વિભાગ :- B

સ્વરૂપ :- 2

1. $4\sqrt{6} - 8\sqrt{10}$ અને $3\sqrt{6} + 12\sqrt{10}$ નો સરવાળો કરો.

→ $(4\sqrt{6} - 8\sqrt{10}) + (3\sqrt{6} + 12\sqrt{10})$

$= 4\sqrt{6} - 8\sqrt{10} + 3\sqrt{6} + 12\sqrt{10}$

$= \underline{4\sqrt{6} + 3\sqrt{6}} - \underline{8\sqrt{10} + 12\sqrt{10}}$

$= 7\sqrt{6} + 4\sqrt{10}$

2. સાદું રૂપ આપો: $5\sqrt{2} + 2\sqrt{8} - 3\sqrt{32} + 4\sqrt{128}$

$= 5\sqrt{2} + 2\sqrt{4\times2} - 3\sqrt{16\times2} + 4\sqrt{64\times2}$

$= 5\sqrt{2} + 2\times2\sqrt{2} - 3\times4\sqrt{2} + 4\times8\sqrt{2}$

$= \underline{5\sqrt{2} + 4\sqrt{2}} - \underline{12\sqrt{2} + 32\sqrt{2}}$

$= 9\sqrt{2} + 20\sqrt{2}$

$= 29\sqrt{2}$

3. જો $\frac{3-\sqrt{5}}{3+2\sqrt{5}} = a\sqrt{5} - \frac{19}{11}$ હોય, તો a ની કિંમત શોધો.

→ ડાબી બાજુના પદમાં છેદનું સંમેયીકરણ કરતાં,

$\frac{3-\sqrt{5}}{3+2\sqrt{5}} \times \frac{3-2\sqrt{5}}{3-2\sqrt{5}} = \frac{(3-\sqrt{5})(3-2\sqrt{5})}{(3)^2 - (2\sqrt{5})^2}$

$= \frac{(3\times3) - (3)(2\sqrt{5}) - (3)(\sqrt{5}) + (\sqrt{5})(2\sqrt{5})}{9 - (4)(5)}$

$= \frac{9 - 6\sqrt{5} - 3\sqrt{5} + 2(5)}{9 - 20}$

$= \frac{9 - 9\sqrt{5} + 10}{-11}$

$= \frac{19 - 9\sqrt{5}}{-11}$

$\therefore$ ડા.બા. = ૪.બા

$$\frac{19 - 9\sqrt{5}}{-11} = a\sqrt{5} - \frac{19}{11}$$

$$\therefore -\frac{19}{11} - \frac{9\sqrt{5}}{-11} = a\sqrt{5} - \frac{19}{11}$$

$$\therefore a\sqrt{5} = \frac{9\sqrt{5}}{11}$$

$$\therefore a = \frac{9\sqrt{5}}{11\sqrt{5}}$$

$$\therefore a = \frac{9}{11}$$

4. જો $x = 5 + 2\sqrt{6}$ હોય, તો $x^2 + \frac{1}{x^2}$ ની કિંમત શોધો.

→ $x = 5 + 2\sqrt{6}$ —(1)

અને $\frac{1}{x} = \frac{1}{5+2\sqrt{6}}$ —(2)

→ (2) માં છેદના પદનું સંમેયીકરણ કરતાં,

$$\frac{1}{x} = \frac{1}{5+2\sqrt{6}} = \frac{1}{5+2\sqrt{6}} \times \frac{5-2\sqrt{6}}{5-2\sqrt{6}}$$

$(a+b)(a-b) = a^2 - b^2$

$$= \frac{5-2\sqrt{6}}{(5)^2 - (2\sqrt{6})^2}$$

$$= \frac{5-2\sqrt{6}}{25-24}$$

$$\therefore \frac{1}{x} = \frac{5-2\sqrt{6}}{1} \quad \text{—(3)}$$

→ $\left(x+\frac{1}{x}\right)^2 = x^2 + 2(x)\left(\frac{1}{x}\right) + \left(\frac{1}{x}\right)^2$ $(a+b)^2 = a^2 + 2ab + b^2$

