



(iii) We have to prove that $\left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}} = \frac{16}{3}$

Now,

$$\begin{aligned} \left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}} &= \frac{1^{-2}}{4^{-2}} - 3 \times 2^{3 \times \frac{2}{3}} \times 4^0 + \frac{3^{2 \times -\frac{1}{2}}}{4^{2 \times -\frac{1}{2}}} \\ \Rightarrow \left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}} &= \frac{1}{2^{2 \times -2}} - 3 \times 2^{\cancel{3} \times \frac{2}{\cancel{3}}} \times 4^0 + \frac{3^{\cancel{2} \times -\frac{1}{\cancel{2}}}}{2^{\cancel{2} \times -\frac{1}{\cancel{2}}}} \\ \Rightarrow \left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}} &= \frac{1}{2^{-4}} - 3 \times 2^2 \times 4^0 + \frac{3^{-1}}{2^{-2}} \\ \Rightarrow \left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}} &= \frac{1}{\frac{1}{2^4}} - 3 \times 2^2 \times 4^0 + \frac{\frac{1}{3}}{\frac{1}{2^2}} \\ \Rightarrow \left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}} &= 1 \times \frac{2^4}{1} - 3 \times 2^2 \times 1 + \frac{1}{3} \times \frac{2^2}{1} \\ \Rightarrow \left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}} &= \frac{16}{1} - \frac{12}{1} + \frac{4}{3} = \frac{16}{3} \end{aligned}$$

Hence, $\boxed{\left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}} = \frac{16}{3}}$

(iv) We have to prove that $\frac{2^{\frac{1}{2}} \times 3^{\frac{1}{3}} \times 4^{\frac{1}{4}}}{10^{\frac{-1}{5}} \times 5^{\frac{3}{5}}} \div \frac{3^{\frac{4}{3}} \times 5^{\frac{-7}{5}}}{4^{\frac{-3}{5}} \times 6} = 10$. So,

$$\begin{aligned} \text{Let } x &= \frac{2^{\frac{1}{2}} \times 3^{\frac{1}{3}} \times 4^{\frac{1}{4}}}{10^{\frac{-1}{5}} \times 5^{\frac{3}{5}}} \div \frac{3^{\frac{4}{3}} \times 5^{\frac{-7}{5}}}{4^{\frac{-3}{5}} \times 6} \\ x &= \frac{2^{\frac{1}{2}} \times 3^{\frac{1}{3}} \times 4^{\frac{1}{4}}}{10^{\frac{-1}{5}} \times 5^{\frac{3}{5}}} \div \frac{3^{\frac{4}{3}} \times 5^{\frac{-7}{5}}}{4^{\frac{-3}{5}} \times 6} \\ &= \frac{2^{\frac{1}{2}} \times 3^{\frac{1}{3}} \times 2^{2 \times \frac{1}{4}}}{5^{\frac{-1}{5}} \times 2^{\frac{-1}{5}} \times 5^{\frac{3}{5}}} \div \frac{3^{\frac{4}{3}} \times 5^{\frac{-7}{5}}}{2^{2 \times \frac{-3}{5}} \times 3 \times 2} \\ &= \frac{2^{\frac{1}{2}} \times 3^{\frac{1}{3}} \times 2^{2 \times \frac{1}{4}}}{5^{\frac{-1}{5}} \times 2^{\frac{-1}{5}} \times 5^{\frac{3}{5}}} \div \frac{3^{\frac{4}{3}} \times 5^{\frac{-7}{5}}}{2^{2 \times \frac{-3}{5}} \times 3 \times 2} \\ &= \frac{2^{\frac{1}{2} + \frac{1}{2} + \frac{1}{5}} \times 3^{\frac{1}{3}}}{5^{\frac{-1}{5} + \frac{3}{5}}} \div \frac{3^{\frac{4}{3} - 1} \times 5^{\frac{-7}{5}}}{2^{\frac{-6}{5} + 1}} \\ x &= \frac{2^{\frac{1 \times 5}{2 \times 5} + \frac{1 \times 5}{2 \times 5} + \frac{1 \times 2}{2 \times 5}} \times 3^{\frac{1}{3}}}{5^{\frac{-1+3}{5}}} \div \frac{3^{\frac{4}{3} - \frac{1 \times 3}{1 \times 3}} \times 5^{\frac{-7}{5}}}{2^{\frac{-6}{5} + \frac{1 \times 5}{1 \times 5}}} \end{aligned}$$

$$= \frac{2^{\frac{5}{10} + \frac{5}{10} + \frac{2}{10}} \times 3^{\frac{1}{3}}}{5^{\frac{2}{5}}} \div \frac{3^{\frac{4-3}{3}} \times 5^{\frac{-7}{5}}}{2^{\frac{-6+5}{5}}}$$

$$= \frac{2^{\frac{12}{10}} \times 3^{\frac{1}{3}}}{5^{\frac{2}{5}}} \div \frac{3^{\frac{1}{3}} \times 5^{\frac{-7}{5}}}{2^{\frac{-1}{5}}}$$

$$= \frac{2^{\frac{12}{10}} \times 3^{\frac{1}{3}}}{5^{\frac{2}{5}}} \div \frac{3^{\frac{1}{3}} \times 5^{\frac{-7}{5}}}{\frac{1}{2^{\frac{1}{5}}}}$$

$$x = \frac{2^{\frac{12}{10}} \times 3^{\frac{1}{3}} \times \frac{1}{5^{\frac{2}{5}}}}{\frac{3^{\frac{1}{3}}}{1} \times \frac{1}{5^{\frac{7}{5}}} \times \frac{2^{\frac{1}{5}}}{1}}$$

$$= 2^{\frac{12}{10}} \times 3^{\frac{1}{3}} \times \frac{1}{5^{\frac{2}{5}}} \times \frac{1}{3^{\frac{1}{3}}} \times \frac{5^{\frac{7}{5}}}{1} \times \frac{1}{2^{\frac{1}{5}}}$$

$$= 2^{\frac{12}{10} - \frac{1}{5}} \times \cancel{3^{\frac{1}{3}}} \times \frac{1}{\cancel{3^{\frac{1}{3}}}} \times 5^{\frac{7}{5} - \frac{2}{5}}$$

$$= 2^{\frac{12}{10} - \frac{1 \times 2}{5 \times 2}} \times 5^{\frac{7-2}{5}}$$

$$x = 2^{\frac{12-2}{10}} \times 5^{\frac{5}{5}}$$

$$= 2^{\frac{10}{10}} \times 5^{\frac{5}{5}}$$

$$= 2 \times 5 = 10$$

$$\text{Hence, } \frac{2^{\frac{1}{2}} \times 3^{\frac{1}{3}} \times 4^{\frac{1}{4}}}{10^{\frac{-1}{5}} \times 5^{\frac{3}{5}}} \div \frac{3^{\frac{4}{3}} \times 5^{\frac{-7}{5}}}{4^{\frac{-3}{5}} \times 6} = 10$$

***** END *****