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

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

The slant height of the bucket is

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

The total surface area of the bucket is

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

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

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

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

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

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

The slant height of the bucket is

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

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 **********