$\therefore (5+2\sqrt{6}+5-2\sqrt{6})^2 = x^2 + 2 + \frac{1}{x^2}$

$\therefore (5+5)^2 = x^2 + \frac{1}{x^2} + 2$

$\therefore (10)^2 = x^2 + \frac{1}{x^2} + 2$

$\therefore 100 = x^2 + \frac{1}{x^2} + 2$

$\therefore x^2 + \frac{1}{x^2} = 100 - 2 = 98$

$\therefore \boxed{x^2 + \frac{1}{x^2} = 98}$

5. $\frac{1}{-4-\sqrt{15}}$ ના છેદનું સંમેલીકરણ કરવાની કઈ રીત થશે?

→ $\frac{1}{-4-\sqrt{15}} = \frac{1}{-4-\sqrt{15}} \times \frac{-4+\sqrt{15}}{-4+\sqrt{15}}$

$= \frac{-4+\sqrt{15}}{(-4)^2 - (\sqrt{15})^2}$

$= \frac{-4+\sqrt{15}}{16-15}$

$= \frac{-4+\sqrt{15}}{1}$

$= \underline{-4+\sqrt{15}}$

6. $\dfrac{6-4\sqrt{2}}{6+4\sqrt{2}}$ ના છેદનું સંમેયીકરણ કરો.

$$\rightarrow \frac{6-4\sqrt{2}}{6+4\sqrt{2}} = \frac{6-4\sqrt{2}}{6+4\sqrt{2}} \times \frac{6-4\sqrt{2}}{6-4\sqrt{2}}$$

$$= \frac{(6-4\sqrt{2})(6-4\sqrt{2})}{(6+4\sqrt{2})(6-4\sqrt{2})}$$

$$= \frac{(6-4\sqrt{2})^2}{(6)^2-(4\sqrt{2})^2} \qquad \left[\begin{array}{l}(a-b)^2 = a^2-2ab+b^2 \\ a^2-b^2 = (a+b)(a-b)\end{array}\right.$$

$$= \frac{(6)^2-2(6)(4\sqrt{2})+(4\sqrt{2})^2}{36-(16\times 2)}$$

$$= \frac{36-48\sqrt{2}+32}{36-32}$$

$$= \frac{68-48\sqrt{2}}{4} = \frac{\cancel{4}(17-12\sqrt{2})}{\cancel{4}}$$

$$= 17-12\sqrt{2}$$

7. સાદું રૂપ આપો: (i) $\dfrac{11^{1/2}}{11^{1/4}}$ (iii) $\left(\dfrac{1}{3^3}\right)^7$

$$\rightarrow \text{(i)} \ \frac{11^{1/2}}{11^{1/4}} = 11^{1/2} \times 11^{-1/4} \qquad [a^m \times a^n = a^{m+n}]$$

$$= 11^{1/2+(-1/4)}$$

$$= 11^{1/2-1/4} \longrightarrow \therefore \frac{1}{2}-\frac{1}{4} = \frac{1\times 2}{2\times 2}-\frac{1}{4} \quad [\text{લ.સા.અ}=4]$$

$$= 11^{1/4} \qquad\qquad = \frac{2-1}{4} = \frac{1}{4}$$

$$\text{(ii)} \left(\frac{1}{3^3}\right)^7 = (3^{-3})^7 = 3^{-3\times 7} \qquad [(a^m)^n = a^{m\times n}]$$

$$= 3^{-21}$$

8. સાદું રૂપ આપો: $\frac{(25)^{3/2} \times (343)^{1/5}}{16^{5/4} \times 8^{4/3} \times 7^{3/5}}$

$= \frac{(5^2)^{3/2} \times (7^3)^{1/5}}{(2^4)^{5/4} \times (2^3)^{4/3} \times 7^{3/5}}$

$= \frac{5^{2\times\frac{3}{2}} \times 7^{3\times\frac{1}{5}}}{2^{4\times\frac{5}{4}} \times 2^{3\times\frac{4}{3}} \times 7^{3/5}} = \frac{5^3 \times 7^{3/5}}{2^5 \times 2^4 \times 7^{3/5}} = \frac{5^3}{2^{5+4}}$

$= \frac{5\times5\times5}{2^9} = \frac{125}{512}$

સ્વકસોટી :- 2

1. $2x-1$ એ $8x^4+4x^3-16x^2+10x+m$ નો એક અવયવ હોય, તો m ની કિંમત શોધો.

