

Ex-2(A)

$$1) \text{ iii) } z^9 \times z^3 \times z^{-6} = z^{9+3-6} = z^6 \quad \left[\text{using, the Law, } a^m \times a^n = a^{m+n} \right]$$

$$v) 5x^7 \times 3x^4 = 15x^{7+4} = 15x^{11}$$

$$ix) x^6 y^4 z^{-2} \times x^{-3} y^{-5} z^{-1} \times x^2 z^4$$

$$= (x^6 \times x^{-3} \times x^2) \times (y^4 \times y^{-5}) \times (z^{-2} \times z^{-1} \times z^4)$$

$$= x^{6-3+2} \times y^{4-5} \times z^{-2-1+4} \quad \left[\text{using Law, } a^m \times a^n = a^{m+n} \right]$$

$$= x^5 y^{-1} z^1$$

$$= \frac{x^5 z}{y} \quad \left[\text{using Law, } a^{-1} = \frac{1}{a} \right]$$

(Ans)

$$2) \text{ v) } 7a^{12} \div 56a^{15} \quad \left[\text{using law, } a^m \div a^n = a^{m-n} \right]$$

$$= \frac{7}{56} a^{12-15} = \frac{1}{8} a^{-3}$$

$$= \frac{1}{8a^3} \quad \left[\text{using Law, } a^{-1} = \frac{1}{a} \right]$$

(Ans)

$$vii) 7x^{14} \div 21x^{-10} \quad \left[\text{using law, } a^m \div a^n = a^{m-n} \right]$$

$$= \frac{7}{21} x^{14 - (-10)}$$

$$= \frac{1}{3} x^{14+10}$$

$$= \frac{1}{3} x^{24} \quad \text{(Ans)}$$

$$2) \text{ ix) } \frac{a^7 b^5 c^4}{a^{-2} b^3 c^6} \quad \left[\text{using law } a^m \div a^n = a^{m-n} \right]$$

$$= a^{7-(-2)} b^{5-3} c^{4-6}$$

$$= a^{7+2} b^2 c^{-2}$$

$$= \frac{a^9 b^2}{c^2} \quad (\text{Ans.}) \quad \left[\text{using law } a^{-1} = \frac{1}{a} \right]$$

$$3) \text{ ii) } (2x^2y)^4 \quad \left[\text{using Law, } (a^m)^n = a^{mn} \right]$$

$$= 2^4 x^{2 \times 4} y^4 = 16 x^8 y^4 \quad (\text{Ans.})$$

$$\text{iv) } (x^2 y^{-3})^{-2} = x^{2 \times (-2)} \cdot y^{(-3) \times (-2)}$$

$$= x^{-4} \cdot y^6 = \frac{y^6}{x^4}$$

$$\text{vi) } (5m^4 n^{-3})^3 = 5^3 \cdot m^{4 \times 3} \cdot n^{-3 \times 3}$$

$$= 125 \cdot m^{12} \cdot n^{-9}$$

$$= \frac{125 m^{12}}{n^9} \quad (\text{Ans.})$$

$$4) \text{ ii) } (27)^{2/3} = (3^3)^{2/3} = 3^{3 \times \frac{2}{3}} = 3^2 = 9. \text{ (Ans)}$$

$$\text{iv) } (64)^{-1/3} = (4^3)^{-1/3} = 4^{3 \times (-\frac{1}{3})} = 4^{-1} = \frac{1}{4} \text{ (Ans)}$$

$$\text{vi) } (32)^{-4/5} = (2^5)^{-4/5} = 2^{5 \times (-\frac{4}{5})} = 2^{-4} = \frac{1}{2^4} = \frac{1}{16} \text{ (Ans)}$$

$$\begin{aligned} \text{5) iii) } & (64 m^{-6} n^3)^{2/3} \\ &= (4^3)^{2/3} (m^{-6})^{2/3} (n^3)^{2/3} \\ &= 4^{3 \times \frac{2}{3}} \cdot m^{-6 \times \frac{2}{3}} \cdot n^{3 \times \frac{2}{3}} \\ &= 4^2 m^{-4} n^2 \\ &= 16 m^{-4} n^2 = \frac{16 n^2}{m^4}. \end{aligned}$$

