CDS 1 2025

LIVE

MATHS

ALGEBRA

CLASS 6

NAVJYOTI SIR

Crack
EXAMS

PYQ – 2024 - II

A real number x is such that the sum of the number and four times its square is the least. What is that number ?

(a) – 0·625

(b) – 0·125

(c) 0·125 ✓

(d) 1 ✓

$x + 4x^2$

$4x^2 + x + 0$

$(ax^2 + bx + c)$

Least value for a quadratic expression works at $x = \frac{-b}{2a}$

(OR) (c) and (d) are +ve ⟶ eliminated

(a) $-\frac{5}{8}$ $\quad -\frac{5}{8} + 4\left(\frac{25}{64}\right) = \frac{-40+100}{64} = \frac{60}{64}$

(b) $-\frac{1}{8}$ $\quad -\frac{1}{8} + 4\left(\frac{1}{64}\right) = \frac{-8+4}{64} = -\frac{4}{64}$ (least)

$\longrightarrow \frac{-b}{2a} = \frac{-1}{2\times 4} = -\frac{1}{8}$

$= -0.125$

CDS 1 2025 LIVE CLASS - MATHS - PART 6

PYQ – 2024 - II

A real number x is such that the sum of the number and four times its square is the least. What is that number ?

(a) $-0{\cdot}625$

(b) $-0{\cdot}125$

(c) $0{\cdot}125$

(d) 1

Ans: B

PYQ – 2024 - II

Let k be a positive integer. What is the quotient when

$x^{8k+3} + x^{8k+6} + x^{8k+9} + x^{8k+12}$

is divided by $(1 + x^3)(1 + x^6)$?

(a) x^{8k}

(b) x^{8k+1}

(c) x^{8k+2}

(d) x^{8k+3}

$$x^{8k+3}(1+x^3) + x^{8k+9}(1+x^3)$$

$$(1+x^3)(x^{8k+3} + x^{8k+9})$$

$$(1+x^3)\,x^{8k+3}(1+x^6)$$

$$(1+x^3)(1+x^6)\,x^{8k+3}$$

PYQ – 2024 - II

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is divided by $(1 + x^3)(1 + x^6)$?

(a) x^{8k}

(b) x^{8k+1}

(c) x^{8k+2}

(d) x^{8k+3}

Ans: D

PYQ – 2024 - II

If

$$\left(x+\frac{1}{yz}\right)-\left(y+\frac{1}{zx}\right)=\left(y+\frac{1}{zx}\right)-\left(z+\frac{1}{xy}\right)$$

and $x+z \neq 2y$, then what is xyz equal to ?

(a) –3

(b) –1

(c) 1

(d) 3

$$\left(x+\frac{1}{yz}\right)+\left(z+\frac{1}{xy}\right)=2\left(y+\frac{1}{zx}\right)$$

$$\frac{xyz+1}{yz}+\frac{xyz+1}{xy}=\frac{2xyz+2}{zx}$$

$$\frac{x^2yz+x+xyz^2+z}{xyz}=\frac{2xyz+2}{zx}$$

$$x^2yz+xyz^2+x+z=2xy^2z+2y$$

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

$$xyz(x+z-2y)=(-1)(x+z-2y)$$

$$xyz=-1$$

PYQ – 2024 - II

If

$$\left(x+\frac{1}{yz}\right)-\left(y+\frac{1}{zx}\right)=$$

$$\left(y+\frac{1}{zx}\right)-\left(z+\frac{1}{xy}\right)$$

and $x+z \neq 2y$, then what is xyz equal to ?

(a) -3

(b) -1

(c) 1

(d) 3

Ans: B

PYQ – 2024 - II

If $x^3 + px^2 + qx + r$ is an integer for all integral values of x, then consider the following statements :

I. p must be an integer ✗

II. q must be an integer ✗

III. r must be an integer ✗

Which of the statements given above is/are correct ?

