If, $x + \frac{1}{x} = \pm\sqrt{2}$,

$$x^2 + \frac{1}{x^2} = 0$$

$$x^4 + 1 = 0$$

$$x^4 = -1$$

If $x + \frac{1}{x} = \pm\sqrt{3}$ or $x^2 + \frac{1}{x^2} = 1$,

then

$$x^3 + \frac{1}{x^3} = 0$$

$$x^6 + 1 = 0 \longrightarrow x^6 = -1$$

(x>0)

30. If $\left(x+\frac{1}{x}+1\right)\left(x+\frac{1}{x}-1\right)=2$, then

यदि $\left(x+\frac{1}{x}+1\right)\left(x+\frac{1}{x}-1\right)=2$, तो

(i) $x^{38}+\frac{1}{x^{38}}=?$

(ii) $x^{53}+\frac{1}{x^{53}}=?$

(iii) $x^{320}+x^{314}+x^{250}+x^{244}+x^{94}+x^{88}+x^{45}+x^{39}+x^6+5=?$

$=-1+5=4$

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

$x+\frac{1}{x}=\sqrt{3} \Rightarrow x^6+1=0$

or

$x^6=-1$

$x^{53}=\frac{x^{54}}{x}=\frac{(x^6)^9}{x}=\frac{-1}{x}$

If $x + \frac{1}{x} = K$, then

$$x^5 + \frac{1}{x^5} = \left(x^3 + \frac{1}{x^3}\right)\cdot\left(x^2 + \frac{1}{x^2}\right) - \left(x + \frac{1}{x}\right)$$

If $x - \frac{1}{x} = K$, then

$$x^5 - \frac{1}{x^5} = \left(x^3 - \frac{1}{x^3}\right)\cdot\left(x^2 + \frac{1}{x^2}\right) - \left(x - \frac{1}{x}\right)$$

31. If $x > 0$, and $x^4 + \frac{1}{x^4} = 254$, what is the value of $x^5 + \frac{1}{x^5}$?

यदि $x>0$, और $x^4 + \frac{1}{x^4} = 254$, तो $x^5 + \frac{1}{x^5}$ का मान क्या है?

(a) $717\sqrt{2}$
(b) $723\sqrt{2}$
(c) $720\sqrt{2}$
(d) $726\sqrt{2}$

$x^2 + \frac{1}{x^2} = 16$

$x + \frac{1}{x} = \sqrt{18}$

$15\sqrt{18} \times 16 - \sqrt{18}$

$= 239\sqrt{18}$

$= 239 \times 3\sqrt{2}$

32. If $X = 4 - \cfrac{1}{4 - \cfrac{1}{4 - \cfrac{1}{4 - \cdots \ldots\ldots\ldots \infty}}}$, then find $X^5 + \frac{1}{X^5} = ?$

यदि $X = 4 - \cfrac{1}{4 - \cfrac{1}{4 - \cfrac{1}{4 - \cdots \ldots\ldots\ldots \infty}}}$, तो $X^5 + \frac{1}{X^5}$ = ज्ञात करें?

(a) 656
(b) 548
(c) 732
(d) 724

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

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

33. **If $x - \frac{1}{x} = -6$, what will be the value of $x^5 - \frac{1}{x^5}$?**

यदि $x - \frac{1}{x} = -6$ है, तो $x^5 - \frac{1}{x^5}$ का मान क्या होगा?

SSC CGL 2023 PRE

(a) -8898 ✗

(b) -8896 ✗

(c) -8886 ✓

(d) -8892 ✗

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

$-234 \times 38 + 6$

$= -(234 \times 38 - 6) =$

If $x + \frac{1}{x} = K$, then $x^6 + \frac{1}{x^6} = ?$

$$x^3 + \frac{1}{x^3} = K^3 - 3K = T$$

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

If $x - \frac{1}{x} = K$, then $x^6 + \frac{1}{x^6} = ?$

$$x^3 - \frac{1}{x^3} = K^3 + 3K = T$$

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

34. If $\left(a+\frac{1}{a}\right)=7\sqrt{3}$, then what is the value of (a^6+a^{-6})?

यदि $\left(a+\frac{1}{a}\right)=7\sqrt{3}$ है, तो (a^6+a^{-6}) का मान ज्ञात कीजिए।

(a) 3048190
(b) 3048542
(c) 3048132
(d) 3048625

$145^3-3\times145$

$a^2+\frac{1}{a^2}=(7\sqrt{3})^2-2=145$

35. If $\left(x - \frac{1}{x} = 4\right)$, then what is the value of $\left(x^6 + \frac{1}{x^6}\right)$?

यदि $\left(x - \frac{1}{x} = 4\right)$, तो $\left(x^6 + \frac{1}{x^6}\right)$ का मान क्या है?

