

## Chapter-13

### Surface Areas and Volumes

- **Cylinder:** A solid obtained by revolving a rectangular lamina about one of its sides is called a right circular cylinder.
- **Right Circular Cone:** A solid obtained by revolving a right-angled triangular lamina about any side (other than the hypotenuse) is called a right circular cone.
- **Sphere:** A sphere is a solid obtained on revolving a circle about any of its diameters.
- **Hemisphere:** When a sphere is cut by a plane through its center into two equal parts, then each part is called a hemisphere.
- **Spherical Shell:** The solid enclosed between two concentric sphere is called a spherical shell.
- **Hemisphere Shell:** The solid enclosed between two concentric hemispheres is called a hemispherical shell.
- **Frustum of a Cone:** If a cone is cut by a plane parallel to the base of the cone, then the portion between this plane and the base is called the frustum of the cone.
- Curved surface area of cylinder of radius  $r$  and height  $h = 2\pi rh$  square units.
- Total surface area of cylinder of radius  $r$  and height  $h = 2\pi r (r + h)$  square units.
- Volume of cylinder of radius  $r$  and height  $h = \pi rh$  cubic units.
- Curved surface area of cone of radius  $r$ , height  $h$  and slant height  $l = \pi rl$  square units where  $l = \sqrt{r^2 + h^2}$
- Total surface area of cone  $= \pi r (l + r)$  sq.units.
- Volume of cone  $= \frac{1}{3} \pi r^2 h$  cubic units.
- Total surface area of sphere of radius  $r$  units  $= 4\pi r^2$  sq.units.
- Curved surface area of hemisphere of radius  $r$  units  $= 2\pi r^2$  sq.units.
- Total surface area of a solid hemisphere of radius  $r$  units  $= 3\pi r^2$  sq.units.

- Volume of sphere of radius  $r$  units  $= \frac{4}{3}\pi r^3$  cubic units.
- Volume of hemisphere of radius  $r$  units  $= \frac{2}{3}\pi r^3$  cubic units.
- Curved surface area of *frustum*  $= \pi l(r + R) + \pi(r^2 + R^2)$  sq. units. where  $l$  slant height of frustum and radii of circular ends are  $r$  and  $R$ .
- Total surface area of frustum  $= \pi l(r + R) + \pi(r^2 + R^2)$  sq. units.
- Volume of Frustum  $= \frac{1}{3}\pi h(r^2 + R^2 + rR)$  cubic units. Where  $l = \sqrt{h^2 + (R - r)^2}$

