

// Exercise - 2.5 //

① Write the following in the form of 5^n :

(i) 625 (ii) $\frac{1}{5}$ (iii) $\sqrt{5}$ (iv) $\sqrt{125}$

$$\begin{aligned} \Rightarrow \text{(i) } 625 &= 5 \times 5 \times 5 \times 5 \\ &= 5^4 \\ \text{(ii) } \frac{1}{5} &= 5^{-1} \\ \text{(iii) } \sqrt{5} &= 5^{\frac{1}{2}} \\ \text{(iv) } \sqrt{125} &= (125)^{\frac{1}{2}} \\ &= (5^3)^{\frac{1}{2}} \\ &= (5)^{\frac{3}{2}} \end{aligned}$$

② Write the following in the form of 4^n :

(i) 16 (ii) 8 (iii) 32

$$\begin{aligned} \Rightarrow \text{(i) } 16 &= 4 \times 4 \\ &= 4^2 \\ \text{(ii) } 8 &= \sqrt{64} \\ &= (64)^{\frac{1}{2}} \\ &= (4 \times 4 \times 4)^{\frac{1}{2}} \\ &= (4)^{\frac{3}{2}} \\ \text{(iii) } 32 &= \sqrt{1024} \\ &= (1024)^{\frac{1}{2}} \\ &= (4 \times 4 \times 4 \times 4 \times 4)^{\frac{1}{2}} \\ &= (4)^{\frac{5}{2}} \end{aligned}$$

③ Find the value of

(i) $(49)^{\frac{1}{2}}$ (ii) $(243)^{\frac{2}{5}}$ (iii) $9^{-\frac{3}{2}}$ (iv) $\left(\frac{64}{125}\right)^{-\frac{2}{3}}$

$$\begin{aligned} \Rightarrow \text{(i) } (49)^{\frac{1}{2}} &= (7^2)^{\frac{1}{2}} \\ &= (7)^{2 \times \frac{1}{2}} \\ &= 7 \\ \text{(ii) } (243)^{\frac{2}{5}} &= \sqrt[5]{243 \times 243} \\ &= \sqrt[5]{9 \times 9 \times 3 \times 9 \times 9 \times 3} \\ &= \sqrt[5]{9 \times 9 \times 9 \times 9 \times 9} \\ &= (9)^{5 \times \frac{1}{5}} \\ &= 9 \end{aligned}$$

(iii) $(9)^{-\frac{3}{2}}$

$$= \sqrt[2]{\frac{1}{9 \times 9 \times 9}}$$

$$= \sqrt[2]{\frac{1}{3 \times 3 \times 3 \times 3 \times 3 \times 3}} = \left(\frac{1}{3}\right)^{\frac{6}{2}} = \left(\frac{1}{3}\right)^3 = \frac{1}{27}$$

$$(iv) \left(\frac{64}{125}\right)^{-2/3}$$

$$= \sqrt[3]{\left(\frac{64}{125}\right)^{-2}}$$

$$= \sqrt[3]{\frac{125 \times 125}{64 \times 64}}$$

$$= \sqrt[3]{\frac{5 \times 5 \times 5 \times 5 \times 5 \times 5}{4 \times 4 \times 4 \times 4 \times 4 \times 4}}$$

$$= \left(\frac{5}{4}\right)^{\frac{6}{3}} = \left(\frac{5}{4}\right)^2 = \frac{25}{16}$$

4) Use a fractional index to write :-

$$(i) \sqrt{5} \quad (ii) \sqrt[3]{7} \quad (iii) (\sqrt[3]{49})^5 \quad (iv) \left(\frac{1}{\sqrt[3]{100}}\right)^7$$

$$\Rightarrow (i) \sqrt{5} = \sqrt[2]{5} = 5^{\frac{1}{2}} \quad (ii) \sqrt[3]{7} = 7^{\frac{1}{3}} \quad (iii) (\sqrt[3]{49})^5 = (49)^{5/3} = (7^2)^{5/3} = (7)^{\frac{10}{3}}$$

$$(iv) \left(\frac{1}{\sqrt[3]{100}}\right)^7$$

$$= \left(\frac{1}{\sqrt[3]{(10)^2}}\right)^7$$

$$= \left(\frac{1}{(10)^{2/3}}\right)^7$$

$$= (10)^{-\frac{2 \times 7}{3}}$$

$$= (10)^{-\frac{14}{3}}$$

5) Find the 5th root of

$$(i) 32 \quad (ii) 243 \quad (iii) 100000 \quad (iv) \frac{1024}{3125}$$

$$\Rightarrow (i) \sqrt[5]{32} = \sqrt[5]{2 \times 2 \times 2 \times 2 \times 2} = 2 \quad (ii) \sqrt[5]{243} = \sqrt[5]{3 \times 3 \times 3 \times 3 \times 3} = 3 \quad (iii) \sqrt[5]{100000} = \sqrt[5]{10 \times 10 \times 10 \times 10 \times 10} = 10 \quad (iv) \sqrt[5]{\frac{1024}{3125}} = \sqrt[5]{\frac{4 \times 4 \times 4 \times 4 \times 4}{5 \times 5 \times 5 \times 5 \times 5}} = \frac{4}{5}$$