Surface Area and volume of A Right Circular cylinder Ex 19.2 Q21

Answer :

Given data is as follows:

$h = 14$ cm

Outer Curved Surface Area − Inner Curved Surface Area = $88\ \text{cm}^2$

Volume = $176\ \text{cm}^3$

We have to find the inner and outer radii of the tube.

As given in the problem we have,

$$2\pi Rh - 2\pi rh = 88$$

$$2\pi h(R-r) = 88$$

$$2 \times \frac{22}{7} \times 14(R-r) = 88$$

$$R - r = 1$$

Also, from the given data we have,

$$\pi R^2 h - \pi r^2 h = 176$$

$$\pi h(R^2 - r^2) = 176$$

$$\frac{22}{7} \times 14 \times (R-r)(R+r) = 176$$

$$(R-r)(R+r) = 4$$

We have already found out that $R - r = 1$

Therefore,

$R + r = 4$

Now let us solve these two equations, by adding them

$R - r = 1$

$R + r = 4$

We get

$2R = 5$

$R = 2.5$

Substituting for R in $R - r = 1$, we get

$r = 1.5$

Thus, inner radius of the pipe is equal to 1.5 cm and outer radius of the pipe is equal to 2.5 cm.

Surface Area and volume of A Right Circular cylinder Ex 19.2 Q22

Answer :

Given data is as follows:
Internal diameter of the pipe = 2 cm
Water flow rate through the pipe = 6 m/sec
Radius of the tank = 60 cm
Time = 30 minutes
The volume of water that flows for 1 sec through the pipe at the rate of 6 m/sec is nothing but the volume of the cylinder with $h = 6$.
Also, given is the diameter which is 2 cm. Therefore,

$r = 1$ cm

Since the speed with which water flows through the pipe is in meters/second, let us convert the radius of the pipe from centimeters to meters. Therefore,

$$r = \frac{1}{100} \text{ m}$$

Volume of water that flows for 1 sec = $\frac{22}{7} \times \frac{1}{100} \times \frac{1}{100} \times 6$

Now, we have to find the volume of water that flows for 30 minutes.
Since speed of water is in meters/second, let us convert 30 minutes into seconds. It will be 30×60

Volume of water that flows for 30 minutes = $\frac{22}{7} \times \frac{1}{100} \times \frac{1}{100} \times 6 \times 30 \times 60$

Now, considering the tank, we have been given the radius of tank in centimeters. Let us first convert it into meters. Let radius of tank be 'R'.

$R = 60$ cm

$$R = \frac{60}{100} \text{ m}$$

Volume of water collected in the tank after 30 minutes= $\frac{22}{7} \times \frac{60}{100} \times \frac{60}{100} \times h$

We know that,
Volume of water collected in the tank after 30 minutes= Volume of water that flows through the pipe for 30 minutes

$$\frac{22}{7} \times \frac{60}{100} \times \frac{60}{100} \times h = \frac{22}{7} \times \frac{1}{100} \times \frac{1}{100} \times 6 \times 30 \times 60$$

$$h = 3m$$

Therefore, the height of the tank is 3 meters.

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