

QUANTUM UNIVERSITY

ASSIGNMENT ON - QUANT & REASONING

SUBMITTED TO:- SUBMITTED BY:-

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QUANTUM UNIVERSITY
QUANTUM SCHOOL of BUSINESS
Department of Humanities and Social Sciences

Assignment - 6

Course Code - VAP-4
Session - 2020-2021

Course title :- Employability skills
Name of Faculty :- MR. Ashish Garg

Q1:- If $x^2 + \frac{1}{x^2} = 527$

then what will come in place of Question Mark in Eqⁿ
 $\sqrt{x} (\sqrt{x} - ?) = -1$

Q2:- If $x = 8 + 3\sqrt{7}$

then $x + \frac{1}{x} = ?$

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

Q3:- If $\sqrt{x} + \frac{1}{\sqrt{x}} = 3$

then $x^2 (x^2 - 47) = ?$

Q4:- If $x^{2019} = 11 - 2\sqrt{30}$

then $x^{4038} + \frac{1}{x^{4038}} = ?$

Q5:- If $x = \frac{2 + \sqrt{3}}{2 - \sqrt{3}}$, $y = \frac{1}{x}$

then what will be the value of
 $x^2 + y^2 + xy = ?$

Q 6:- If $x + \frac{1}{x} = \sqrt{2}$

Then what will be the value of

(i), $x^{23} + x^{19} + x^4 + 5 = ?$

(ii), $x^{29} + \frac{1}{x^{29}} = ?$

Q 7:- If $x = \frac{\sqrt{13} + \sqrt{11}}{\sqrt{13} - \sqrt{11}}$, $y = \frac{1}{x}$

then $3x^2 - 5xy + 3y^2 = ?$

Q 8:- If $x + \frac{1}{x} = \sqrt{29}$

then $x - \frac{1}{x} = ?$

Q 9:- If $x = \frac{\sqrt{a} + \sqrt{6}}{\sqrt{a} - \sqrt{6}}$, $y = \frac{\sqrt{a} - \sqrt{6}}{\sqrt{a} + \sqrt{6}}$

then Prove $x + y = ?$

Q 10:- If $x^2 - 5x + 1 = 0$

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

Assignment = 6

①

$$\sqrt{x}(\sqrt{x} - ?) = -1$$

$$x^2 + \frac{1}{x^2} = 527$$

$$x^2 + \frac{1}{x^2} = 527 + 2$$

$$\left(x + \frac{1}{x}\right)^2 = 529$$

$$x + \frac{1}{x} = 23$$

$$x + \frac{1}{x} + 2 = 23 + 2$$

$$x + \frac{1}{x} + 2 = 23 + 2$$

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

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

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

$$\sqrt{x}(\sqrt{x} - 5) = -1 \quad \text{Ans}$$

②

$$\frac{1}{x} = \frac{1}{8+3} \times \frac{8-3\sqrt{7}}{8-3\sqrt{7}} = \frac{8-3\sqrt{7}}{8-3\sqrt{7}}$$

$$x + \frac{1}{x} = 8+3\sqrt{7} + 8-3\sqrt{7}$$

$$= 16 \} \text{ Ans}$$

$$x - \frac{1}{x} = 6\sqrt{7} \} \text{ Ans}$$

③

$$\left(\sqrt{x} + \frac{1}{\sqrt{x}} \right) = 3, x^2(x^2 - 49) = ?$$

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

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

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

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

$$x^2 + \frac{1}{x^2} + 2 = 49$$

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

$$x^2(x^2 - 49) = -1 \} \text{ Ans}$$

②
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$$\frac{1}{x} = \frac{1}{8+3} \times \frac{8-3\sqrt{7}}{8-3\sqrt{7}} = \frac{8-3\sqrt{7}}{8-3\sqrt{7}}$$

$$x + \frac{1}{x} = \frac{8+3\sqrt{7}}{8+3\sqrt{7}} + \frac{8-3\sqrt{7}}{8-3\sqrt{7}}$$

