# 09 Dec 2024 Live Classes Schedule

| Time | Class | Instructor |
|---|---|---|
| 8:00AM | 09 DEC 2024 DAILY CURRENT AFFAIRS | RUBY MA'AM |
| 9:00AM | 09 DEC 2024 DAILY DEFENCE UPDATES | DIVYANSHU SIR |

## NDA 1 2025 LIVE CLASSES

| Time | Class | Instructor |
|---|---|---|
| 1:00PM | PHYSICS - SOUND | NAVJYOTI SIR |
| 5:30PM | MATHS - DIFFERENTIABILITY & DIFFERENTIATION - CLASS 4 | NAVJYOTI SIR |

## CDS 1 2025 LIVE CLASSES

| Time | Class | Instructor |
|---|---|---|
| 1:00PM | PHYSICS - SOUND | NAVJYOTI SIR |
| 7:00PM | MATHS - ALGEBRA - CLASS 4 | NAVJYOTI SIR |

**Q)** If $4x + \dfrac{1}{x} = 5$, $x \neq 0$, then the value of $\dfrac{5x}{4x^2 + 10x + 1}$ is

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

$$4x + \frac{1}{x} = 5$$

$$x = 1$$

$$\frac{5 \times 1}{4(1)^2 + 10(1) + 1} = \frac{5}{15} = \frac{1}{3}$$

**Q)** If $4x + \dfrac{1}{x} = 5$, $x \neq 0$, then the value of $\dfrac{5x}{4x^2 + 10x + 1}$ is

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

**Ans: (b)**

**Q)** If $x^8 - 1442x^4 + 1 = 0$, then a possible value of

$x - \dfrac{1}{x}$ is:

(a) 5      (b) 8      (c) 4      (d) 6

$$x^8 - 1442x^4 + 1 = 0$$

Divide by $x^4$,

$$x^4 - 1442 + \frac{1}{x^4} = 0$$

$$x^4 + \frac{1}{x^4} = 1442$$

$$\left(x^2 + \frac{1}{x^2}\right)^2 - 2 = 1442$$

$$x^2 + \frac{1}{x^2} = 38$$

$$-2 = \boxed{36} \checkmark$$

$$+2 = \boxed{40} \; ✗$$

$$\left(x - \frac{1}{x}\right)^2 + 2 = 38$$

$$\boxed{\left(x - \frac{1}{x}\right) = 6}$$

$\boxed{-2} \; 1440 \; ✗$

$\boxed{+2} \; 1444 = 38^2$

$\left.\begin{array}{}\end{array}\right)$ perfect square

$$x^2 + \frac{1}{x^2}$$

$$\left(x + \frac{1}{x}\right)^2 - 2$$

$$\left(x - \frac{1}{x}\right)^2 + 2$$

**Q)** If $x^8 - 1442x^4 + 1 = 0$, then a possible value of

$x - \dfrac{1}{x}$ is:

(a) 5        (b) 8        (c) 4        (d) 6

**Ans: (d)**

**Q)** For what value of k, does the equation
$[kx^2 + (2k + 6)x + 16 = 0]$ have equal roots?

(a) 1 and 9        (b) −9 and 1

(c) −1 and 9        (d) −1 and −9

$$D = 0$$

$$(2k + 6)^2 - 4(k)(16) = 0$$

$$4k^2 + 36 + 24k - 64k = 0$$

$$4k^2 - 40k + 36 = 0$$

$$k^2 - 10k + 9 = 0$$

$$(k-1)(k-9) = 0$$

$$k = 1, 9$$

**Q)** For what value of k, does the equation
$[kx^2 + (2k + 6)x + 16 = 0]$ have equal roots?

(a)  1 and 9

(b)  −9 and 1

(c)  −1 and 9

(d)  −1 and −9

**Ans: (a)**

**Q)** If $a^3 + 3a^2 + 9a = 1$, then what is the value of $a^3 + (3/a)$?

(a) 31     (b) 26     (c) 28     (d) 24

$$a^3 + 3a^2 + 9a = 1 \quad\text{---}\quad \times a$$

$$a^4 + 3a^3 + 9a^2 = a \quad\text{---}\quad \textcircled{1}$$

$$a^3 + 3a^2 + 9a = 1 \quad\text{---}\quad \times 3$$

$$3a^3 + 9a^2 + 27a = 3 \quad\text{---}\quad \textcircled{2}$$

$$\textcircled{1} - \textcircled{2},$$

$$
\begin{array}{r}
a^4 + 3a^3 + 9a^2 = a \\
3a^3 + 9a^2 + 27a = 3 \\
\hline
a^4 - 27a = a - 3
\end{array}
$$