→ $2x-1$ એ બહુપદીનો એક અવયવ છે.

$\therefore 2x-1=0$

$\therefore 2x=1$ $\boxed{x=\frac{1}{2}}$

$\therefore p(x)=0$

$\therefore 8x^4+4x^3-16x^2+10x+m=0$

$\therefore 8\left(\frac{1}{2}\right)^4+4\left(\frac{1}{2}\right)^3-16\left(\frac{1}{2}\right)^2+10\left(\frac{1}{2}\right)+m=0$

$\therefore \frac{8\times1}{16_2}+\frac{4\times1}{8_2}-\frac{16\times1}{4}+\frac{10\times1}{2}+m=0$

$\therefore \frac{1}{2}+\frac{1}{2}-4+5+m=0$

$1+1+m=0$

$2+m=0$ $\boxed{\therefore m=-2}$

2. દર્શાવો કે, $2x-3$ એ $x+2x^3-9x^2+12$ નો અવયવ છે.

→ $p(x) = x+2x^3-9x^2+12$

→ $g(x) = 2x-3 = 0$

$\therefore x = 3/2$

$$p(3/2) = 3/2 + 2(3/2)^3 - 9(3/2)^2 + 12$$

$$= 3/2 + 2 \times \frac{27}{8_4} - 9 \times \frac{9}{4} + 12$$

$$= 3/2 + \frac{27}{4} - \frac{81}{4} + 12$$

$$= \frac{6+27-81+48}{4} \quad (\text{L.C.M.} = 4)$$

$$= \frac{81-81}{4}$$

$$= 0/4$$

$\therefore p(3/2) = 0$

→ $p(3/2)=0$ હોવાથી, સાબિત થાય છે $(2x-3)$ એ $p(x)$ નો અવયવ છે.

3. નીચે આપેલા દરેક બહુપદીનાં શૂન્યો શોધો:

(1) $p(x) = 2\pi x + 9$

$p(x) = 0$

$\therefore 2\pi x + 9 = 0$

$\therefore 2\pi x = -9$

$\therefore x = \frac{-9}{2\pi}$

(2) $p(x) = 2/3 x - 5/6$

$\therefore p(x) = 0$

$\therefore 2/3 x - 5/6 = 0$

$\therefore 2/3 x = 5/6$

$\therefore x = 5/6 \times 3/2$

$\therefore x = \frac{5}{2 \times 2}$

$\therefore x = 5/4$

4. બહુપદી $p(y) = (y+2)(y-2)$ માટે $p(1)$ અને $p(-2)$ શોધો.

(i) $p(y) = (y+2)(y-2)$

$p(1) = (1+2)(1-2)$

$= (3)(-1)$

$\therefore p(1) = -3$

(ii) $p(y) = (y+2)(y-2)$

$p(-2) = (-2+2)(-2-2)$

$= (0)(-4)$

$\therefore p(-2) = 0$

5. જો $x+1$ એ $ax^3 + x^2 - 2x + 4a - 9$ નો એક અવયવ હોય, તો a ની કિંમત શોધો.

→ $x+1 = 0$ $\therefore x = -1$

$p(x) = ax^3 + x^2 - 2x + 4a - 9 = 0$

$\therefore a(-1)^3 + (-1)^2 - 2(-1) + 4a - 9 = 0$

$a(-1) + 1 + 2 + 4a - 9 = 0$

$-a + 3 + 4a - 9 = 0$

$\therefore 4a - a + 3 - 9 = 0$

$\therefore 3a - 6 = 0$

$\therefore 3a = 6$

$\therefore a = 6/3$

$\therefore a = 2$