(a) I and II only

(b) III only

(c) I, II and III

(d) None of the statements is correct ✓

$x^3 + px^2 + qx + r$

I.) $p = \frac{1}{4}$ $x = 2$

II.) qx ; $q = \frac{1}{2}$; $x = 2$

III.) $px^2 + qx + r$

$x = \frac{1}{2}$ $x^3 = \frac{1}{8}$ $r = \frac{7}{8}$

$\frac{1}{8} + \frac{7}{8} = 1$ (integral)

PYQ – 2024 - II

If $x^3 + px^2 + qx + r$ is an integer for all integral values of x, then consider the following statements :

I. p must be an integer

II. q must be an integer

III. r must be an integer

Which of the statements given above is/are correct ?

(a) I and II only

(b) III only

(c) I, II and III

(d) None of the statements is correct

Ans: D

If the sum and product of the roots of a quadratic equation are 2 and -100 respectively, then which one of the following is correct ?

(a) There are infinitely many such equations having different roots.

(b) There is only one such equation which is $x^2 + 2x - 100 = 0$.

(c) There is only one such equation which is $x^2 - 2x - 100 = 0$.

(d) There is no such equation.

PYQ – 2024 - I

$\alpha + \beta = 2$

$\alpha\beta = -100$

$x^2 - (\text{sum of roots})x + (\text{product of roots}) = 0$

$x^2 - 2x + (-100) = 0$

$x^2 - 2x - 100 = 0$

PYQ – 2024 - I

If the sum and product of the roots of a quadratic equation are 2 and -100 respectively, then which one of the following is correct ?

(a) There are infinitely many such equations having different roots.

(b) There is only one such equation which is $x^2 + 2x - 100 = 0$.

(c) There is only one such equation which is $x^2 - 2x - 100 = 0$.

(d) There is no such equation.

Ans: C

PYQ – 2024 - I

If 2 is a zero of the polynomial $p(x) = x^3 + 3x^2 - 6x - a$, then what is the sum of the squares of the other zeros of the polynomial ?

(a) 10

(b) 17

(c) 21

(d) 37

$p(2) = 0$

$2^3 + 3(2)^2 - 6(2) - a = 0$

$8 + 12 - 12 - a = 0$

$a = 8$

2 is a zero,

$\Rightarrow (x-2)$ is a factor

$$\begin{array}{r|l} & x^2+5x+4 \\ \hline x-2 & x^3+3x^2-6x-8 \\ & x^3-2x^2 \\ \hline & 5x^2-6x \\ & 5x^2-10x \\ \hline & 4x-8 \\ & -4x-8 \\ \hline & 0 \end{array}$$

$x+1=0$

$x=-1$

$x+4=0$

$x=-4$

$(-1)^2+(-4)^2$

$1+16=17$

$p(x) = x^3 + 3x^2 - 6x - 8$

$= (x-2)(x^2+5x+4) = (x-2)(x+1)(x+4)$

PYQ – 2024 - I

If 2 is a zero of the polynomial $p(x) = x^3 + 3x^2 - 6x - a$, then what is the sum of the squares of the other zeros of the polynomial ?

(a) 10

(b) 17

(c) 21

(d) 37

Ans: B

PYQ – 2024 - I

Suppose $p(x) = x^4 + a_3x^3 + a_2x^2 + a_1x + a_0$ and $q(x) = x^4 + b_3x^3 + b_2x^2 + b_1x + b_0$ are the polynomials. If $\alpha, \beta, \gamma, \delta$ are zeros of $p(x)$ and $\alpha, \beta, \gamma, \lambda$ are zeros of $q(x)$, then what is $\frac{p(x) - q(x)}{(x-\alpha)(x-\beta)(x-\gamma)}$ equal to ?

