07 Feb 2025 Live Classes Schedule

| 9:00AM | 07 FEBRUARY 2025 DAILY DEFENCE UPDATES | DIVYANSHU SIR |
| 10:00AM | 07 FEBRUARY 2025 DAILY CURRENT AFFAIRS | RUBY MA'AM |

SSB INTERVIEW LIVE CLASSES

| 9:30AM | OVERVIEW OF PPDT & PRACTICE | ANURADHA MA'AM |

AFCAT 1 2025 LIVE CLASSES

3:00PM	STATIC GK - HIGHEST SMALLEST IN INDIA & WORLD	DIVYANSHU SIR
4:30PM	ENGLISH - FILL IN THE BLANKS - CLASS 1	ANURADHA MA'AM
5:30PM	MATHS - PROBABILITY	NAVJYOTI SIR

NDA 1 2025 LIVE CLASSES

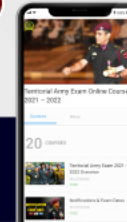| 10:00AM | MATHS - SEQUENCE & SERIES - CLASS 2 | NAVJYOTI SIR |
11:30AM	POLITY - CLASS 2	RUBY MA'AM
1:00PM	PHYSICS - NUCLEUS & RADIOACTIVITY	NAVJYOTI SIR
4:30PM	ENGLISH - FILL IN THE BLANKS - CLASS 1	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	POLITY - CLASS 2	RUBY MA'AM
1:00PM	HYSICS - NUCLEUS & RADIOACTIVITY	NAVJYOTI SIR
4:30PM	ENGLISH - FILL IN THE BLANKS - CLASS 1	ANURADHA MA'AM

SSBCrack EXAMS

The roots of the quadratic equation

$$a^2(b^2 - c^2)x^2 + b^2(c^2 - a^2)x + c^2(a^2 - b^2) = 0$$

$$D = 0$$

are equal $(a^2 \neq b^2 \neq c^2)$.

$$B^2 - 4AC = 0$$

Which one of the following statements is correct?

$$\left[b^2 (c^2 - a^2) \right]^2 - 4 \left[a^2 (b^2 - c^2) c^2 (a^2 - b^2) \right] = 0$$

(a) a^2, b^2, c^2 are in AP.

(b) a^2, b^2, c^2 are in GP.

$$b^4 (c^2 - a^2)^2 - 4a^2 c^2 (b^2 - c^2)(a^2 - b^2) = 0$$

(c) a^2, b^2, c^2 are in HP.

$$b^4 c^4 + b^4 a^4 - 2b^4 c^2 a^2 - 4a^2 c^2 (b^2 a^2 - b^4 - a^2 c^2$$

(d) a^2, b^2, c^2 are neither in AP nor in GP nor in HP.

$$+ b^2 c^2)$$

$$= b^4 c^4 + b^4 a^4 - 2b^4 c^2 a^2 - 4a^4 b^2 c^2 + 4a^2 b^4 c^2 + 4a^4 c^4 - 4a^2 c^4 b^2$$

$$b^4 c^4 + b^4 a^4 - 2b^4 c^2 a^2 - 4a^4 b^2 c^2 + 4a^2 b^4 c^2 + 4a^4 c^4 - 4a^2 c^4 b^2 = 0$$

$$\Rightarrow b^4 c^4 + b^4 a^4 + 2b^4 c^2 a^2 - 4a^4 b^2 c^2 + 4a^4 c^4 - 4a^2 c^4 b^2 = 0$$

$$\Rightarrow \left(b^2 c^2 + b^2 a^2 - 2a^2 c^2 \right)^2 = 0$$

$$\color{red}{(a+b+c)^2}$$

$$\color{red}{= a^2 + b^2 + c^2 + 2ab + 2bc + 2ca}$$

$$b^2 c^2 + b^2 a^2 - 2a^2 c^2 = 0$$

$$b^2 c^2 + b^2 a^2 = 2a^2 c^2$$

Divide by $a^2 b^2 c^2$,

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

$$b^2 = \frac{2a^2 c^2}{a^2 + c^2} \Rightarrow a^2, b^2 \,\&\, c^2 \text{ are in HP}$$

The roots of the quadratic equation

$$a^2(b^2 - c^2)x^2 + b^2(c^2 - a^2)x + c^2(a^2 - b^2) = 0$$

are equal $(a^2 \neq b^2 \neq c^2)$.

