \text{ in}}$ GP.

SSBCrack EXAMS

QUESTION

PYQ – 2024 - I

If a, b, c are in AP; b, c, d are in GP; c, d, e are in HP, then which of the following is/are correct ?

1. a, c and e are in GP ✓ $\rightarrow (c^2 = ae)$
2. $\frac{1}{a}$, $\frac{1}{c}$, $\frac{1}{e}$ are in GP ✓

Select the correct answer using the code given below :

(a) 1 only

(b) 2 only

(c) Both 1 and 2 ✓

(d) Neither 1 nor 2

$2b = a + c$

$c^2 = bd$

$d = \frac{2ce}{c+e}$

$c^{\cancel{2}} = b\left(\frac{2\cancel{c}e}{c+e}\right)$

$c^2 + ce = 2be \longrightarrow c^2 + ce = (a+c)e$

$c^2 + ce = ae + ce \Rightarrow c^2 = ae$

If p, q, r are in GP,

$\Rightarrow \frac{1}{p}, \frac{1}{q}, \frac{1}{r}$ are also in GP.

QUESTION

PYQ – 2024 - I

. If a, b and c ($a > 0$, $c > 0$) are in GP, then consider the following in respect of the equation $ax^2 + bx + c = 0$:

1. The equation has imaginary roots. ✓
2. The ratio of the roots of the equation is $1 : \omega$ where ω is a cube root of unity. ✓
3. The product of roots of the equation is $\left(\frac{b^2}{a^2}\right)$. ✓

Which of the statements given above are correct ?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3 ✓

$$b^2 = ac \qquad b = \sqrt{ac}$$

1

$$ax^2 + bx + c = 0$$

$$D = b^2 - 4ac$$

$$= ac - 4ac$$

$$= -3ac < 0$$

$$(a > 0,\ c > 0)$$

2

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-\sqrt{ac} \pm \sqrt{-3ac}}{2a} = \frac{-\sqrt{ac}}{a}\left(\frac{1 \mp \sqrt{-3}}{2}\right)$$

$$\frac{-\sqrt{ac}}{a}\left(\frac{1 \mp \sqrt{-3}}{2}\right) = -\frac{b}{a}\omega \; ; \quad -\frac{b}{a}\omega^2$$

$$\omega = \frac{-1+\sqrt{3}i}{2} \qquad \omega^2 = \frac{-1-\sqrt{3}i}{2}$$

$$(i = \sqrt{-1})$$

Ratio of roots

$$\frac{\frac{-b}{a}\omega}{\frac{-b}{a}\omega^2} = 1 : \omega$$

③ product $\longrightarrow \left(-\frac{b}{a}\omega\right)\left(-\frac{b}{a}\omega^2\right) = \frac{b^2}{a^2}\omega^3 = \frac{b^2}{a^2}(1) = \frac{b^2}{a^2}$

QUESTION

$\frac{1}{q+r}, \frac{1}{r+p}, \frac{1}{p+q}$ are in A.P. then,

(a) p, q, r are in A.P

(b) p^2, q^2, r^2 are in A.P ✓

(c) $\frac{1}{p}, \frac{1}{q}, \frac{1}{r}$ are in A.P

(d) $p+q+r$ are in A.P

$$\frac{1}{r+p} - \frac{1}{q+r} = \frac{1}{p+q} - \frac{1}{r+p}$$

$$\frac{q-p}{(\cancel{r+p})(q+r)} = \frac{r-q}{(p+q)(\cancel{r+p})}$$

$$= -(p-q)(p+q) = (r+q)(r-q)$$

$$-(p^2-q^2) = r^2 - q^2$$

$$\underbrace{2q^2 = r^2+p^2} \Rightarrow p^2, q^2, r^2 \text{ are in AP}$$

QUESTION

The sum of the first n terms of the series

$\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+\ldots$ is equal to

(a) $2^n - n - 1$ (b) $1 - 2^{-n}$

(c) $2^{-n} + n - 1$ (d) $2^n - 1$

$$\frac{2^1-1}{2^1} + \frac{2^2-1}{2^2} + \frac{2^3-1}{2^3} + \frac{2^4-1}{2^4} + \ldots \quad \frac{2^n-1}{2^n}$$

$$= 1 - \frac{1}{2^n} = a_n$$

$$S_n = \Sigma a_n = \Sigma\left(1 - \frac{1}{2^n}\right) = \Sigma 1 - \Sigma \frac{1}{2^n}$$

$$\sum 1 = n$$

$$\sum \frac{1}{2^n} = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \cdots \frac{1}{2^n}$$