$$\begin{aligned} \text{vi) } & (6ab^2c^{-3})^{-1} \\ &= 6^{-1} a^{-1} b^{2 \times (-1)} c^{(-3) \times (-1)} \\ &= \frac{1 a^{-1} b^{-2} c^3}{6} \\ &= \frac{c^3}{6ab^2} \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} \text{ix) } & \sqrt[3]{x^{18} y^{-12} z^3} \\ &= (x^{18} y^{-12} z^3)^{1/3} \\ &= x^{18 \times \frac{1}{3}} y^{-12 \times \frac{1}{3}} z^{3 \times \frac{1}{3}} \\ &= x^6 y^{-4} z \\ &= \frac{x^6 z}{y^4} \text{ (Ans)} \end{aligned}$$

$$\begin{aligned}
 6) \text{ ii) } L.H.S &= \sqrt{x^{p-q}} \times \sqrt{x^{q-r}} \times \sqrt{x^{r-p}} \\
 &= (x^{p-q})^{1/2} \times (x^{q-r})^{1/2} \times (x^{r-p})^{1/2} \\
 &= x^{\frac{p-q}{2}} \times x^{\frac{q-r}{2}} \times x^{\frac{r-p}{2}} \\
 &= x^{\frac{p}{2} - \frac{q}{2}} \times x^{\frac{q}{2} - \frac{r}{2}} \times x^{\frac{r}{2} - \frac{p}{2}} \\
 &= x^{\frac{p}{2} - \frac{q}{2} + \frac{q}{2} - \frac{r}{2} + \frac{r}{2} - \frac{p}{2}} \\
 &= x^0 \\
 &= \underline{1} = R.H.S. \quad \underline{\text{(Showed)}}
 \end{aligned}$$

$$\begin{aligned}
 7) \text{ L.H.S} &= \left(\frac{x^p}{x^q}\right)^r \times \left(\frac{x^q}{x^r}\right)^p \times \left(\frac{x^r}{x^p}\right)^q \\
 &= \frac{x^{pr}}{x^{qr}} \times \frac{x^{qp}}{x^{rp}} \times \frac{x^{rq}}{x^{pq}} \\
 &= x^{pr-pr} \times x^{pq-pq} \times x^{rq-rq} \\
 &= x^0 \times x^0 \times x^0 \\
 &= 1 \times 1 \times 1 \\
 &= \underline{1} = R.H.S \quad \underline{\text{(Showed)}}
 \end{aligned}$$

$$\begin{aligned}
 8) \text{ ii) } LHS &= \left(\frac{x^a}{x^{-b}}\right)^{a-b} \times \left(\frac{x^b}{x^{-c}}\right)^{b-c} \times \left(\frac{x^c}{x^{-a}}\right)^{c-a} \\
 &= \left\{x^{a-(-b)}\right\}^{a-b} \times \left\{x^{b-(-c)}\right\}^{b-c} \times \left\{x^{c-(-a)}\right\}^{c-a} \\
 &= (x^{a+b})^{a-b} \times (x^{b+c})^{b-c} \times (x^{c+a})^{c-a} \\
 &= x^{(a+b)(a-b)} \times x^{(b+c)(b-c)} \times x^{(c+a)(c-a)} \\
 &= x^{a^2-b^2} \times x^{b^2-c^2} \times x^{c^2-a^2} \\
 &= x^{a^2-b^2+b^2-c^2+c^2-a^2} \\
 &= x^0 \\
 &= 1 = RHS \quad (\text{Showered})
 \end{aligned}$$

$$\begin{aligned}
 8) \text{ iv) } LHS &= \left(\frac{x^{a^2}}{x^{b^2}}\right)^{\frac{1}{a+b}} \times \left(\frac{x^{b^2}}{x^{c^2}}\right)^{\frac{1}{b+c}} \times \left(\frac{x^{c^2}}{x^{a^2}}\right)^{\frac{1}{c+a}} \\
 &= (x^{a^2-b^2})^{\frac{1}{a+b}} \times (x^{b^2-c^2})^{\frac{1}{b+c}} \times (x^{c^2-a^2})^{\frac{1}{c+a}} \\
 &= x^{\frac{(a+b)(a-b)}{a+b}} \times x^{\frac{(b+c)(b-c)}{b+c}} \times x^{\frac{(c+a)(c-a)}{c+a}} \\
 &= x^{a-b} \times x^{b-c} \times x^{c-a} \\
 &= x^{a-b+b-c+c-a} \\
 &= x^0 = 1 = RHS \quad (\text{Showered}).
 \end{aligned}$$