Which one of the following is a root of the equation?

(a) $\dfrac{b^2(c^2 - a^2)}{a^2(c^2 - b^2)}$

(b) $\dfrac{b^2(c^2 - a^2)}{a^2(b^2 - c^2)}$

(c) $\dfrac{b^2(c^2 - a^2)}{2a^2(c^2 - b^2)}$

(d) $\dfrac{b^2(c^2 - a^2)}{2a^2(b^2 - c^2)}$

for equal roots, $\quad x = \dfrac{-B}{2A}$

$$Ax^2 + Bx + C = 0$$

$$= \left(\dfrac{- b^2(c^2 - a^2)}{2a^2(b^2 - c^2)} \right)$$

$$= \dfrac{b^2(c^2 - a^2)}{2a^2(c^2 - b^2)}$$

The product of 5 consecutive terms of an ĀP is 229635. The first, second and fifth terms are in GP.

PYQ – 2024 - II

What is the common difference?

(a) 3

(b) 4

(c) 5

(d) 6

$$a-2d \qquad a-d \qquad a \qquad a+d \qquad a+2d$$

$$\downarrow_{1^{st}} \qquad \downarrow_{2^{nd}} \qquad\qquad\qquad\qquad \downarrow_{5^{th}}$$

$$(a-d)^2 = (a-2d)(a+2d)$$

$$a^2 + d^2 - 2ad = a^2 - 4d^2$$

$$d^2 + 4d^2 = 2ad$$

$$5d^2 = 2ad$$

$$5d = 2a$$

$$\left(d = \frac{2a}{5}\right) \implies a = \frac{5d}{2}$$

$$a - 2d \qquad a - d \qquad a \qquad a + d \qquad a + 2d$$

$$a = \frac{5d}{2}$$

$$\frac{d}{2} \qquad \frac{3d}{2} \qquad \frac{5d}{2} \qquad \frac{7d}{2} \qquad \frac{9d}{2}$$

$$\left(\frac{d}{2}\right)\left(\frac{3d}{2}\right)\left(\frac{5d}{2}\right)\left(\frac{7d}{2}\right)\left(\frac{9d}{2}\right) = 229635$$

$$d^5 = \frac{229635 \times 2^5}{3 \times 5 \times 7 \times 9} \qquad \Rightarrow \qquad d^5 = 243 \times 2^5$$

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

$$d = 3 \times 2 = \boxed{6}$$

The product of 5 consecutive terms of an ȦP is 229635. The first, second and fifth terms

are in GP.

What is the sum of all five terms?

(a) 60

(b) 65

(c) 75

(d) 80

$$\frac{d}{2} + \frac{3d}{2} + \frac{5d}{2} + \frac{7d}{2} + \frac{9d}{2}$$

$$\frac{d}{2}\left(1 + 3 + 5 + 7 + 9\right)$$

$$\frac{6}{2} \times 25 = 3 \times 25 = \boxed{75}$$

Q) After paying 30 out of 40 installments of a debt of Rs. 3600, one third of the debt is unpaid. If the installments are forming an arithmetic series, then what is the first instalment?

(a) Rs 50
(b) Rs 51
(c) Rs 105
(d) Rs 110

$(a) = ?$

$$paid = \frac{2}{3}(3600) = 2400 \equiv 30 \text{ installments}$$

$$n = 30 \; ; \; a = ?, \; d = ?, \; S_n = 2400$$

$$2400 = \frac{30}{2}\left(2a + (30-1)d\right)$$

$$160 = 2a + 29d \quad \text{---} \quad (1)$$

$$3600 = \frac{40}{2}\left(2a + (40-1)d\right)$$

$$180 = 2a + 39d \quad \text{---} \quad (2)$$

From (1) and (2),

$$2a + 29d = 160$$

$$2a + 39d = 180$$

(-) ——————————

$$10d = 20$$

$$\underline{d = 2}$$

$$2a = 160 - 29d$$

$$2a = 160 - 29(2) = 160 - 58 = 102$$

$$2a = 102$$

$$\boxed{a = 51}$$ first installment

Q) After paying 30 out of 40 installments of a debt of Rs. 3600, one third of the debt is unpaid. If the installments are forming an arithmetic series, then what is the first instalment?

