Surface Areas and Volumes Ex.16.3 Q15

Answer :

The height of the bucket is h=16cm. The radii of the upper and lower circles of the bucket are r_1 =20 cm and r_2 = 8 cm respectively.

The slant height of the bucket is

$$l = \sqrt{(r_1 - r_2)^2 + h^2}$$
$$= \sqrt{(20-8)^2 + 16^2}$$
$$= \sqrt{400}$$
$$= 20 \text{ cm}$$

The volume of the bucket is

$$V = \frac{1}{3}\pi(r_1^2 + r_1 r_2 + r_2^2) \times h$$
$$= \frac{1}{3}\pi(20^2 + 20\times 8 + 8^2)\times 16$$
$$= \frac{1}{3}\times 3.14 \times 624 \times 16$$
$$= 3.14 \times 208 \times 16$$
$$= 10449.92 \text{ cm}^3$$

Hence the volume of the bucket is $\boxed{10449.92 \text{ cm}^3}$

The surface area of the used metal sheet to make the bucket is

$$S_1 = \pi(r_1 + r_2)\times l + \pi r_2^2$$
$$= \pi \times (20+8)\times 20 + \pi \times 8^2$$
$$= \pi \times 28 \times 20 + 64\pi$$
$$= 624\pi \text{ cm}^2$$

Therefore, the total cost of making the bucket is

$$= \frac{624\pi}{100}\times 20$$
$$= \boxed{\text{Rs.}391.9}$$

Surface Areas and Volumes Ex.16.3 Q16

Answer :

The height of the frustum of a cone is h=9cm. The radii of the upper and lower circles of the frustum of the cone are r_1 =30cm and r_2 =18cm respectively.

The slant height of the frustum of the cone is

$$l = \sqrt{(r_1 - r_2)^2 + h^2}$$
$$= \sqrt{(30-18)^2 + 9^2}$$
$$= \sqrt{225}$$
$$= 15 \text{ cm}$$

The volume of the frustum of the cone is

$$V = \frac{1}{3}\pi(r_1^2 + r_1 r_2 + r_2^2)\times h$$
$$= \frac{1}{3}\pi(30^2 + 30\times 18 + 18^2)\times 9$$
$$= \frac{1}{3}\times 1764 \times 9 \times \pi$$
$$= \boxed{5292\pi \text{ cm}^3}$$

The total surface area of the frustum of the cone is

$$S_1 = \pi(r_1 + r_2)\times l + \pi r_1^2 + \pi r_2^2$$
$$= \pi \times (30+18)\times 15 + \pi \times 30^2 + \pi \times 18^2$$
$$= \pi \times 48 \times 15 + 900\pi + 324\pi$$
$$= \boxed{1944\pi \text{ cm}^2}$$

Surface Areas and Volumes Ex.16.3 Q17

Answer :

Let the depth of the container is *h* cm. The radii of the top and bottom circles of the container are r_1 =20cm and r_2 =8cm respectively.

The volume/capacity of the container is

$$V = \frac{1}{3}\pi(r_1^2 + r_1 r_2 + r_2^2) \times h$$
$$= \frac{1}{3}\pi(20^2 + 20 \times 8 + 8^2) \times h$$
$$= \frac{1}{3} \times \frac{22}{7} \times 624 \times h$$
$$= \frac{22}{7} \times 208 \times h \text{ cm}^3$$

Given that the capacity of the bucket is $10459\frac{3}{7}$ cm^3. Thus, we have

$$\frac{22}{7} \times 208 \times h = 10459\frac{3}{7}$$
$$\Rightarrow h = \frac{73216}{22 \times 208}$$
$$\Rightarrow h = 16 \text{ cm}$$

Hence, the height of the container is 16 cm.

The slant height of the container is

$$l = \sqrt{(r_1 - r_2)^2 + h^2}$$
$$= \sqrt{(20-8)^2 + 16^2}$$
$$= \sqrt{400}$$
$$= 20 \text{ cm}$$

The surface area of the used metal sheet to make the container is

$$S_1 = \pi(r_1 + r_2) \times l + \pi r_2^2$$
$$= \pi \times (20+8) \times 20 + \pi \times 8^2$$
$$= \pi \times 28 \times 20 + 64\pi$$
$$= 624\pi \text{ cm}^2$$

The cost to make the container is $= 624\pi \times 1.4 = 624 \times \frac{22}{7} \times 1.4 = \boxed{Rs.\ 2745.6}$

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