

if,  $x + \frac{1}{x} = k$

$\Rightarrow x - k = -\frac{1}{x}$

$\Rightarrow \boxed{x \cdot (x - k) = -1}$

if,  $x - \frac{1}{x} = k$

$\Rightarrow x - k = \frac{1}{x}$

$\Rightarrow \boxed{x \cdot (x - k) = +1}$



$$\text{If, } x \oplus \frac{1}{x} = k$$

$$\Rightarrow x - k = \frac{-1}{x}$$

$$\Rightarrow x \cdot (x - k) = -1$$

$$\text{If, } x \ominus \frac{1}{x} = k$$

$$\Rightarrow x - k = \frac{1}{x}$$

$$\Rightarrow x \cdot (x - k) = +1$$

$$\text{If, } x^n + \frac{1}{x^n} = k$$

$$x^n - k = \frac{-1}{x^n}$$

$$x^n \cdot (x^n - k) = -1$$

$$\text{If, } x^n - \frac{1}{x^n} = k$$

$$\text{तो } x^n \cdot (x^n - k) = +1$$

$$\text{If, } x^n \oplus \frac{1}{x^n} = k$$

$$x^n \cdot (x^n - k) = -1$$

If,  $w \oplus \frac{1}{w} = 5$   
तो

$$w^4 \cdot (w^4 - 527) = -1$$

Basic  $\Rightarrow$   $w^2 + \frac{1}{w^2} = 5^2 - 2 = 23$

$$w^4 \oplus \frac{1}{w^4} = 527$$

$$w^4 - 527 = -\frac{1}{w^4} \Rightarrow w^4 \cdot (w^4 - 527) = -1$$

$$\text{If, } x - \frac{1}{x} = \sqrt{6} \Rightarrow x^2 + \frac{1}{x^2} = \sqrt{6}^2 + 2 = 8$$

✓

$$x^4 \cdot (x^4 - x) = -1 \Rightarrow x^4 - x = -\frac{1}{x^4}$$

then,  $x = ?$

$$x^4 + \frac{1}{x^4} = x^2 = 8 - 2 = 6$$

34. If  $P = 7 + 4\sqrt{3}$  and  $PQ = 1$ , then what is the value of  $\left(\frac{1}{P^2}\right) + \left(\frac{1}{Q^2}\right) = ?$

यदि  $P = 7 + 4\sqrt{3}$  तथा  $PQ = 1$  है तो  $\left(\frac{1}{P^2}\right) + \left(\frac{1}{Q^2}\right)$  का मान क्या है?

[A] 148

[C] 194

[B] 189

[D] 204

$$= \frac{1}{P^2} + P^2 = 14^2 - 2 = 194$$

$$\frac{1}{Q} = P$$

$$P = 7 + 4\sqrt{3}$$

$$\frac{1}{P} = 7 - 4\sqrt{3}$$

$$P + \frac{1}{P} = 14$$

#

**35. If  $x^{2019} = 11 - 2\sqrt{30}$ , then  $x^{4038} + \frac{1}{x^{4038}} = ?$**

यदि  $x = 11 - 2\sqrt{30}$  हो तो,  $x^2 + \frac{1}{x^2} = ?$

[A] 443

[B] 439

[C] 486

[D] 482

$(x^2)^2$

$$\begin{array}{l} x = 11 - 2\sqrt{30} \\ \frac{1}{x} = 11 + 2\sqrt{30} \\ \hline x + \frac{1}{x} = 22 \end{array}$$

36. If,  $p = \frac{\sqrt{5}-2}{\sqrt{5}+2}$  and  $q = \frac{\sqrt{5}+2}{\sqrt{5}-2}$ , then what is  $\left(\frac{p}{q} + \frac{q}{p}\right)$  equal to?

यदि,  $p = \frac{\sqrt{5}-2}{\sqrt{5}+2}$  और  $q = \frac{\sqrt{5}+2}{\sqrt{5}-2}$  है, तो  $\left(\frac{p}{q} + \frac{q}{p}\right)$  किसके बराबर है?  $18-2$

(UPSC CDS - II 2025)

[A] 18

[C] 322

[B]  $8\sqrt{5}$

[D]  $72\sqrt{5}$

$$\frac{p^2 + q^2}{pq} = p^2 + \frac{1}{p^2}$$

$$= 18-2$$

$$= 16$$

$$p \cdot q = 1$$

$$p + \frac{1}{p} = \frac{\sqrt{5}-2}{\sqrt{5}+2} + \frac{\sqrt{5}+2}{\sqrt{5}-2}$$

$$= \frac{2 \times (5+4)}{5-4} = 18$$

**37. If  $x = \frac{\sqrt{5}+2}{\sqrt{5}-2}$  and  $y = \frac{\sqrt{5}-2}{\sqrt{5}+2}$ , then find the value of  $x^2 + y^2$ .**

यदि  $x = \frac{\sqrt{5}+2}{\sqrt{5}-2}$  और  $y = \frac{\sqrt{5}-2}{\sqrt{5}+2}$  है, तो  $x^2 + y^2$  का मान ज्ञात कीजिए।