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(a) 4689 (b) 4786

(c) 5832 (d) 5778

$x^3 - \frac{1}{x^3} = 4^3 + 3 \times 4$

$= 76$

$76^2 + 2$

if, $x+\frac{1}{x}=6$ & $x>1$

$x-\frac{1}{x}=\sqrt{32}$

तो $x^6-\frac{1}{x^6}=\left(x^3+\frac{1}{x^3}\right)\left(x^3-\frac{1}{x^3}\right)$

$198 \times 35\sqrt{32}$ ✓

$=6930\times4\sqrt{2}$

$=27720\sqrt{2}$

If $x + \frac{1}{x} = K$, then

$$x^7 + \frac{1}{x^7} = \left(x^4 + \frac{1}{x^4}\right)\left(x^3 + \frac{1}{x^3}\right) - \left(x + \frac{1}{x}\right)$$

#याद

If $x - \frac{1}{x} = K$, then

$$x^7 - \frac{1}{x^7} = \left(x^4 + \frac{1}{x^4}\right)\left(x^3 - \frac{1}{x^3}\right) + \left(x - \frac{1}{x}\right)$$

36. **If $x > 0$ & $x^4 + \frac{1}{x^4} = 2207$, then find $x^7 + \frac{1}{x^7}$?**

यदि $x > 0$ & $x^4 + \frac{1}{x^4} = 2207$, तो $x^7 + \frac{1}{x^7}$ का मान क्या है?

(a) 710649
(b) 710647
(c) 710654
(d) 710661

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

$x + \frac{1}{x} = 7$

$2207 \times 322 - 7$

37. If $x + \frac{1}{x} = 4$, then, $x^7 - \frac{1}{x^7} = ?$

यदि $x + \frac{1}{x} = 4$, तो, $x^7 - \frac{1}{x^7} = ?$

a) $5844\sqrt{3}$

b) $5842\sqrt{3}$

c) $5824\sqrt{3}$

d) $5822\sqrt{3}$

$x - \frac{1}{x} = \sqrt{4^2 - 4} = \sqrt{12}$

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

$= 194 \times 15\sqrt{12} + \sqrt{12}$

$= 2911\sqrt{12}$

$= 5822\sqrt{3}$

38. If $\left(x-\frac{1}{x}\right)=\sqrt{6}$ & $x>1$, then what is the value of $\left(x^8-\frac{1}{x^8}\right)$?

यदि $\left(x-\frac{1}{x}\right)=\sqrt{6}$ & $x>1$, तो $\left(x^8-\frac{1}{x^8}\right)$ का मान क्या है?

(a) $1024\sqrt{15}$

(b) $992\sqrt{15}$

(c) $998\sqrt{15}$

(d) $1012\sqrt{15}$

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

$$62 \times 8 \times \sqrt{10} \times \sqrt{6}$$

$$= 496 \times 2\sqrt{15}$$

39. $x^2 - 3x + 1 = 0$, then find the value of $x^9 + x^7 + x^{-9} + x^{-7}$?

$x^2 - 3x + 1 = 0$, तब $x^9 + x^7 + x^{-9} + x^{-7}$? का मान बताओ

a) 6621 b) 4414

c) 9208 d) 6069

$x^2 + 1 = 3x$

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

$= x^7(x^2+1) + \frac{(1+x^2)}{x^9}$

$= 3x^8 + \frac{3}{x^8}$

$= 3\left(x^8 + \frac{1}{x^8}\right)$

$= 3 \times 2207$

40. If $x^2 - 3x + 1 = 0$, then what is the value of $x^{12} + x^8 - 123x^7 - 123x^3$?

यदि $x^2 - 3x + 1 = 0$, तो $x^{12} + x^8 - 123x^7 - 123x^3$ का मान क्या है?

(a) 7
(b) -3
(c) -7
(d) 3

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

$x^5 + \frac{1}{x^5} = 18 \times 7 - 3$

$= 123$

$= x^{12} + x^8 - \left(x^5 + \frac{1}{x^5}\right)x^7 - \left(x^5 + \frac{1}{x^5}\right)x^3$

$= x^{12} + x^8 - x^{12} - x^8 - x^3 - \frac{1}{x^3}$

$= -\left(x^3 + \frac{1}{x^3}\right)$

$= -7$

41. If $x^3 - \frac{1}{x^3} = \sqrt{k^2 - 4}(k^2 - 1)$, then $x^2 - \frac{1}{x^2} = ?$

यदि $x^3 - \frac{1}{x^3} = \sqrt{k^2 - 4}(k^2 - 1)$, तो $x^2 - \frac{1}{x^2} = ?$

