Surface Areas and Volumes Ex.16.1 Q41

Answer :

The internal radius of the pipe is 10 cm=0.1 m. The water is flowing in the pipe at 3km/hr = 3000m/hr. Let the cylindrical tank will be filled in *t* hours. Therefore, the length of the flowing water in *t* hours is

$= 3000 \times t \;\text{ meter}$

Therefore, the volume of the flowing water is

$V_1 = \pi \times (0.1)^2 \times 3000 \times t \;\text{ m}^3$

The radius of the cylindrical tank is 5 m and the height is 2 m. Therefore, the volume of the cylindrical tank is

$V_2 = \pi \times (5)^2 \times 2 \text{ m}^3$

Since, we have considered that the tank will be filled in *t* hours; therefore the volume of the flowing water in *t* hours is same as the volume of the cylindrical tank. Hence, we have

$V_1 = V_2$

$\Rightarrow \pi \times (5)^2 \times 2 = \pi \times (0.1)^2 \times 3000 \times t$

$\Rightarrow t = \dfrac{(5)^2 \times 2}{(0.1)^2 \times 3000}$

$\Rightarrow t = \dfrac{5}{3} \text{ hours}$

$t = \dfrac{5 \times 60}{3} = 100 \text{ minut}$

Hence, the tank will be filled in $\boxed{1 \text{ hour } 40 \text{ minutes}}$

Surface Areas and Volumes Ex.16.1 Q42

Answer :

The inner radius of the well is $\frac{3}{2}$ m and the height is 14m. Therefore, the volume of the Earth taken out of it is

$V_1 = \pi \times \left(\frac{3}{2}\right)^2 \times 14 \text{ m}^3$

The inner and outer radii of the embankment are $\frac{3}{2}$ m and $4 + \frac{3}{2} = \frac{11}{2}$ m respectively. Let the height of the embankment be *h*. Therefore, the volume of the embankment is

$V_2 = \pi \times \left\{\left(\frac{11}{2}\right)^2 - \left(\frac{3}{2}\right)^2\right\} \times h \text{ m}^3$

Since, the volume of the well is same as the volume of the embankment; we have

$V_1 = V_2$

$\Rightarrow \pi \times \left(\frac{3}{2}\right)^2 \times 14 = \pi \times \left\{\left(\frac{11}{2}\right)^2 - \left(\frac{3}{2}\right)^2\right\} \times h$

$\Rightarrow h = \dfrac{9 \times 14}{112}$

$\Rightarrow h = \dfrac{9}{8} \text{ m}$

Hence, the height of the embankment is $\boxed{h = \frac{9}{8} \text{ m}}$

Surface Areas and Volumes Ex.16.1 Q43

Answer :

The surface area of the metallic sphere is 616 square cm. Let the radius of the metallic sphere is *r*. Therefore, we have

$4\pi r^2 = 616$

$\Rightarrow r^2 = \dfrac{616\times 7}{4\times 22}$

$\Rightarrow r^2 = 7\times 7$

$\Rightarrow r = 7$

Therefore, the radius of the metallic sphere is 7 cm and the volume of the sphere is

$V_1 = \dfrac{4}{3}\pi\times(7)^3 \text{ cm}^3$

The sphere is melted to recast a cone of height 28 cm. Let the radius of the cone is *R* cm. Therefore, the volume of the cone is

$V_2 = \dfrac{1}{3}\pi\times(R)^2\times 28 \text{ cm}^3$

Since, the volumes of the sphere and the cone are same; we have

$V_1 = V_2$

$\Rightarrow \dfrac{4}{3}\pi\times(7)^3 = \dfrac{1}{3}\pi\times(R)^2\times 28$

$\Rightarrow R^2 = \dfrac{4\times(7)^3}{28}$

$\Rightarrow R^2 = 7^2$

$\Rightarrow R = 7$

Hence, the diameter of the base of the cone so formed is two times its radius, which is $\boxed{14}$ cm.

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