**[A] 312**

**[C] 322**

**[B] 311**

**[D] 302**

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

$$y = \frac{1}{x}$$

$$x + \frac{1}{x} = 2 \times \frac{9}{1} = 18$$

$$\text{if, } m = \frac{\sqrt{11} + \sqrt{3}}{\sqrt{11} - \sqrt{3}}$$

$$\text{तो } m^2 + \frac{1}{m^2} = 3.5^2 - 2 \\ = 10.25$$

$$m + \frac{1}{m} = \frac{\sqrt{11} + \sqrt{3}}{\sqrt{11} - \sqrt{3}} + \frac{\sqrt{11} - \sqrt{3}}{\sqrt{11} + \sqrt{3}}$$

$$= \frac{2 \times (11 + 3)}{(11 - 3)} \\ = \frac{28}{8} = \frac{7}{2} = 3.5$$



38. If  $a = \frac{3+\sqrt{5}}{3-\sqrt{5}}$  and  $b = \frac{3-\sqrt{5}}{3+\sqrt{5}}$ , find the value of  $a^2 + b^2 + 3ab$ .

यदि  $a = \frac{3+\sqrt{5}}{3-\sqrt{5}}$  और  $b = \frac{3-\sqrt{5}}{3+\sqrt{5}}$  है, तो  $a^2 + b^2 + 3ab$  का मान ज्ञात कीजिए।

**RRB NTPC Graduate Level CBT-1 2025**

[A] ~~42~~

[C] ~~98~~

[B] **50**

[D] ~~78~~

$$\begin{aligned} & \left( a^2 + \frac{1}{a^2} \right) + 3 \\ &= (7^2 - 2) + 3 \\ &= 50 \end{aligned}$$

$$a \cdot b = 1$$

$$\text{या } b = \frac{1}{a}$$

$$a + \frac{1}{a} = \frac{3+\sqrt{5}}{3-\sqrt{5}} + \frac{3-\sqrt{5}}{3+\sqrt{5}} = \frac{2 \times (9+5)}{(9-5)} = 7$$

#



39. If  $x + \frac{1}{x} = 9$ , then find  $x^4 + \frac{1}{x^4}$ .

यदि  $x + \frac{1}{x} = 9$  है, तो  $x^4 + \frac{1}{x^4}$  का मान ज्ञात करें।

**SSC CGL 2023 PRE**

[A] 5431

[C] 6156

[B] 6561

[D] 6239

$$x + \frac{1}{x} = 9$$

$$x^2 + \frac{1}{x^2} = 9^2 - 2 = 79$$

$$x^4 + \frac{1}{x^4} = 79^2 - 2 = \dots 9$$

**40. If  $x\sqrt{x} + \frac{1}{x\sqrt{x}} = 7$ , then  $x^6 + \frac{1}{x^6} = ?$**

यदि  $x\sqrt{x} + \frac{1}{x\sqrt{x}} = 7$  हो तो,  $x^6 + \frac{1}{x^6} = ?$   $47^2 - 2 = 2207 - 2$

**[A] 2401**

**[B] 2207**

**[C] 2399**

**[D] 2211**

$$(x\sqrt{x})^2 = x^3$$

$$(x^3)^2 = x^6$$

$$x^3 + \frac{1}{x^3} = 7^2 - 2 = 47$$

**41. If  $x - \frac{1}{x} = 3$ , then the value of  $x^4 + \frac{1}{x^4}$  is:**

यदि  $x - \frac{1}{x} = 3$  है, तो  $x^4 + \frac{1}{x^4}$  का मान ज्ञात कीजिए।

[A] 19

[B] 196

[C] 176

✓ [D] 119

$$x^2 + \frac{1}{x^2} = 3^2 + 2 = 11$$

$$x^4 + \frac{1}{x^4} = 11^2 - 2 = 119$$

42. If  $x - \frac{1}{x} = 11$ , what is the value of  $\left(x^4 + \frac{1}{x^4}\right)$ ?

यदि  $x - \frac{1}{x} = 11$  है, तो  $\left(x^4 + \frac{1}{x^4}\right)$  का मान क्या होगा?

[A] ~~14159~~

[C] ~~15127~~

[B] ~~14163~~

[D] ~~15131~~

↓  
123-2

$$x^2 + \frac{1}{x^2} = 11^2 + 2 = 123$$

43. If  $x^{1.08\sqrt{2}} - \frac{1}{x^{1.08\sqrt{2}}} = \sqrt{5}$ , then find  $x^{4.32\sqrt{2}} + \frac{1}{x^{4.32\sqrt{2}}}$ ?

यदि  $x^{1.08\sqrt{2}} - \frac{1}{x^{1.08\sqrt{2}}} = \sqrt{5}$  है, तो  $x^{4.32\sqrt{2}} + \frac{1}{x^{4.32\sqrt{2}}}$  ज्ञात कीजिये?