(a) $-\lambda + \delta$

(b) $\lambda - \delta$

(c) $\lambda + \delta$

(d) $-\lambda - \delta$

$p(x)$ has zeroes $\longrightarrow \alpha, \beta, \gamma, \delta$

$$p(x) = (x-\alpha)(x-\beta)(x-\gamma)(x-\delta)$$

$$q(x) = (x-\alpha)(x-\beta)(x-\gamma)(x-\lambda)$$

$$\frac{p(x) - q(x)}{(x-\alpha)(x-\beta)(x-\gamma)} = \frac{(x-\alpha)(x-\beta)(x-\gamma)\left[x-\delta-x+\lambda\right]}{(x-\alpha)(x-\beta)(x-\gamma)}$$

$$= \underbrace{\lambda - \delta}$$

PYQ – 2024 - I

Suppose $p(x) = x^4 + a_3x^3 + a_2x^2 + a_1x + a_0$ and $q(x) = x^4 + b_3x^3 + b_2x^2 + b_1x + b_0$ are the polynomials. If $\alpha, \beta, \gamma, \delta$ are zeros of $p(x)$ and $\alpha, \beta, \gamma, \lambda$ are zeros of $q(x)$, then what is $\frac{p(x) - q(x)}{(x-\alpha)(x-\beta)(x-\gamma)}$ equal to ?

(a) $-\lambda + \delta$

(b) $\lambda - \delta$

(c) $\lambda + \delta$

(d) $-\lambda - \delta$

Ans: B

PYQ – 2024 - I

If the equation $x \cos\theta = x^2 + p$ has a real solution for every θ where $0 \le \theta \le \frac{\pi}{4}$, then which one of the following is correct ?

(a) $p = 1/8$

(b) $p \le 1/8$

(c) $p \ge 1/8$

(d) $p \le 1/4$

$$x^2 - (\cos\theta)x + p = 0$$

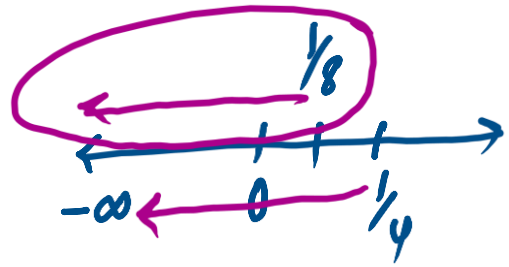
$D \ge 0$

$$(-\cos\theta)^2 - 4 \times 1 \times p \ge 0$$

$$\cos^2\theta - 4p \ge 0$$

$$\cos^2\theta \ge 4p \Rightarrow \frac{1}{4}\cos^2\theta \ge p$$

$0 \le \theta \le \frac{\pi}{4}$



At $\theta = 0°$

$$p \le \frac{1}{4}(1)^2$$

$$(p \le \frac{1}{4})$$

At $\theta = \pi/4$

$$p \le \frac{1}{4}\left(\frac{1}{2}\right) \Rightarrow p \le \frac{1}{8}$$

$p \le \frac{1}{8}$

PYQ – 2024 - I

If the equation $x \cos \theta = x^2 + p$ has a real solution for every θ where $0 \leq \theta \leq \frac{\pi}{4}$, then which one of the following is correct ?

(a) $p = 1/8$

(b) $p \leq 1/8$

(c) $p \geq 1/8$

(d) $p \leq 1/4$

Ans: B

If $p = \sqrt[3]{\left(a + \sqrt{a^2 + b^3}\right)} + \sqrt[3]{\left(a - \sqrt{a^2 + b^3}\right)}$

PYQ – 2024 - I

then what is $p^3 + 3bp$ equal to ?

(a) $-2a$

(b) a

(c) $2a$ ✓

(d) $3a$

$b = 0$; $a = 1$

$$p = \sqrt[3]{1 + \sqrt{1 + 0}} + \sqrt[3]{1 - \sqrt{1 + 0}}$$

$$= \sqrt[3]{1 + 1} + \sqrt[3]{1 - 1}$$

$$p = \sqrt[3]{2}$$

$$p^3 + 3bp = \left(\sqrt[3]{2}\right)^3 + 3(0)\left(\sqrt[3]{2}\right) = 2 = 2 \times 1 = \boxed{2a}$$

If $p = \sqrt[3]{\left(a + \sqrt{a^2 + b^3}\right)} + \sqrt[3]{\left(a - \sqrt{a^2 + b^3}\right)}$

PYQ – 2024 - I

then what is $p^3 + 3bp$ equal to ?

