Surface Areas and Volumes Ex.16.1 Q23

Answer :

The internal and external radii of the hollow sphere are 2cm and 4cm respectively. Therefore, the volume of the hollow sphere is

$$V = \frac{4}{3}\pi\left\{(4)^3 - (2)^3\right\}$$
$$= \frac{4}{3}\times\frac{22}{7}\times 56$$
$$= \frac{32\times 22}{3}$$

The hollow sphere is melted to produce a right circular cone of base-radius 4cm. Let, the height and slant height of the cone be h cm and l cm respectively. Then, we have

$$l^2 = (4)^2 + h^2$$
$$\Rightarrow l^2 = 16 + h^2$$

The volume of the cone is

$$V_1 = \frac{1}{3}\pi r_1^2 h_1$$
$$= \frac{1}{3}\times\frac{22}{7}\times(4)^2\times h$$

Since, the volume of the cone and hollow sphere are same, we have

$$V_1 = V$$
$$\Rightarrow \frac{1}{3}\times\frac{22}{7}\times(4)^2\times h = \frac{32\times 22}{3}$$
$$\Rightarrow \frac{1}{7}\times(4)^2\times h = 32$$
$$\Rightarrow h = \frac{32\times 7}{16}$$
$$\Rightarrow = 14$$

Then, we have

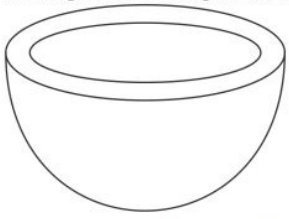
$$l^2 = 16 + (14)^2$$
$$\Rightarrow = 212$$
$$\Rightarrow l = 14.56$$

Therefore, the height and the slant height of the cone are 14 cm and 14.56 cm respectively.

Surface Areas and Volumes Ex.16.1 Q24

Answer :

We are given the following hemi hollow sphere



The internal and external radii of the hollow hemispherical vessel are $\frac{21}{2} = 10.5$ cm and $\frac{25.2}{2} = 12.6$ cm respectively. Therefore, the total surface area of the hollow hemispherical vessel is

$$S = 2\pi\times(12.6)^2 + 2\pi\times(10.5)^2 + \pi\left\{(12.6)^2 - (10.5)^2\right\}$$
$$= 2\times\frac{22}{7}\times 158.76 + 2\times\frac{22}{7}\times 110.25 + \frac{22}{7}\times 48.51$$
$$= 997.92 + 693 + 152.46$$
$$= 1843.38$$

The cost of painting 1 square cm is 10 paise. Therefore the total cost of painting the vessel all over is

$$1843.38\times 10 = 1843.38\times 10 \text{ Paise}$$
$$= 184.338 \text{ Rupees}$$

Hence total cost of painting is $\boxed{184.338}$ rupees

Surface Areas and Volumes Ex.16.1 Q25

Answer :

The radius of the cylindrical tub is 12cm. Upon dropping a spherical ball of radius 9cm into the tub, the height of the raised water is h cm. Therefore, the volume of the raised water is

$V = \pi \times (12)^2 \times h$ cubic cm

The volume of the spherical ball is

$V_1 = \frac{4}{3}\pi \times (9)^3$ cubic cm

Since, the volume of the raised water is same as the volume of the spherical ball, we have

$$V_1 = V$$

$$\Rightarrow \frac{4}{3}\pi \times (9)^3 = \pi \times (12)^2 \times h$$

$$\Rightarrow \quad h = \frac{4 \times (9)^3}{3 \times (12)^2}$$

$$\Rightarrow \quad = \frac{27}{4}$$

$$\Rightarrow \quad = 6.75$$

Therefore, the height of the raised water is $\boxed{h = 6.75 \text{ cm}}$

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