$$= 16 \} \underline{A_2}$$

$$x - \frac{1}{x} = 6\sqrt{7} \} \underline{A_3}$$

③

$$\left(\sqrt{x} + \frac{1}{\sqrt{x}} \right) = 3, x^2(x^2 - 49) = ?$$

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

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

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

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

$$x^2 + \frac{1}{x^2} + 2 = 49$$

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

$$x^2(x^2 - 47) = -1 \} \underline{A_4}$$

④

$$\text{let } x^{2019} = A$$

$$A = 11 - 2\sqrt{30}$$

$$\frac{1}{A} = 11 + 2\sqrt{30}$$

$$\frac{A+1}{A} = 11 - 2\sqrt{30} + 11 + 2\sqrt{30} = 22$$

$$\therefore \frac{A^2+1}{A^2} = 22 - 2$$

$$\frac{A^2+1}{A^2} = 484 - 2$$

$$= 482$$

$$\frac{(x^{2019})^2 + 1}{(x^{2019})^2} = 482$$

$$x^{4038} + \frac{1}{x^{4038}} = 482 \quad \text{Ans}$$

⑤

$$x = \frac{2+\sqrt{3}}{2-\sqrt{3}}, \quad y = \frac{1}{x} = \frac{2-\sqrt{3}}{2+\sqrt{3}}$$

$$xy = \frac{2+\sqrt{3}}{2-\sqrt{3}} \times \frac{2-\sqrt{3}}{2+\sqrt{3}} = 1$$

$$xy = \frac{2(4+3)}{4-3} \quad \left\{ \because xy = \frac{2(a+b)}{a-b} \right\}$$

$$= \frac{2 \times 7}{1}$$

$$= 14$$

$$x^2 + y^2 = 17 - 2$$

$$= 196 - 2$$

$$= 194 \quad \Omega$$

⑥

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

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

$$\frac{x^4 + 1}{x^2} = 0$$

$$\boxed{x^4 = -1}$$

$$x^{23} + x^{19} + x^4 + 5 = 7$$

$$0 + (-1) + 5$$

$$= 4 \text{ Ans}$$

(i)

$$x^{29} + \frac{1}{x^{29}} = 7$$

$$x^{29} + \frac{1}{x^{29}} = \frac{x^{32}}{x^3} + \frac{x^3}{x^{32}}$$

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

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

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

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

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

$$= -\sqrt{2} \text{ Ans}$$

$$xy = 1$$

$$x + y = \frac{a+b}{a-b}$$

$$= \frac{2(13+11)}{(13-11)} = \frac{2 \times 24}{2}$$

$$x^2 + y^2 = k^2 - 2$$

$$= (24)^2 - 2$$

$$= 576 - 2$$

$$= 574 \text{ Ans}$$

$$3x^2 - 5xy + 3y^2$$

$$3(x^2 + y^2) - 5xy$$

$$3 \times 574 - 5 \times 1$$

$$= 1723 \text{ Ans}$$

$$\therefore (a-b)^2 = (a+b)^2 - 4ab$$

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

$$\left(x - \frac{1}{x}\right)^2 = (\sqrt{29})^2 - 4$$

$$\left(x - \frac{1}{x}\right)^2 = 25$$

$$x - \frac{1}{x} = 5 \quad \text{ } \{ \text{ } \}$$

9

$$x + y = \frac{\sqrt{a} + \sqrt{b}}{\sqrt{a} - \sqrt{b}} + \frac{\sqrt{a} - \sqrt{b}}{\sqrt{a} + \sqrt{b}}$$

$$= \frac{(\sqrt{a} + \sqrt{b})^2 + (\sqrt{a} - \sqrt{b})^2}{(\sqrt{a} - \sqrt{b})(\sqrt{a} + \sqrt{b})}$$

$$= \frac{a + b + 2\sqrt{a}\sqrt{b} + a + b - 2\sqrt{a}\sqrt{b}}{(a - b)}$$

$$= \frac{2(a + b)}{(a - b)} \quad \text{ } \{ \text{ } \}$$

10

$$x^2 - 5x + 1 = 0$$

Divide by x .

$$\frac{x^2}{x} - \frac{5x}{x} + \frac{1}{x} = 0$$

$$x - 5 + \frac{1}{x} = 0$$

$$x + \frac{1}{x} = 5 \quad (\because k = 5)$$

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

$$\frac{x^2+1}{x^2} \Rightarrow 25-2 = 23 \quad \text{op}$$