(a) Rs 50

(b) Rs 51

(c) Rs 105

(d) Rs 110

Ans: (b)

Q) If the sum of 'n' terms of an arithmetic progression is $n^2 - 2n$, then what is the nth term?

(a) $3n - n^2$ (b) $2n - 3$

(c) $2n + 3$ (d) $2n - 5$

$$S_n = n^2 - 2n$$

$$S_1 = a_1 = (1)^2 - 2(1) = \underline{-1}$$

(OR)

$$a_n = S_n - S_{n-1}$$

$$= \left[(n)^2 - 2n\right] - \left[(n-1)^2 - 2(n-1)\right] = n^2 - 2n - \left(n^2 + 1 - 2n - 2n + 2\right)$$

$$= 2n - 3 \underline{\qquad\qquad} (b) \checkmark$$

(a) $a_1 = a = 3 - (1)^2 = 2$ ✗

(b) $a_1 = a = 2(1) - 3 = -1$ ✓

(c) $a_1 = a = 2(1) + 3 = 5$ ✗

(d) $a_1 = a = 2(1) - 5 = -3$ ✗

Q) If the sum of 'n' terms of an arithmetic progression is $n^2 - 2n$, then what is the nth term?

(a) $3n - n^2$ (b) $2n - 3$

(c) $2n + 3$ (d) $2n - 5$

Ans: (b)

Q) What is sum to the 100 terms of the series

$9 + 99 + 999 + \ldots$?

(a) $\dfrac{10}{9}\left(10^{100} - 1\right) - 100$

(b) $\dfrac{10}{9}\left(10^{99} - 1\right) - 100$

(c) $100\left(100^{10} - 1\right)$

(d) $\dfrac{9}{100}\left(10^{100} - 1\right)$

$$\left(10 - 1\right) + \left(10^2 - 1\right) + \left(10^3 - 1\right) + \ldots$$

GP

$$\left(10 + 10^2 + 10^3 + \ldots\ 10^{100}\right) - \left(1 + 1 + 1 + \ldots (100 \text{ times})\right)$$

$$= \frac{10\left((10)^{100} - 1\right)}{10 - 1} - 100 \qquad = \frac{10}{9}\left(10^{100} - 1\right) - 100$$

Q) What is sum to the 100 terms of the series
9 + 99 + 999 + ...?

(a) $\dfrac{10}{9}\left(10^{100} - 1\right) - 100$

(b) $\dfrac{10}{9}\left(10^{99} - 1\right) - 100$

(c) $100\left(100^{10} - 1\right)$

(d) $\dfrac{9}{100}\left(10^{100} - 1\right)$

Ans: (a)

Q) If the sum of the first two terms and the sum of the first four terms of a geometric progression with positive common ratio are 8 and 80 respectively, then what is the 6th term?

ar^5

(a) 88   (b) 243

(c) 486   (d) 1458

$$a + ar = 8$$

$$a + ar + ar^2 + ar^3 = 80$$

$$a(1+r) = 8$$

$$a(1+r+r^2+r^3) = 80$$

$$a = \frac{8}{1+r}$$

$$1+r+r^2+r^3 = 10(1+r)$$

$$r^3 + r^2 - 9r = 9$$

$$r^3 + r^2 - 9r - 9 = 0$$

$$r = -1$$ (one of the zeroes)

rejected as $(a = \infty)$

$$r+1 \overline{)\begin{array}{c} r^2 - 9 \\ r^3 + r^2 - 9r - 9 \\ r^3 + r^2 \end{array}}$$

