Assignment 1

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Question 9(c)

The following figure represents a solid consisting of a right circular cylinder with a hemisphere at one end and cone at the other. Their common radius is $7cm$. The height of the cylinder and the cone are each of $4cm$. Find the volume of the solid.
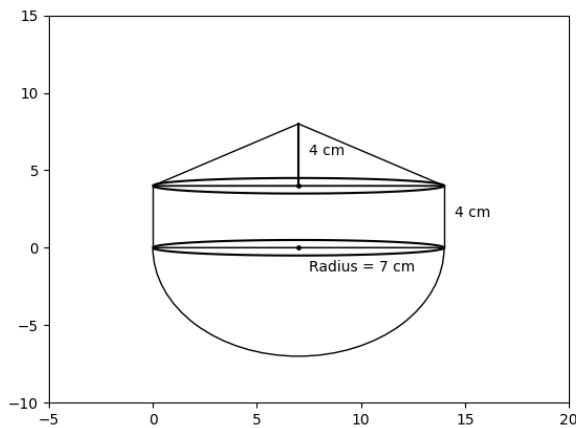
Symbol	Formulae/Value	Description
r	$7cm$	common radius
h	$4cm$	height of cone and cylinder
V_1	$\frac{1}{3}\pi r^2 h$	Volume of cone
V_2	$\pi r^2 h$	Volume of cylinder
V_3	$\frac{1}{3}\pi r^3$	Volume of hemisphere
V	?	Volume of the figure

TABLE I

From the given information, the volume of the figure is equal to the sum of the volume of the cone, cylinder and hemisphere. Thus,

$$V = V_1 + V_2 + V_3$$
$$\implies V = \frac{1}{3}\pi r^2 h + \pi r^2 h + \frac{2}{3}\pi r^3$$
$$\therefore V = \frac{2}{3}\pi r^2(2h + r)$$

By substituting h and r,

$$V = \frac{2}{3} \times 49(8 + 7)\pi$$
$$= 490\pi$$
$$\approx 1539.38cm^3$$

Fig. 1. Solid

Steps for generating the figure:

1) Construct a cylinder with height $4cm$ and radius $7cm$.
2) Then, construct a cone of height $4cm$ such that its circular surface is having radius $7cm$ and coinciding with top surface of the cylinder.
3) In the same way, construct a hemisphere coinciding with the other circular surface of cylinder with radius $7cm$.
4) Therefore, the required figure is generated.

Solution :

The various parameters considered in this problem are listed in Table (I)