Exercise 11.2

Assume $\pi = \frac{22}{7}$, unless stated otherwise.

1. *Find the surface area of a sphere of radius*:

(*i*) *10.5 cm* (*ii*) *5.6 cm* (*iii*) *14 cm*.

Sol. (*i*) Radius of a sphere (r) = 10.5 cm

$\therefore$ Surface area of the sphere = $4\pi r^2$

$$= 4 \times \frac{22}{7} \times 10.5 \times 10.5$$

$$= 1386 \text{ cm}^2$$

(*ii*) Radius of a sphere (r) = 5.6 cm

$\therefore$ Surface area of the sphere = $4\pi r^2$

$$= 4 \times \frac{22}{7} \times 5.6 \times 5.6$$

$$= 394.24 \text{ cm}^2$$

(*iii*) Radius of a sphere (r) = 14 cm

$\therefore$ Surface area of the sphere = $4\pi r^2$

$$= 4 \times \frac{22}{7} \times 14 \times 14 = 2464 \text{ cm}^2$$

2. *Find the surface area of a sphere of diameter*:

(*i*) *14 cm* (*ii*) *21 cm* (*iii*) *3.5 m*

Sol. (*i*) Diameter (d) = 14 cm

$$\therefore \text{ Radius } (r) = \frac{14}{2} = 7 \text{ cm}$$

Now, surface area of the sphere = $4\pi r^2$

$$= 4 \times \frac{22}{7} \times 7 \times 7 = 4 \times 22 \times 7 = 616 \text{ cm}^2.$$

(*ii*) Diameter (d) = 21 cm

$$\therefore \quad \text{Radius } (r) = \frac{21}{2} \text{ cm}$$

Now, surface area of the sphere = $4\pi r^2$

$$= 4 \times \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} = 1386 \text{ cm}^2$$

(*iii*) Diameter (d) = 3.5 m

$$\therefore \quad \text{Radius } (r) = \frac{3.5}{2} \text{ m} = \frac{7}{4} \text{ m}$$

Now, surface area of the sphere = $4\pi r^2$

$$= 4 \times \frac{22}{7} \times \frac{7}{4} \times \frac{7}{4} = \frac{22 \times 7}{4} = 38.5 \text{ m}^2.$$

3. *Find the total surface area of a hemisphere of radius 10 cm. (Use $\pi = 3.14$).*

Sol. Total surface area of hemisphere = $3\pi r^2$

$$= 3 \times 3.14 \times 10 \times 10 \text{ cm}^2$$

$$= 942 \text{ cm}^2.$$

4. *The radius of a spherical balloon increases from 7 cm to 14 cm as air is being pumped into it. Find the ratio of surface areas of the balloon in the two cases.*

Sol. S_1 = Surface area with radius 7 cm = $4\pi(7)^2$ cm^2.

S_2 = Surface area with radius 14 cm = $4\pi(14)^2$ cm^2.

$$\therefore \quad \frac{S_1}{S_2} = \frac{4\pi(7)^2}{4\pi(14)^2} = \frac{1}{4} \quad \Rightarrow \quad S_1 : S_2 = 1 : 4.$$

5. *A hemispherical bowl made of brass has inner diameter 10.5 cm. Find the cost of tin-plating it on the inside at the rate of Rs. 16 per 100 cm^2.*

Sol. Inner diameter = 10.5 cm $\Rightarrow$ Inner radius = 5.25 cm.

Inner surface area = $2 \times \frac{22}{7} \times (5.25)^2$ cm^2 = 173.25 cm^2.

Cost of tin-plating = ₹ $\left(16 \times \frac{173.25}{100}\right)$ = ₹ 27.72.

6. *Find the radius of a sphere whose surface area is 154 cm^2.*

Sol. Let r be the radius of the sphere.

Surface area of the sphere = 154 cm^2

$$4 \times \frac{22}{7} \times r^2 = 154 \Rightarrow r^2 = \frac{154 \times 7}{88} = \frac{49}{4}$$

$$\Rightarrow \quad r = \frac{7}{2} \text{ cm} \Rightarrow r = 3.5 \text{ cm}.$$

7. *The diameter of the moon is approximately one fourth of the diameter of the earth. Find the ratio of their surface areas.*

Sol. Let diameter of the earth = d units

$\Rightarrow$ Radius of the earth = $\frac{d}{2}$ units

$\therefore$ Diameter of the moon = $\frac{d}{4}$ units

$\Rightarrow$ Radius of the moon = $\frac{d}{8}$ units.

$$\therefore \quad \frac{\text{Surface area of the moon}}{\text{Surface area of the earth}} = \frac{4\pi\left(\frac{d}{8}\right)^2}{4\pi\left(\frac{d}{2}\right)^2} = \frac{4}{64} = \frac{1}{16}$$

$\therefore$ Surface area of the moon : surface area of the earth = 1 : 16.

8. *A hemispherical bowl is made of steel, 0.25 cm thick. The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl.*

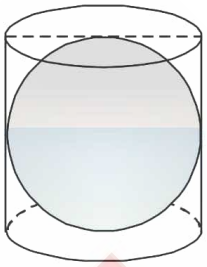
Sol. Inner radius = 5 cm.

$\therefore$ Outer radius = (5 + 0.25) cm = 5.25 cm.

$\therefore$ Outer curved surface area $= 2 \times \frac{22}{7} \times (5.25)^2 \text{ cm}^2$

$= 173.25 \text{ cm}^2$.

9. *A right circular cylinder just encloses a sphere of radius r (see figure). Find*



(*i*) *surface area of the sphere,*

(*ii*) *curved surface area of the cylinder,*

(*iii*) *ratio of the areas obtained in* (*i*) *and* (*ii*).

Sol. (*i*) Surface area of the sphere $= 4\pi r^2$

(*ii*) For cylinder: radius of base $= r$, height $= 2r$.

$\therefore$ Curved surface area of the cylinder $= 2\pi(r)(2r)$

$= 4\pi r^2$

(*iii*) Ratio of the required areas is 1 : 1.