$$a^4 + 3 = 28a$$

$$\boxed{a^3 + \frac{3}{a} = 28}$$

**Q)** If $a^3 + 3a^2 + 9a = 1$, then what is the value of $a^3 + (3/a)$?

(a) 31     (b) 26     (c) 28     (d) 24

**Ans: (c)**

**Q)** If $\dfrac{x}{(2x+y+z)} = \dfrac{y}{(x+2y+z)} = \dfrac{z}{(x+y+2z)} = a$,

then find 'a' if $x+y+z \neq 0$

(a) $\dfrac{1}{3}$

(b) $\dfrac{1}{4}$

(c) $\dfrac{1}{8}$

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

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

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

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

$$x+y+z = a(4x+4y+4z)$$

$$(x+y+z) = 4a(x+y+z)$$

comparing $(x+y+z)$, $\qquad 4a = 1 \Rightarrow a = \dfrac{1}{4}$

**Q)** If $\dfrac{x}{(2x+y+z)} = \dfrac{y}{(x+2y+z)} = \dfrac{z}{(x+y+2z)} = a$,

then find 'a' if $x+y+z \neq 0$

(a) $\dfrac{1}{3}$

(b) $\dfrac{1}{4}$

(c) $\dfrac{1}{8}$

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

**Ans: (b)**

**Q)** If $x = \dfrac{4ab}{a+b}$, then the value of $\dfrac{x+2a}{x-2a} + \dfrac{x+2b}{x-2b}$ is equal to:

(a)  0

(b)  1

(c)  2

(d)  None of these

$x = \dfrac{4ab}{a+b}$

$x = \dfrac{2a \cdot 2b}{a+b}$

$\dfrac{x}{2a} = \dfrac{2b}{a+b}$

$\dfrac{x+2a}{x-2a} = \dfrac{(x+2a)+(x-2a)}{(x+2a)-(x-2a)} = \dfrac{2x}{4a} = \dfrac{x}{2a} = \dfrac{2b}{a+b}$

$\dfrac{x+2b}{x-2b} = \dfrac{2a}{a+b}$

$\dfrac{2b}{a+b} + \dfrac{2a}{a+b} = \dfrac{2(b+a)}{a+b} = \boxed{2}$

**Q)** If $x = \dfrac{4ab}{a+b}$ , then the value of $\dfrac{x+2a}{x-2a} + \dfrac{x+2b}{x-2b}$ is equal to:

(a)  0

(b)  1

(c)  2

(d)  None of these

**Ans: (c)**

**Q)** If $\sqrt{x} + \dfrac{1}{\sqrt{x}} = \sqrt{6}$, then $x^2 + \dfrac{1}{x^2}$ is equal to:

(a)   18          (b)   14          (c)   16          (d)   12

$$x + \frac{1}{x} + 2 = 6$$

$$x + \frac{1}{x} = 4$$

$$x^2 + \frac{1}{x^2} + 2 = 16 \quad \Rightarrow \quad \boxed{x^2 + \frac{1}{x^2} = 14}$$

**Q)** If $\sqrt{x} + \dfrac{1}{\sqrt{x}} = \sqrt{6}$, then $x^2 + \dfrac{1}{x^2}$ is equal to:

(a)   18          (b)   14          (c)   16          (d)   12

**Ans: (b)**

**Q)** A man has ₹ 480 in the denominations of one-rupee notes, five-rupee notes and ten-rupee notes. The number of notes of each denomination is equal. What is the total number of notes that he has ?