(a) $-2a$

(b) a

(c) $2a$

(d) $3a$

Ans: C

Q) If $a + b + c = 0$, find the value of $\frac{a+b}{c} - \frac{2b}{c+a} + \frac{b+c}{a}$

(a) 0

(b) 1

(c) -1

(d) 2

Q) If $a+b+c=0$, find the value of $\frac{a+b}{c}-\frac{2b}{c+a}+\frac{b+c}{a}$

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

Ans: (a)

Q) If $x^3 + y^3 + z^3 = 3(1 + xyz)$, $P = y + z - x$, $Q = z + x - y$ and $R = x + y - z$, then what is the value of $P^3 + Q^3 + R^3 - 3PQR$?

(a) 9 (b) 8 (c) 12 (d) 6

Q) If $x^3 + y^3 + z^3 = 3(1 + xyz)$, $P = y + z - x$, $Q = z + x - y$ and $R = x + y - z$, then what is the value of $P^3 + Q^3 + R^3 - 3PQR$?

(a) 9 (b) 8 (c) 12 (d) 6

Ans: (c)

Q) Which one is one of the factors of

$$x^2+\frac{1}{x^2}+8\left(x+\frac{1}{x}\right)+14\ ?$$

(a) $x+\frac{1}{x}+1$

(b) $x+\frac{1}{x}+3$

(c) $x+\frac{1}{x}+6$

(d) $x+\frac{1}{x}+7$

Q) Which one is one of the factors of

$$x^2+\frac{1}{x^2}+8\left(x+\frac{1}{x}\right)+14\ ?$$

(a) $x+\frac{1}{x}+1$

(b) $x+\frac{1}{x}+3$

(c) $x+\frac{1}{x}+6$

(d) $x+\frac{1}{x}+7$

Ans: (c)

Q) If $x + \frac{1}{x} = \sqrt{3}$, then the value of $x^{18} + x^{12} + x^6 + 1$ is

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

Q) If $x + \frac{1}{x} = \sqrt{3}$, then the value of $x^{18} + x^{12} + x^6 + 1$ is

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

Ans: (a)

Q) If $x^2+y^2+z^2=xy+yx+zx$, then the value of

$$\frac{3x^4+7y^4+5z^4}{5x^2y^2+7y^2z^2+3z^2x^2}$$ is

(a) 1 (b) 2 (c) –1 (d) 0

Q) If $x^2+y^2+z^2=xy+yx+zx$, then the value of

$$\frac{3x^4+7y^4+5z^4}{5x^2y^2+7y^2z^2+3z^2x^2}$$ is

(a) 1 (b) 2 (c) –1 (d) 0

Ans: (a)

Q) If $x^4 + \frac{1}{x^4} = 119$ amd $x > 1$, then the value of $x^3 - \frac{1}{x^3}$ is

(a) 54 (b) 18 (c) 72 (d) 36

Q) If $x^4 + \frac{1}{x^4} = 119$ amd $x > 1$, then the value of $x^3 - \frac{1}{x^3}$ is

(a) 54 (b) 18 (c) 72 (d) 36

Ans: (d)

Q) Consider the following statements :

1 The equation $1990x - 173y = 11$ has no solution in integers for x and y.

2. The equation $3x - 12y = 7$ has no solution in integers for x and y.

Which of the above statements is/are correct?

(a) 1 only (b) 2 only

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

Q) Consider the following statements :

1 The equation $1990x - 173y = 11$ has no solution in integers for x and y.

2. The equation $3x - 12y = 7$ has no solution in integers for x and y.

Which of the above statements is/are correct?

(a) 1 only (b) 2 only

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

Ans: (c)

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