$$\begin{aligned}
 9) \text{ LHS} &= \left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2} \times \left(\frac{x^b}{x^c}\right)^{b^2+bc+c^2} \times \left(\frac{x^c}{x^a}\right)^{c^2+ca+a^2} \\
 &= \left\{x^{(a-b)}\right\}^{a^2+ab+b^2} \times \left\{x^{(b-c)}\right\}^{b^2+bc+c^2} \times \left\{x^{(c-a)}\right\}^{c^2+ca+a^2} \\
 &= x^{(a-b)(a^2+ab+b^2)} \times x^{(b-c)(b^2+bc+c^2)} \times x^{(c-a)(c^2+ca+a^2)} \\
 &= x^{a^3-b^3} \times x^{b^3-c^3} \times x^{c^3-a^3} \quad \left[\text{as } (a-b)(a^2+ab+b^2) = a^3-b^3\right] \\
 &= x^{\cancel{a^3-b^3} + \cancel{b^3-c^3} + \cancel{c^3-a^3}} = x^0 = 1 = \text{RHS} \quad \text{(shown)}
 \end{aligned}$$

$$\begin{aligned}
 10) \text{ ii)} \quad & \frac{1}{1+x^{a-b}} + \frac{1}{1+x^{b-a}} \\
 &= \frac{1}{1+\frac{x^a}{x^b}} + \frac{1}{1+\frac{x^b}{x^a}} \\
 &= \frac{1}{\frac{x^b+x^a}{x^b}} + \frac{1}{\frac{x^a+x^b}{x^a}} \\
 &= \frac{x^b}{x^b+x^a} + \frac{x^a}{x^a+x^b} \\
 &= \frac{\cancel{(x^b+x^a)}}{\cancel{(x^b+x^a)}} = 1 \quad \text{(ANS)}
 \end{aligned}$$

$$12) \frac{x^{2n+3} \cdot x^{(2n+1)(n+2)}}{(x^3)^{2n+1} \cdot x^{n(2n+1)}}$$

$$= \frac{x^{2n+3} \cdot x^{2n^2+4n+n+2}}{x^{6n+3} \cdot x^{2n^2+n}}$$

$$= \frac{x^{2n+3} \cdot x^{2n^2+5n+2}}{x^{6n+3+2n^2+n}}$$

$$= \frac{x^{2n^2+7n+5}}{x^{2n^2+7n+3}}$$

$$= x^{2n^2+7n+5-2n^2-7n-3}$$

$$= x^2 \quad (\text{Am})$$

$$14) i) \left(\frac{16}{625}\right)^{1/4}$$

$$= \left(\frac{2^4}{5^4}\right)^{1/4}$$

$$= \frac{2^{4 \times \frac{1}{4}}}{5^{4 \times \frac{1}{4}}} = \frac{2}{5} \quad (\text{Am})$$

$$\begin{aligned}
14) \text{ iii) } & (64)^{2/3} + \sqrt[3]{125} + 3^0 + \frac{1}{2^{-5}} + (27)^{-2/3} \times \left(\frac{25}{9}\right)^{-1/2} \\
& = (4^3)^{2/3} + (125)^{1/3} + 1 + 2^5 + (3^3)^{-2/3} \times \left\{\left(\frac{5^2}{3}\right)\right\}^{-1/2} \\
& = 4^{3 \times \frac{2}{3}} + (5^3)^{1/3} + 1 + 32 + 3^{3 \times -\frac{2}{3}} \times \left(\frac{5}{3}\right)^{2 \times -\frac{1}{2}} \\
& = 4^2 + 5 + 1 + 32 + 3^{-2} \times \left(\frac{5}{3}\right)^{-1} \\
& = 16 + 5 + 1 + 32 + \frac{1}{3^2} \times \left(\frac{3}{5}\right) \\
& = 16 + 5 + 1 + 32 + \frac{1}{\cancel{9}} \times \frac{3}{5} \\
& = 16 + 5 + 1 + 32 + \frac{1}{15} \\
& = 54 + \frac{1}{15} = 54 \frac{1}{15} \quad \underline{\text{(Ans)}}
\end{aligned}$$

