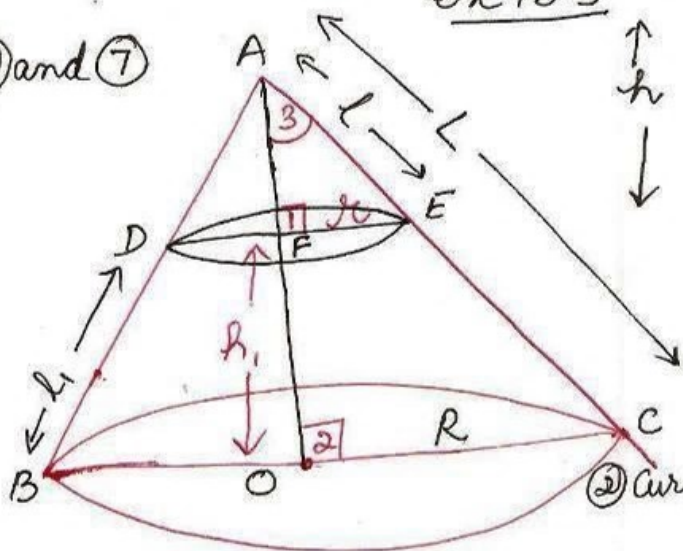


ex 13.5

⑥ and ⑦



$$= \frac{1}{3} \pi h_1 (R^2 + r^2 + Rr)$$

$$\frac{l}{L} = \frac{r}{R}$$

$$\Rightarrow L = \frac{lR}{r} \dots \textcircled{iii}$$

$$\text{or } r = \frac{lR}{L} \dots \textcircled{iv}$$

② Curved surface area of frustum = $\pi RL - \pi rl$

$$= \pi (RL - rl)$$

$$= \pi (R \times \frac{lR}{r} - rl) \text{ using iii}$$

$$= \pi l (R^2 - r^2)$$

$$= \pi \frac{l}{r} (R - r)(R + r)$$

$$= \pi \frac{l}{r} (R - \frac{lR}{L})(R + r)$$

$$= \pi \times L (\frac{l_1}{L})(R + r)$$

$$= \pi l_1 (R + r)$$

$\triangle AFE \sim \triangle AOC$ by AA cor.

$$\Rightarrow \frac{r}{R} = \frac{h}{H} = \frac{l}{L}$$

$$\frac{r}{R} = \frac{h}{H} \quad | \quad \text{or } r = \frac{hR}{H} \textcircled{ii}$$

$$\Rightarrow H = \frac{hR}{r} \textcircled{i}$$

① Volume of frustum

$$= \frac{1}{3} \pi R^2 H - \frac{1}{3} \pi r^2 h$$

$$= \frac{1}{3} \pi (R^2 H - r^2 h)$$

$$= \frac{1}{3} \pi (R^2 \times \frac{hR}{r} - r^2 h)$$

using (i)

$$= \frac{1}{3} \pi (R^3 \frac{h}{r} - r^3 \frac{h}{r})$$

$$= \frac{1}{3} \pi \frac{h}{r} (R^3 - r^3)$$

$$= \frac{1}{3} \pi \frac{h}{r} (R - r)(R^2 + r^2 + Rr)$$

$$= \frac{1}{3} \pi \frac{h}{r} (R - \frac{hR}{H})(R^2 + r^2 + Rr) \text{ (using ii)}$$

$$= \frac{1}{3} \pi \frac{hR}{r} (\frac{H-h}{H})(R^2 + r^2 + Rr)$$

$$= \frac{1}{3} \pi \times \frac{h_1}{H} (R^2 + r^2 + Rr) \text{ (using i)}$$

③ total surface area of frustum

$$= \pi l_1 (R + r) + \pi r^2 + \pi R^2$$

④ $l_1 = \sqrt{h_1^2 + (R - r)^2}$