(a) $k\sqrt{k^2 - 4}$ (b) $k\sqrt{k^2 + 4}$

(c) $k(k^2 - 4)$ (d) $k(k^2 + 4)$

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

$x^3 - \frac{1}{x^3} = \sqrt{k}\cdot(k+3)$

$x - \frac{1}{x} = \sqrt{k^2 - 4}$

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

42. If $x - \frac{1}{x} = 1$, then $\left\{\frac{1}{x-1} - \frac{1}{x+1} + \frac{1}{x^2+1} - \frac{1}{x^2-1}\right\} = ?$

यदि $x - \frac{1}{x} = 1$, तो $\left\{\frac{1}{x-1} - \frac{1}{x+1} + \frac{1}{x^2+1} - \frac{1}{x^2-1}\right\} = ?$

(a) $\pm\sqrt{5}$ ✓

(b) $\frac{2}{5}$

(c) $\pm\frac{2}{\sqrt{5}}$

(d) $\pm\frac{\sqrt{5}}{2}$

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

$$= \frac{2}{1 \times \pm\sqrt{5}}$$

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

$$= \frac{2x^2/x^2}{\frac{(x^2-1)\cdot(x^2+1)}{x \quad x}}$$

43. **If $x\sqrt{x} + \frac{1}{x\sqrt{x}} = 110$, then find $x^2\sqrt{x} + \frac{1}{x^2\sqrt{x}}$?**

यदि $x\sqrt{x} + \frac{1}{x\sqrt{x}} = 110$ है, तो $x^2\sqrt{x} + \frac{1}{x^2\sqrt{x}}$ ज्ञात कीजिये?

(a) 2525 **(b) 12098**

(c) 140 **(d) 3645**

$\sqrt{x}^3 + \frac{1}{\sqrt{x}^3} = 110$

$\sqrt{x}^5 + \frac{1}{\sqrt{x}^5} = 2525$

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

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

& If $x + \frac{1}{x} = -2$, then $x = -1$

#

44. If $x + \frac{1}{x-9} = 11$, then $(x-11)^{12} + \frac{1}{(x-11)^{13}} = ?$

यदि $x + \frac{1}{x-9} = 11$, तो $(x-11)^{12} + \frac{1}{(x-11)^{13}} = ?$

(a) 0 (b) 2

(c) -2 (d) 1

$(x-9) + \frac{1}{(x-9)} = 2$

$x = 10$

If $x + \frac{1}{x} = 1$ or $x^2 - x + 1 = 0$,

then

$x^3 = -1$

#

If $x + \frac{1}{x} = -1$ or $x^2 + x + 1 = 0$,

then

$$x^3 = 1$$

45. If, $\frac{r}{13}+\frac{13}{r}=1$ then the value of r^3 is:

यदि $\frac{r}{13}+\frac{13}{r}=1$ है, तो r^3 का मान ज्ञात कीजिए।

(SSC CGL 2022)

(a) -2157 (b) 2197

(c) 2157 (d) -2197

$\left(\frac{r}{13}\right)^3=-1$

46. If $x+\frac{1}{x}=1$, then $(1+x+x^2)(1-x-x^2)=?$

यदि $x+\frac{1}{x}=1$, तो $(1+x+x^2)\cdot(1-x-x^2)=?$

(a) 0 (b) 4

(c) -2 (d) 1

$x^2+1=x$

$1-x=-x^2$

$\Rightarrow x^3=-1$

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

$=2x-2x^2$

$=-4x^3$

$=-4\times-1$

$=4$

47. If $\frac{x}{5\sqrt{6}} + 1 = \frac{-5\sqrt{6}}{x}$, then find the value of $x^5 - 750\sqrt{6}x^2 + 1 = ?$

यदि $\frac{x}{5\sqrt{6}} + 1 = \frac{-5\sqrt{6}}{x}$, तो $x^5 - 750\sqrt{6}x^2 + 1$ का मान ज्ञात कीजिए?

(a) $25\sqrt{6}$ (b) 1

(c) 0 (d) $1+5\sqrt{6}$

$$\left(\frac{x}{5\sqrt{6}}\right) + \left(\frac{5\sqrt{6}}{x}\right) = -1$$

$$\Rightarrow \left(\frac{x}{5\sqrt{6}}\right)^3 = 1$$

$$x^3 = 750\sqrt{6}$$

48. If $x^2-7x+13=0$ then $(x-3)^{22}+\frac{1}{(x-3)^{22}}=?$

यदि $x^2-7x+13=0$ तो $(x-3)^{22}+\frac{1}{(x-3)^{22}}=?$

(a) 3 (b) 1

(c) -1 (d) -2

$y^2+6y+9-7y-21+13=0$

$\frac{y^2-y+1=0}{y}$

$y+\frac{1}{y}=1 \Rightarrow y^3=-1$

माना $x-3=y$

$\Rightarrow x=y+3$

$y^{22}+\frac{1}{y^{22}}=-y-\frac{1}{y}=-1$

$y^{22}=(y^3)^7 \times y=-y$