$$\begin{aligned}
14) \text{ iv) } & (81)^{-1} \times 3^{-5} \times 3^9 \times (64)^{5/6} \times (\sqrt[3]{3})^6 \\
& = (3^4)^{-1} \times 3^{-5} \times 3^9 \times (2^6)^{5/6} \times (3^{1/3})^6 \\
& = 3^{-4} \times 3^{-5} \times 3^9 \times 2^{6 \times \frac{5}{6}} \times 3^{\frac{1}{3} \times 6 \times 2} \\
& = 3^{-4} \times 3^{-5} \times 3^9 \times 2^5 \times 3^2 \\
& = 3^{9+2-4-5} \times 2^5 \\
& = 3^2 \times 2^5 \\
& = 9 \times 32 \\
& = 288 \quad \underline{\text{(Ans)}}
\end{aligned}$$

$$15) i) \left(\frac{-3}{11}\right)^{x+5} \div \left(\frac{-3}{11}\right)^{-2x+3} = \left(\frac{-3}{11}\right)^{2x-5} \times \left[\left(\frac{-3}{11}\right)^{-2}\right]^{x+4}$$

$$\Rightarrow \left(\frac{-3}{11}\right)^{x+5+2x-3} = \left(\frac{-3}{11}\right)^{2x-5} \times \left(\frac{-3}{11}\right)^{-2x-8}$$

$$\Rightarrow \left(\frac{-3}{11}\right)^{3x+2} = \left(\frac{-3}{11}\right)^{2x-5-2x-8}$$

$$\Rightarrow \left(\frac{-3}{11}\right)^{3x+2} = \left(\frac{-3}{11}\right)^{-13} \quad \left[\begin{array}{l} \text{If } a^m = a^n \\ \text{then, } m=n \end{array} \right]$$

$$\Rightarrow 3x+2 = -13$$

$$\Rightarrow 3x = -2-13$$

$$\Rightarrow 3x = -15$$

$$\Rightarrow x = \frac{-15}{3}$$

$$\Rightarrow \boxed{x = -5} \quad (\text{Ans})$$

$$15) ii) \left[\left\{ \left(\frac{2}{5}\right)^2 \right\}^4 \right]^{x+2} = \left[\left\{ \left(\frac{2}{5}\right)^{-2} \right\}^{(x-1)} \right]^{-3}$$

$$\Rightarrow \left(\frac{2}{5}\right)^{2 \times 4 \times (x+2)} = \left(\frac{2}{5}\right)^{-2 \times (x-1) \times (-3)}$$

$$\Rightarrow \left(\frac{2}{5}\right)^{8x+16} = \left(\frac{2}{5}\right)^{6x-6} \quad \left[\begin{array}{l} \text{If } a^m = a^n \\ \text{then } m=n \end{array} \right]$$

$$\Rightarrow 8x+16 = 6x-6$$

$$\Rightarrow 8x-6x = -16-6$$

$$\Rightarrow 2x = -22$$

$$\Rightarrow x = \frac{-22}{2} \Rightarrow x = -11 \quad (\text{Ans})$$

$$16) \text{ ii) } \left(\frac{3p^2 a r^{-2}}{2p^{-1} a^3} \right)^2 \div (2p^3 r)^{-1}$$

$$= \left(\frac{3^2 p^{2 \times 2} a^2 r^{-2 \times 2}}{2^2 p^{-1 \times 2} a^{3 \times 2}} \right) \div \left(\frac{1}{2p^3 r} \right)$$

$$= \frac{9p^4 a^2 r^{-4}}{2^4 p^{-2} a^6} \times 2p^3 r$$

$$= \frac{9}{2} p^{4+2+3} a^{2-6} r^{-4+1}$$

$$= \frac{9}{2} p^9 a^{-4} r^{-3}$$

$$= \frac{9p^9}{2a^4 r^3} \text{ (Ans)}$$

End of Chapter - 2