[A] 45

[C] 7

✓ [B] 47

[D] 11

↘  $7^2 - 2$

$$\sqrt{5}^2 + 2 = 7$$

**44. If  $\sqrt{x} - \frac{1}{\sqrt{x}} = 7$ , then  $x^2 + \frac{1}{x^2}$  is equal to:**

यदि  $\sqrt{x} - \frac{1}{\sqrt{x}} = 7$ , है, तो  $x^2 + \frac{1}{x^2}$  का मान होगा?

**[A] 2599**

**[B] 2603**

**[C] 2508**

**[D] 2560**

$$x + \frac{1}{x} = 7^2 + 2 = 51$$

$$\rightarrow 51^2 - 2 = 2601 - 2$$



**45. If  $\sqrt{x} + \frac{1}{\sqrt{x}} = 3, x > 0$ , then  $x^2(x^2 - 47) = ?$**

**यदि  $\sqrt{x} \oplus \frac{1}{\sqrt{x}} = 3, x > 0$  हो तो  $x^2(x^2 - 47) = ?$**

**[A] 0**

**[B] 2**

**[C] -1** ✓

**[D] -2**

$$\sqrt{x} + \frac{1}{\sqrt{x}} = 3$$

$$\sqrt{x} + \frac{1}{\sqrt{x}} = 3$$

$$x^2(x^2 - 47) = -1$$

46. If  $x^2 - 15x + 1 = 0$ , then what is the value of  $x^4 - 223x^2 + 6$ ?

यदि  $x^2 - 15x + 1 = 0$ , तो  $x^4 - 223x^2 + 6$  का मान क्या है?

[A] 9

[C] 6

[B] 5

[D] 0

$$x + \frac{1}{x} = 15$$

$$x^2 + \frac{1}{x^2} = 223$$

$$x^2 \cdot (x^2 - 223) + 6$$

47. If  $x^2 - 9x + 1 = 0$ , what is the value of  $x^8 - 6239x^4 + 1$ ?  
यदि  $x^2 - 9x + 1 = 0$  है, तो  $x^8 - 6239x^4 + 1$  का मान क्या होगा?

[A] ~~1~~

[C] ~~-1~~

[B] ~~0~~

[D] 2

$$x \oplus \frac{1}{x} = 9$$

$$x^4 \cdot (x^4 - 6239) + 1$$



If,  $5x + \frac{1}{2x} = 11$

तो,  $25x^2 + \frac{1}{4x^2} = 11^2 - \cancel{2 \times 5x \times \frac{1}{2}}$   
 $= 116$

$$\left(5x + \frac{1}{2x}\right)^2 = 11^2$$

$$\left(25x^2 + \frac{1}{4x^2}\right) + \cancel{2 \times 5x \times \frac{1}{2}} = 11^2$$

$$25x^2 + \frac{1}{4x^2} = 11^2 - 5 = 116$$

$x - \frac{1}{x} = k$   
 तो  $x^2 + \frac{1}{x^2} = k^2 + 2$

$7x - \frac{3}{4x} = 15$

तो  $49x^2 + \frac{9}{16x^2} = 15^2 + \cancel{2 \times 10.5}$   
 $= 235.5$

**48. If  $\left(3x + \frac{2}{x} - 4\right) = 10$ , then what is the value of  $\left(9x^2 + \frac{4}{x^2} + 24\right)$ ?**

यदि  $\left(3x + \frac{2}{x} - 4\right) = 10$ , तो  $\left(9x^2 + \frac{4}{x^2} + 24\right)$  का मान क्या है?

[A] 214

[B] 208

[C] 256

[D] 218

$$3x + \frac{2}{x} = 14$$

$$(14^2 - 2 \times 3 \times 2) + 24$$

$$= 196 + 12$$

49. If  $12x^2 - 21x + 1 = 0$ , then what is the value of  $9x^2 + (16x^2)^{-1}$ ?

यदि  $12x^2 - 21x + 1 = 0$ , तो  $9x^2 + (16x^2)^{-1}$  का मान क्या है?

[A]  $\frac{429}{8}$

[B]  $\frac{465}{16}$

[C]  $\frac{417}{16}$

[D]  $\frac{453}{8}$

$$3x - \frac{21}{4} + \frac{1}{4x} = 0$$

$$\Rightarrow 3x + \frac{1}{4x} = \frac{21}{4}$$

$$9x^2 + \frac{1}{16x^2} = \frac{441}{16} - 2 \times 3 \times \frac{1}{4}$$

$$= \frac{441 - 24}{16}$$

$$= \frac{417}{16}$$

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

**50. If  $k - \frac{3}{k} = 5$ , then what is the value of  $k^2 + \frac{9}{k^2}$ ?**

यदि  $k - \frac{3}{k} = 5$ , है, तो  $k^2 + \frac{9}{k^2}$  का मान ज्ञात करें?

[A] 31

[C] 11

[B] 25

[D] 19

$$5^2 + 2 \times 3$$

$$= 31$$