Ex - 13.2

Q1. The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2. Find the diameter of the base of the cylinder.

Sol. Let the radius of the base of the cylinder be r cm.

height, h = 14 cm

Curved surface area = 88 cm^2

$\Rightarrow \quad 2\pi rh = 88$

$\Rightarrow 2 \times \frac{22}{7} \times r \times 14 = 88$

$\Rightarrow \quad r = \frac{88 \times 7}{2 \times 22 \times 14}$

$\Rightarrow \quad r = 1$

$\Rightarrow 2r = 2$

Hence, the diameter of the base of the cylinder is 2 cm.

Q2. It is required to make a closed cylindrical tank of height 1 m and base diameter 140 cm from a metal sheet. How many square metres of the sheet are required for the same?

Sol. Here, height = 1m

Diameter of the base = 140 cm = 1.40 m

$\therefore \quad$ Radius (r) = $\frac{1.40}{2} = 0.70$ m

Total surface area of the cylinder = $2\pi r\,(h + r)$

$= 2 \times \frac{22}{7} \times 0.70\,(1 + 0.70)\ m^2$

$= 2 \times 22 \times 0.10\,(1.70)\ m^2$

$= 44 \times \frac{17}{100}\ m^2 = \frac{748}{100}\ m^2 = 7.48\ m^2$

Hence, the required sheet is 7.48 m^2

Q3. A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm, the outer diameter being 4.4 cm. Find its :

(i) inner curved surface area,

(ii) outer curved surface area,

(iii) total surface area.

Sol. Lenght of the metal pipe = 77 cm

∴ Height of the metal pipe = 77 cm

Inner diameter = 4 cm

Inner radius = $\frac{4}{2}$ = 2 cm

Outer radius = $\frac{4.4}{2}$ = 2.2 cm

(i) Inner curved surface area = $2\pi Rh$

$= 2 \times \frac{22}{7} \times 2 \times 77 \text{ cm}^2$

$= 968 \text{ cm}^2$

(ii) Outer curved surface area = $2\pi Rh$

$= 2 \times \frac{22}{7} \times 2.2 \times 77 \text{ cm}^2$

$= 1064.8 \text{ cm}^2$

(iii) Total surface area = [Inner curved surface area] + [Outer curved surface area] + [Area of ends of two circular ends]

$= [2\pi rh] + [2\pi Rh] + [2\pi(R^2 - r^2)]$

$= 968 + 1064.8 + 2 \times \frac{22}{7} \times [(2.2)^2 - (2)^2]$

$= 968 + 1064.8 + 2 \times \frac{22}{7} (4.84 - 4)$

$= 2032.8 + \frac{2 \times 22 \times 0.84}{7}$

$= 2038.08 \text{ cm}^2$

Q4. The diameter of a roller is 84 cm and its length is 120 cm. It takes 500 complete revolutions to move once over to level a playground. Find the area of the playground in m^2.

Sol. Radius of the roller (r) = $\frac{84}{2}$ cm = 42 cm

length of the roller (h) = 120 cm

∴ Area of the playground levelled in taking 1 complete revolution = $2\pi rh$

$= 2 \times \frac{22}{7} \times 42 \times 120 = 31680 \text{ cm}^2$

∴ Area of the playground

$= 31680 \times 500 = 15840000 \text{ cm}^2$

$= \frac{15840000}{100 \times 100} m^2 = 1584 \text{ m}^2.$

Hence, the area of the playground is 1584 m^2.

Q5. A cylindrical pillar is 50 cm in diameter and 3.5 m in height. Find the cost of painting the curved surface of the pillar at the rate of Rs 12.50 per m^2.

Sol. Diameter of the pillar = 50 cm

Radius (r) = $\frac{50}{2}$ = 25 cm and Height = 3.50 m

$\therefore$ Curved surface area of a cylinder = $2\pi rh$

$= 2 \times \frac{22}{7} \times \frac{1}{4} \times 3.50\ m^2$

$= 11 \times \frac{1}{2} m^2$

Cost of painting of 1 m^2 = Rs. 12.50

Cost of painting of $\frac{11}{2} m^2$ = Rs. $\frac{11}{2} \times 12.50$ = Rs. 68.75

Q6. Curved surface area of a right circular cylinder is 4.4 m^2. If the radius of the base of the cylinder is 0.7 m, find its height.