$$\underline{-9r - 9}$$

$$\underline{\underline{-9r - 9}}$$

$$0$$

$$r^2 - 9$$

$$(r+3)(r-3)$$

$$r = 3, \quad -3$$

$$a = \frac{8}{1+r}$$

$$a = \frac{8}{4} = 2 \quad \bigg| \quad a = -4$$

$$6^{th} \text{ term}$$

$$ar^5 = 2(3)^5 = 2 \times 243 = \underline{486}$$

$$ar^5 = (-4)(-3)^5 = \underline{972}$$

Q) If the sum of the first two terms and the sum of the first four terms of a geometric progression with positive common ratio are 8 and 80 respectively, then what is the 6th term?

(a) 88
(b) 243
(c) 486
(d) 1458

Ans: (c)

Q) If x^2, y^2, z^2 are in AP, then $y+z, z+x, x+y$ are in

   (a) AP   (b) HP

   (c) GP   (d) None of these

Try in reverse

(a) $y+z, z+x, x+y$ are in AP,

$$2(x+z) = (y+z) + x+y \qquad \alpha$$

$$x+z = 2y$$

$$\left. x^2 + z^2 + 2xz = 4y^2 \right\} \quad \begin{array}{l} x^2, y^2 \text{ \& } z^2 \\ \text{are not in AP} \end{array}$$

(b)

$$\frac{2}{z+x} = \frac{1}{x+y} + \frac{1}{y+z}$$

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

$$2xy + 2xz + 2y^2 + 2yz = xz + x^2 + 2yz + 2yx + z^2 + zx$$

$$2y^2 = x^2 + z^2$$

$$\Rightarrow \quad \underline{x^2, y^2 \ \& \ z^2} \ \text{are in AP}$$

Q) If x^2, y^2, z^2 are in AP, then $y+z, z+x, x+y$ are in

(a) AP

(b) HP

(c) GP

(d) None of these

Ans: (b)

Q) What is the value of

$1 - 2 + 3 - 4 + 5 - \ldots + 101?$

(a) 51
(b) 55
(c) 110
(d) 111

$$\left(1 + 3 + 5 + \ldots 101\right) - 2\left(1 + 2 + 3 + \ldots 50\right)$$

$$= (51)^2 - 2\frac{50(51)}{2}$$

$$= (51)^2 - 50(51) = 51(51 - 50) = \boxed{51}$$

Q) What is the value of

$1 - 2 + 3 - 4 + 5 - \ldots\ldots + 101?$

(a) 51   (b) 55

(c) 110   (d) 111

Ans: (a)

Q) If b_1, b_2, b_3 are three consecutive terms of an arithmetic progression with common difference $d > 0$, then what is the value of d for which $b_3^2 = b_2 b_3 + b_1 d + 2$?

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

(b) 0

(c) 1

(d) 2

$b_1 = a - d$

$b_2 = a$

$b_3 = a + d$

$(a+d)^2 = a(a+d) + (a-d)d + 2$

$a^2 + d^2 + 2ad = a^2 + ad + ad - d^2 + 2$

$2d^2 = 2 \Rightarrow d^2 = 1 \Rightarrow \boxed{d = 1} \ \text{or} \ -1$

Q) If b_1, b_2, b_3 are three consecutive terms of an arithmetic progression with common difference $d > 0$, then what is the value of d for which $b_3^2 = b_2 b_3 + b_1 d + 2$?

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

(b) 0

(c) 1

(d) 2

Ans: (c)

Q) If 1, x, y, z, 16 are in geometric progression, then what is the value of $x + y + z$?

(a) 8

(b) 12

(c) 14

(d) 16

$a = 1$

$$x + y + z$$

$16 = ar^4$

$$= 2 + 4 + 8 \qquad\qquad (-2) + 4 + (-8)$$

$r^4 = 16$

$$= \boxed{14} \qquad\qquad = \boxed{6}$$

$r = 2 \text{ or } r = -2$

matches option

Q) If 1, x, y, z, 16 are in geometric progression, then what is the value of $x + y + z$?

(a) 8

(b) 12

(c) 14

(d) 16

Ans: (c)

Q) Which one of the following is correct?