(a) 45

(b) 60

(c) 75

(d) 90

Let the number of notes of each denomination be $x$.

$$480 = 1 \cdot x + 5 \cdot x + 10 \cdot x$$

$$16x = 480$$

$$\boxed{x = 30}$$

$$x + x + x = 3x$$

$$3 \times 30 = \boxed{90}$$

**Q)** A man has ₹ 480 in the denominations of one-rupee notes, five-rupee notes and ten-rupee notes. The number of notes of each denomination is equal. What is the total number of notes that he has ?
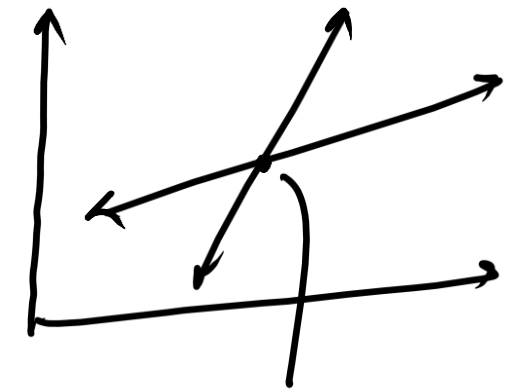
(a)   45
(b)   60
(c)   75
(d)   90

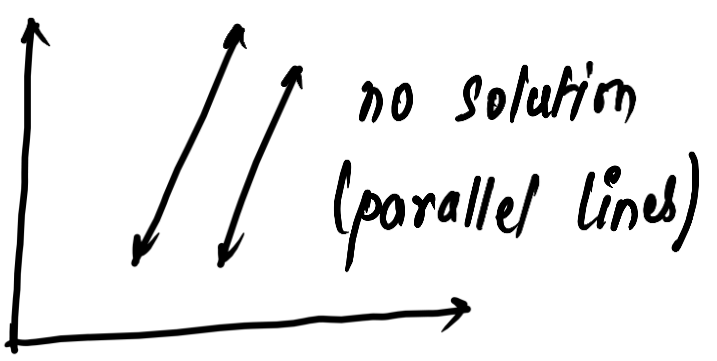**Ans: (d)**

**Q)** The graphs of ax + by = c, dx + ey = f will be:

I. parallel, if the system has no solution. ✓

II. co-incident, if the system has finite number of solutions. ✗

III. intersecting, if the system has only one solution. ✓
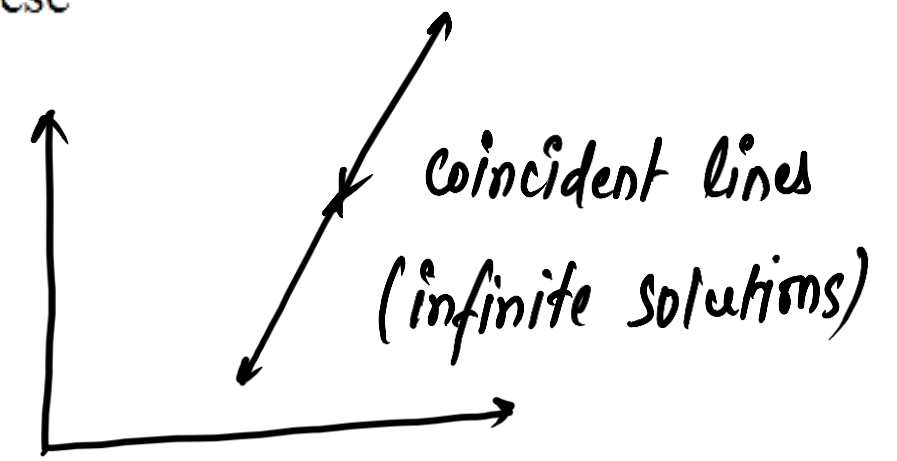
Which of the above statements are correct?

(a) Both I and II

(b) Both II and III

(c) Both I and III ✓

(d) All of these

*Intersecting lines (one unique soln.)*

*no solution (parallel lines)*

*coincident lines (infinite solutions)*

**Q)** The graphs of ax + by = c, dx + ey = f will be:

I.   parallel, if the system has no solution.

II.  co-incident, if the system has finite number of solutions.

III. intersecting, if the system has only one solution.

Which of the above statements are correct?

