Surface Areas and Volumes Ex.16.3 Q1

Answer :

The radii of the top and bottom circles are r_1 = 20 cm and r_2 = 10 cm respectively. The height of the bucket is h = 12 cm. Therefore, the volume of the bucket is

$$\begin{aligned} V &= \frac{1}{3}\pi(r_1^2 + r_1 r_2 + r_2^2) \times h \\ &= \frac{1}{3}\pi(20^2 + 20\times10 + 10^2)\times 12 \\ &= \frac{1}{3}\times\frac{22}{7}\times 700\times 12 \\ &= 8800 \text{ cm}^3 \end{aligned}$$

The slant height of the bucket is

$$\begin{aligned} l &= \sqrt{(r_1 - r_2)^2 + h^2} \\ &= \sqrt{(20-10)^2 + 12^2} \\ &= \sqrt{244} \\ &= 2\sqrt{61} \text{ cm} \end{aligned}$$

The total surface area of the bucket is

$$\begin{aligned} &= \pi(r_1 + r_2)\times l + \pi r_2^2 \\ &= \frac{22}{7}\times(20+10)\times 2\sqrt{61} + \frac{22}{7}\times 10^2 \\ &= \frac{1320\sqrt{61} + 2200}{7} \text{ cm}^2 \\ &= \frac{1320\sqrt{61} + 2200}{7\times 100} \text{ dm}^2 \end{aligned}$$

The total cost of tin sheet used for making the bucket is

$$\begin{aligned} &= 1.20\times\left(\frac{1320\sqrt{61} + 2200}{7\times 100}\right) \\ &= 21.40 \end{aligned}$$

Surface Areas and Volumes Ex.16.3 Q2

Answer :

The radii of the bottom and top circles are r_1 = 10 cm and r_2 = 6 cm respectively. The height of the frustum cone is h = 3 cm. Therefore, the volume of the bucket is

$$\begin{aligned} V &= \frac{1}{3}\pi(r_1^2 + r_1 r_2 + r_2^2) \times h \\ &= \frac{1}{3}\pi(10^2 + 10\times6 + 6^2)\times 3 \\ &= \frac{1}{3}\times\frac{22}{7}\times 196\times 3 \\ &= 616 \text{ cm}^3 \end{aligned}$$

Hence $\boxed{\text{volume} = 616 \text{ cm}^3}$

The slant height of the bucket is

$$\begin{aligned} l &= \sqrt{(r_1 - r_2)^2 + h^2} \\ &= \sqrt{(10-6)^2 + 3^2} \\ &= \sqrt{25} \\ &= 5 \text{ cm} \end{aligned}$$

The total surface area of the frustum cone is

$$= \pi(r_1 + r_2) \times l + \pi r_1^2 + \pi r_2^2$$

$$= \frac{22}{7} \times (10 + 6) \times 5 + \frac{22}{7} \times 10^2 + \frac{22}{7} \times 6^2$$

$$= \frac{4752}{7} \text{ Square cm}$$

$$= 678.85 \text{ Square cm}$$

Hence $\boxed{\text{Total surface area} = 678.85}$

Surface Areas and Volumes Ex.16.3 Q3

Answer :

The slant height of the frustum of the cone is $l = 4$ cm. The perimeters of the circular ends are 18 cm and 6 cm. Let the radii of the bottom and top circles are r_1 cm and r_2 cm respectively. Then, we have

$$2\pi r_1 = 18$$
$$\Rightarrow \pi r_1 = 9$$
$$2\pi r_2 = 6$$
$$\Rightarrow \pi r_2 = 3$$

The curved surface area of the frustum cone is

$$= \pi(r_1 + r_2) \times l$$
$$= (\pi r_1 + \pi r_2) \times l$$
$$= (9 + 3) \times 4$$

= 48 Square cm

*********** END **********