If $\dfrac{1}{b-c} + \dfrac{1}{b-a} = \dfrac{1}{a} + \dfrac{1}{c}$, then a, b, c are in

(a) AP

(b) HP

(c) GP

(d) None of these

Q) Which one of the following is correct?

If $\dfrac{1}{b-c}+\dfrac{1}{b-a}=\dfrac{1}{a}+\dfrac{1}{c}$, then a, b, c are in

(a) AP

(b) HP

(c) GP

(d) None of these

Ans: (b)

Q) If A, B and C are in AP and $b : c = \sqrt{3} : \sqrt{2}$, then what is the value of sin C?

(a) 1

(b) $\dfrac{1}{\sqrt{3}}$

(c) $\sqrt{3}$

(d) $\dfrac{1}{\sqrt{2}}$

Q) If A, B and C are in AP and $b : c = \sqrt{3} : \sqrt{2}$, then what is the value of sin C?

(a) 1

(b) $\dfrac{1}{\sqrt{3}}$

(c) $\sqrt{3}$

(d) $\dfrac{1}{\sqrt{2}}$

Ans: (d)

Q) If the AM and GM between two number are in the ratio $m : n$, then what is the ratio between the two numbers?

(a) $\dfrac{m + \sqrt{m^2 - n^2}}{m - \sqrt{m^2 - n^2}}$

(b) $\dfrac{m + n}{m - n}$

(c) $\dfrac{m^2 - n^2}{m^2 + n^2}$

(d) $\dfrac{m^2 + n^2 - mn}{m^2 + n^2 + mn}$

Q) If the AM and GM between two number are in the ratio $m : n$, then what is the ratio between the two numbers?

(a) $\dfrac{m + \sqrt{m^2 - n^2}}{m - \sqrt{m^2 - n^2}}$

(b) $\dfrac{m + n}{m - n}$

(c) $\dfrac{m^2 - n^2}{m^2 + n^2}$

(d) $\dfrac{m^2 + n^2 - mn}{m^2 + n^2 + mn}$

Ans: (a)

Q) The arithmetic mean of two numbers exceeds their geometric mean by 2 and the geometric mean exceeds their harmonic mean by 1.6. What are the two numbers?

(a) 16, 4

(b) 81, 9

(c) 256, 16

(d) 625, 25

Q) The arithmetic mean of two numbers exceeds their geometric mean by 2 and the geometric mean exceeds their harmonic mean by 1.6. What are the two numbers?

(a) 16, 4

(b) 81, 9

(c) 256, 16

(d) 625, 25

Ans: (a)

Q) What is the sum of $\sqrt{3} + \dfrac{1}{\sqrt{3}} + \dfrac{1}{3\sqrt{3}} + ...$?

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

(b) $\dfrac{3\sqrt{3}}{2}$

(c) $\dfrac{2\sqrt{3}}{3}$

(d) $\sqrt{3}$

Q) What is the sum of $\sqrt{3} + \dfrac{1}{\sqrt{3}} + \dfrac{1}{3\sqrt{3}} + \ldots ?$

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

(b) $\dfrac{3\sqrt{3}}{2}$

(c) $\dfrac{2\sqrt{3}}{3}$

(d) $\sqrt{3}$

Ans: (b)

Q) If $\dfrac{1}{b-a} + \dfrac{1}{b-c} = \dfrac{1}{a} + \dfrac{1}{c}$, then a, b, c are in

(a) AP

(b) GP

(c) HP

(d) None of these

Q) If $\dfrac{1}{b-a} + \dfrac{1}{b-c} = \dfrac{1}{a} + \dfrac{1}{c}$, then a, b, c are in

(a) AP

(b) GP

(c) HP

(d) None of these

Ans: (c)

Q) Which one of the following options is correct?

    (a) $\sin^2 30°, \sin^2 45°, \sin^2 60°$ are in GP

    (b) $\cos^2 30°, \cos^2 45°, \cos^2 60°$ are in GP

    (c) $\cot^2 30°, \cot^2 45°, \cot^2 60°$ are in GP

    (d) $\tan^2 30°, \tan^2 45°, \tan^2 60°$ are in GP

Q) Which one of the following options is correct?