Sol. r = 0.7 m

$2\pi r \times h = 4.4$

$\Rightarrow 2 \times \frac{22}{7} \times \frac{7}{10} \times h = \frac{44}{10} \Rightarrow h = 1$ m

Q7. The inner diameter of a circular well is 3.5 m. It is 10 m deep. Find

(i) its inner curved surface area,

(ii) the cost of plastering this curved surface at the rate of Rs 40 per m^2.

Sol. (i) $r = \frac{35}{20} m = \frac{7}{4} m$, h = 10 m

Inner curved surface area of the well $= 2 \times \frac{22}{7} \times \frac{7}{4} \times 10 m^2 = 110\ m^2$

(ii) Cost of plastering = Rs. 40×110 = Rs. 4400

Q8. In a hot water heating system, there is a cylindrical pipe of length 28 m,and diameter 5 cm. Find the total radiating surface in the system.

Sol. Here the length, h of the cylindrical pipe = 28 m and radius,

$r = \frac{5}{2}$ cm $= \frac{5}{2 \times 100} m = \frac{5}{200} m = \frac{1}{40} m$

$\therefore$ Total radiating surface in the system $= 2\pi rh = 2 \times \frac{22}{7} \times \frac{1}{40} \times 28 = 4.4\ m^2$.

Q9. Find

(i) The lateral or curved surface area of a closed cylindrical petrol storage tank that is 4.2 m in diameter and 4.5 m high.

(ii) How much steel was actually used, if 1/12 of the steel actually used was wasted in making the tank.

Sol. (i) $r = \frac{42}{20}m = \frac{21}{10}m,\ h = \frac{45}{10}m$

and lateral surface area $= 2 \times \frac{22}{7} \times \frac{21}{10} \times \frac{45}{10}\ m^2 = 59.4m^2$

(ii) Total surface area of the tank $= 2\pi r(r + h)$

$= 2 \times \frac{22}{7} \times 2.1\ (2.1 + 4.5)m^2$

$= 87.12\ m^2$

Let actual area of the steel used = x m^2.

$\therefore$ Area of steel that wasted $= \frac{1}{12} \times x = \frac{x}{12}m^2$

$\Rightarrow$ Area of steel used $= x - \frac{x}{12} = \frac{11x}{12}m^2$

$\Rightarrow \frac{11x}{12} = 87.12 \Rightarrow x = \frac{8712 \times 12}{100 \times 11}m^2$

$x = \frac{104544}{1100}m^2 = 95.04\ m^2$

Q10. In figure, you see the frame of a lampshade. It is to be covered with a decorative cloth. The frame has a base diameter of 20 cm and height of 30 cm. A margin of 2.5 cm is to be given for folding it over the top and bottom of the frame. Find how much cloth is required for covering the lampshade.

Sol. r = 10 cm, h = (30 + 2.5 + 2.5) cm = 35 cm] Ans. 2200 cm^2.

Q11. The students of a Vidyalaya were asked to participate in a competition for making and decorating penholders in the shape of a cylinder with a base, using cardboard. Each penholder was to be of radius 3 cm and height 10.5 cm. The Vidyalaya was to supply the competitors with carboard. If there were 35 competitors, how much cardboard was required to be brought for the competition?

Sol. Radius of a cylinder = 3 cm

Height of a cylinder = 10.5 cm

Since, surface area of penholder (cylinder)

= [Lateral surface area] + [Base area]

= $[2\pi rh] + \pi r^2$

$= (44 \times 3 \times 1.5) + \frac{198}{7} cm^2$

$= 198 + \frac{198}{7}$

$= \frac{1386 + 198}{7} cm^2 = \frac{1584}{7} cm^2$

$\Rightarrow$ Surface area of 35 penholders $= 35 \times \frac{1584}{7} cm^2$

$\Rightarrow$ $7920\ cm^2$

Thus, $7920\ cm^2$ of cardboard was required to be bought.