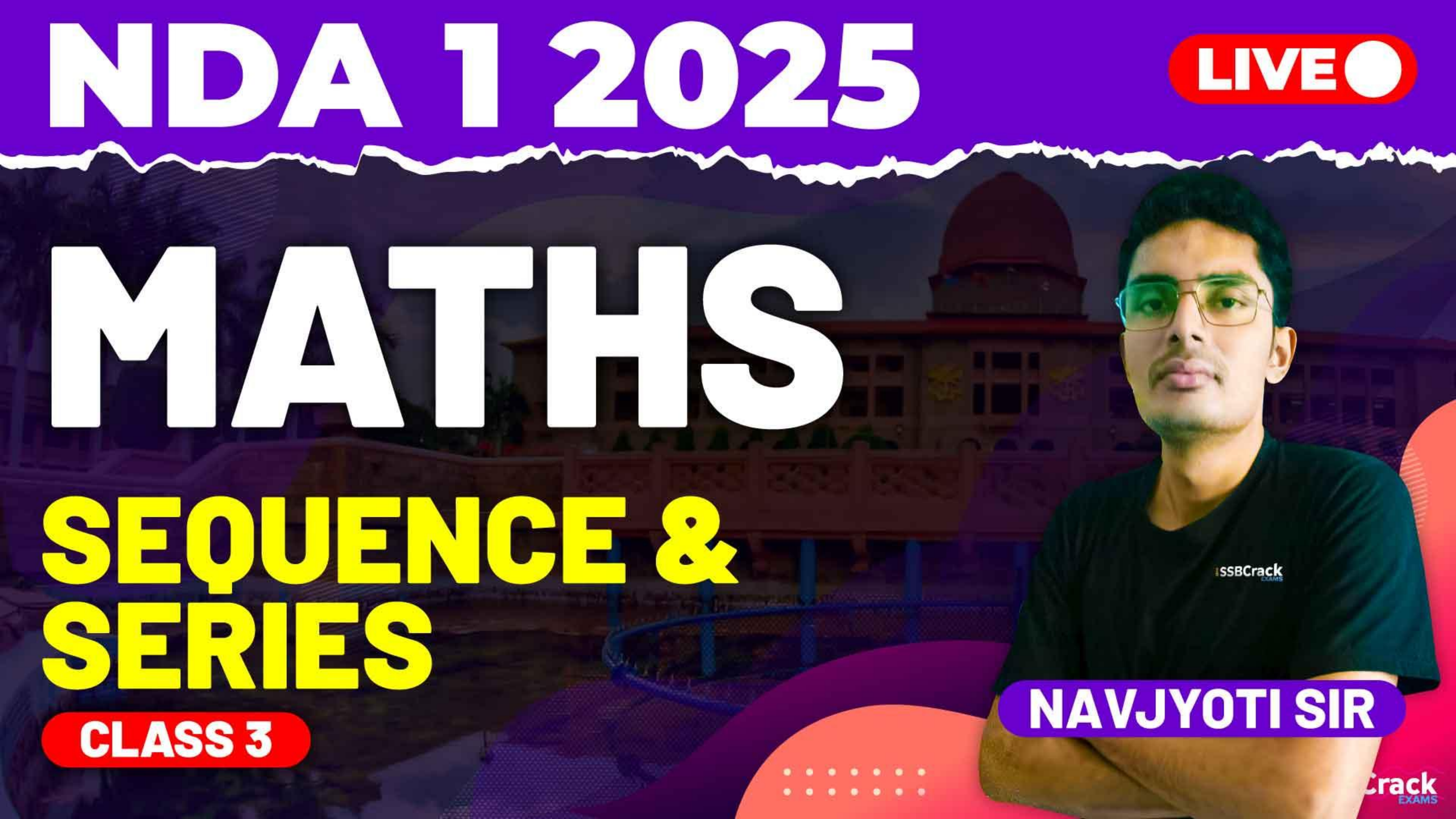
GP with $a = \frac{1}{2}$, $r = \frac{1}{2}$

As $r < 1$, $S_n = \dfrac{a(1-r^n)}{1-r}$

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

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

$$\sum a_n = \sum 1 - \sum \frac{1}{2^n} = n - \left(1 - 2^{-n}\right) = n - 1 + 2^{-n} = 2^{-n} + n - 1$$


NDA 1 2025
LIVE
MATHS
SEQUENCE &
SERIES
CLASS 3
NAVJYOTI SIR
SSBCrack EXAMS