    (a) $\sin^2 30°$, $\sin^2 45°$, $\sin^2 60°$ are in GP

    (b) $\cos^2 30°$, $\cos^2 45°$, $\cos^2 60°$ are in GP

    (c) $\cot^2 30°$, $\cot^2 45°$, $\cot^2 60°$ are in GP

    (d) $\tan^2 30°$, $\tan^2 45°$, $\tan^2 60°$ are in GP

Ans: (d)

Q) What is the 10th common term between the series
$2+6+10+$ .... and $1+6+11+$ .... ?

(a) 180

(b) 186

(c) 196

(d) 206

Q) What is the 10th common term between the series
$2+6+10+\ldots$ and $1+6+11+\ldots$?

(a) 180

(b) 186

(c) 196

(d) 206

Ans: (b)

Q) If the AM and HM of two numbers are 27 and 12 respectively, then what is their GM equal to?

(a) 12

(b) 18

(c) 24

(d) 27

Q) If the AM and HM of two numbers are 27 and 12 respectively, then what is their GM equal to?

(a) 12

(b) 18

(c) 24

(d) 27

Ans: (b)

Q) Which term of the sequence 20, $19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \dots$ is the

first negative term?

(a) 27th

(b) 28th

(c) 29th

(d) No such term exists

Q) Which term of the sequence 20, $19\dfrac{1}{4}$, $18\dfrac{1}{2}$, $17\dfrac{3}{4}$,... is the first negative term?

(a) 27th

(b) 28th

(c) 29th

(d) No such term exists

Ans: (b)

Q) If the sequence $\{S_n\}$ is a geometric progression and $S_2 S_{11} = S_p S_8$, then what is the value of p?

(a) 1

(b) 3

(c) 5

(d) cannot be determined

Q) If the sequence $\{S_n\}$ is a geometric progression and $S_2 \, S_{11} = S_p \, S_8$, then what is the value of p?

(a) 1

(b) 3

(c) 5

(d) cannot be determined

Ans: (c)

DIRECTIONS : *For the next two (02) Questions that follow:*

The sum of first 10 terms and 20 terms of an AP are 120 and 440 respectively.

Q)What is its first term?

(a)   2

(b) 3

(c)   4

(d) 5

Q)What is its first term?

(a) 2

(b) 3

(c) 4

(d) 5

Ans: (b)

Q) What is the common difference?

(a)   1   (b) 2

(c)   3   (d) 4

Q) What is the common difference?

(a) 1   (b) 2

(c) 3   (d) 4

Ans: (b)

Q) What is the number of diagonals which can be drawn by joining the angular points of a polygon of 100 sides?

(a) 4850

(b) 4950

(c) 5000

(d) 10000

Q) What is the number of diagonals which can be drawn by joining the angular points of a polygon of 100 sides?

(a) 4850

(b) 4950

(c) 5000

(d) 10000

Ans: (a)

Q) What is the geometric mean of the sequence $1, 2, 4, 8, \ldots$ 2^n ?

(a) $2^{n/2}$

(b) $2^{(n+1)/2}$

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

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

Q) What is the geometric mean of the sequence 1, 2, 4, 8, ...
2^n ?

(a) $2^{n/2}$

(b) $2^{(n+1)/2}$

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

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

Ans: (a)

Q) The harmonic mean H of two numbers is 4 and the arithmetic mean A and geometric mean G satisfy the equation $2A + G^2 = 27$. The two numbers are

(a) 6, 3   (b) 9, 5

(c) 12, 7   (d) 3, 1

Q) The harmonic mean H of two numbers is 4 and the arithmetic mean A and geometric mean G satisfy the equation $2A + G^2 = 27$. The two numbers are

(a)   6, 3

(b)   9, 5

(c)   12, 7

(d)   3, 1

Ans: (a)

NDA 1 2025

LIVE

MATHS

MATRICES & DETERMINANTS - 1
MCQS

NAVJYOTI SIR

SSBCrack EXAMS