(a)  Both I and II

(b)  Both II and III

(c)  Both I and III

(d)  All of these

**Ans: (c)**

**Q)** A certain number of two digits is three times the sum of its digits. If 45 is added to the number, then the digits will be reversed. What is the sum of the squares of the two digits of the number ?

(a)  41

(b)  45

(c)  53 ✓

(d)  64

$$10x + y + 45 = 10y + x \quad -②$$

ten's digit $= x \longrightarrow 2$

$\qquad (21)$

one's digit $= y \longrightarrow 1$

$$9x + 45 = 9y$$

$2^2 + 7^2$

$$9\left(\frac{2}{7}y\right) + 45 = 9y$$

$= 4 + 49$

$= \boxed{53}$

$$10x + y = 3(x+y) \quad -①$$

$$7x = 2y$$

$$\frac{2}{7}y + 5 = y \Rightarrow 5 = \frac{5}{7}y$$

$$\boxed{x = 2}$$

$$\boxed{y = 7}$$

**Q)** A certain number of two digits is three times the sum of
its digits. If 45 is added to the number, then the digits will
be reversed. What is the sum of the squares of the two
digits of the number ?

(a)  41                        (b)  45
(c)  53                        (d)  64

**Ans: (c)**

**Q)** If $\dfrac{x}{2} + \dfrac{y}{3} = 4$ and $\dfrac{2}{x} + \dfrac{3}{y} = 1$, then what is $x + y$ equal to?

(a) 11

(b) 10

(c) 9

(d) 8

$$\frac{3x + 2y}{6} = 4 \quad \Rightarrow \quad 3x + 2y = 24$$

$$3x + 2y = xy$$

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

$$xy = 24$$

$$\begin{array}{ll} & \text{sum} \\ 1 \times 24 & \quad 25 \\ 8 \times 3 & \quad 11 \\ 6 \times 4 & \quad 10 \\ 2 \times 12 & \quad 14 \quad x \end{array}$$

$$x = 4 \; ; \; y = 6$$

**Q)** If $\dfrac{x}{2} + \dfrac{y}{3} = 4$ and $\dfrac{2}{x} + \dfrac{3}{y} = 1$, then what is $x + y$ equal to?

(a)  11

(b)  10

(c)  9

(d)  8

**Ans: (b)**

**Q)** What is the value of $\dfrac{(x-y)^3 + (y-z)^3 + (z-x)^3}{9(x-y)(y-z)(z-x)}$?

(a) 0       (b) $\dfrac{1}{3}$       (c) $\dfrac{1}{9}$       (d) 1

$$\frac{a^3 + b^3 + c^3}{9\,abc}$$

$$= \frac{3abc}{9abc} = \boxed{\frac{1}{3}}$$

$$\frac{a^3 + b^3 + c^3 - 3abc}{}$$

$$= (a+b+c)(a^2+b^2+c^2 - ab - bc - ca)$$

$$\downarrow$$

$$a+b+c = x - y + y - z + z - x = 0$$

$$a^3 + b^3 + c^3 - 3abc = 0$$

$$a^3 + b^3 + c^3 = 3abc$$

**Q)** What is the value of $\dfrac{(x-y)^3 + (y-z)^3 + (z-x)^3}{9(x-y)(y-z)(z-x)}$ ?

(a) 0      (b) $\dfrac{1}{3}$      (c) $\dfrac{1}{9}$      (d) 1

Ans: (b)

**Q)** If the polynomials f(x) $x^4 - 2x^3 + 3x^2 - ax + b$ is divided by (x – 1) and (x + 1), the remainders are respectively 5 and 19. The values of a and b are:

(a)    a = 8, b = 7          (b)   a = 5, b = 8

(c)    a = 8, b = 5          (d)   a = 6, b = 8

$$p(x) = x^4 - 2x^3 + 3x^2 - ax + b - 5 \longrightarrow \text{exactly divisible by } x-1,$$

$$p(1) = 0$$

$$1 - 2 + 3 - a + b - 5 = 0$$

$$-a + b = 3$$

$$g(x) = x^4 - 2x^3 + 3x^2 - ax + b - 19$$

$$g(-1) = 0$$

$$1 + 2 + 3 + a + b - 19 = 0$$

$$a + b = 13$$

$$a + b = 13 \qquad \boxed{a = 5}$$

$$-a + b = 3$$

$$2b = 16 \implies \boxed{b = 8}$$

**Q)** If the polynomials f(x) $x^4 - 2x^3 + 3x^2 - ax + b$ is divided by $(x - 1)$ and $(x + 1)$, the remainders are respectively 5 and 19. The values of a and b are:

(a)   $a = 8, b = 7$          (b)   $a = 5, b = 8$

(c)   $a = 8, b = 5$          (d)   $a = 6, b = 8$

**Ans: (b)**

**Q)** For what value of a and b, $(x^3 - 10x^2 + ax + b)$ is exactly divisible by $(x - 1)$ and $(x - 2)$?

(a)    a = 23, b = –14          (b)   a = –23, b = 14

(c)    a = 21, b = –14          (d)   a = –21, b = 15

$$p(x) = x^3 - 10x^2 + ax + b$$

$$p(1) = 0$$

$$1 - 10 + a + b = 0$$

$$\underline{a + b = 9}$$

$$p(2) = 0$$

$$8 - 40 + 2a + b = 0$$

$$\underline{2a + b = 32}$$

$$2a + b = 32$$

$$a + b = 9$$

$$\overline{\phantom{xxxxx}}$$

$$a = 23 \;;\; b = -14$$

**Q)** For what value of a and b, $(x^3 - 10x^2 + ax + b)$ is exactly divisible by $(x - 1)$ and $(x - 2)$?

(a)   a = 23, b = –14          (b)   a = –23, b = 14

(c)   a = 21, b = –14          (d)   a = –21, b = 15

**Ans: (a)**

**Q)** If $\dfrac{p}{x} + \dfrac{q}{y} = m$ and $\dfrac{q}{x} + \dfrac{p}{y} = n$, then what is $\dfrac{x}{y}$ equal to?

(a) $\dfrac{np + mq}{mp + nq}$

(b) $\dfrac{np + mq}{mp - nq}$

(c) $\dfrac{np - mq}{mp - nq}$

(d) $\dfrac{np - mq}{mp + nq}$

$$py + qx = mxy \qquad —①$$

$$qy + px = nxy \qquad —②$$

$$① \div ②,$$

$$\frac{py + qx}{qy + px} = \frac{m}{n}$$

$$npy + nqx = mqy + mpx$$

$$np + nq\left(\frac{x}{y}\right) = mq + mp\left(\frac{x}{y}\right)$$

$$\frac{x}{y} = \frac{np - mq}{mp - nq}$$

**Q)** If $\dfrac{p}{x} + \dfrac{q}{y} = m$ and $\dfrac{q}{x} + \dfrac{p}{y} = n$, then what is $\dfrac{x}{y}$ equal to?

(a) $\dfrac{np + mq}{mp + nq}$

(b) $\dfrac{np + mq}{mp - nq}$

(c) $\dfrac{np - mq}{mp - nq}$

(d) $\dfrac{np - mq}{mp + nq}$

**Ans: (c)**

**Q)** If $a^2 = b + c$, $b^2 = c + a$, $c^2 = a + b$, then the value of

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

(a) $abc$      (b) $a^2 b^2 c^2$      (c) $1$      (d) $0$

**Q)** If $a^2 = b + c$, $b^2 = c + a$, $c^2 = a + b$, then the value of

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

(a)  $abc$          (b)  $a^2\, b^2\, c^2$          (c)  1          (d)  0

**Ans: (c)**

**Q)** If $a^2 - by - cz = 0$, $ax - b^2 + cz = 0$ and $ax + by - c^2 = 0$, then

the value of $\dfrac{x}{a+x} + \dfrac{y}{b+y} + \dfrac{z}{c+z}$ will be

(a) $a + b + c$

(b) 3

(c) 1

(d) 0

**Q)** If $a^2 - by - cz = 0$, $ax - b^2 + cz = 0$ and $ax + by - c^2 = 0$, then

the value of $\dfrac{x}{a+x} + \dfrac{y}{b+y} + \dfrac{z}{c+z}$ will be

(a)  $a + b + c$ 　　　　　　　(b)  3

(c)  1 　　　　　　　　　　　(d)  0

**Ans: (c)**