CHAPTER 6

MENSURATION

6.1. MENSURATION OF PLANE FIGURES:

Triangle:

1. Area of a triangle $= \frac{1}{2}$ (Base $\times$ height) $= \frac{1}{2} bh$ sq.units.

Hero's formula:

2. Area of a triangle $= \sqrt{s\,(s-a)\,(s-b)\,(s-c)}$ sq.units where $s = 1/2\,(a+b+c)$, called the semiperimetre of the triangle.

3 (i) Area of an equilateral triangle $= \frac{\sqrt{3}}{4} a^2$ sq.units.

(ii) Height $= \frac{\sqrt{3}}{2}$ a units

(iii) Perimeter $= 3a$ units

4 (i) Area of a right angled isosceles triangle $= \frac{1}{2} a^2$ sq.units.

(ii) Perimeter $= 2a + \sqrt{2}\, a$ units.

5 (i) Area of a square $= a^2$ sq.units

(ii) Perimeter $= 4a$ units

6 (i) Area of a rectangle $= l \times b$ sq.units

(ii) Perimeter $= 2\,(l + b)$ units

7 (i) Area of a parallelogram = Base $\times$ height = bh sq.units

(ii) Perimeter = 2 (sum of adjacent sides) units

8 (i) Area of a Rhombus $= \frac{1}{2} d_1 d_2$ = Base $\times$ height sq.units.

(ii) Side $= \frac{1}{2}\sqrt{d_1^2 + d_2^2}$ units

(iii) Perimeter $= 4 \times$ side units

9. Area of a trapezium $= \frac{1}{2}$ (sum of bases) $\times$ Altitude sq.units

10 (i) Area of a circle $= \pi r^2$ sq.units

(ii) Circumference $= 2\pi r$ units

11 (i) Area of a sector $= \frac{\theta}{360}(\pi r^2)$ sq.units

(ii) Length of an arc $= \frac{\theta}{360}(2\pi r)$ units

6.2. MENSURATION OF SOLID FIGURES:

Cube:

1 (i) Volume of the cube $= a^3$ cubic units.

(ii) Total surface area of the cube $= 6a^2$ sq.units.

(iii) Diagonal of the cube $= \sqrt{3}$ a units.

Cuboid:

2 (i) Volume of cuboid $= l\,bh$ cubic units.

(ii) Total surface area of the cuboid
$= 2(lb + bh + lh)$ sq.units

(iii) Diagonal of the cuboid $= \sqrt{l^2 + b^2 + h^2}$ units.

(iv) Area of 4 walls of a room $= 2(l + b)\,h$ sq.units

3. Cylinder:

(i) Volume $= \pi r^2 h$ cu.units

(ii) Curved surface area $= 2\pi rh$ sq.units.

(iii) Total surface area $= 2\pi r(h + r)$ sq.units.

Hollow Cylinder:

(i) Volume of the material $= \pi h(R^2 - l^2)$ cu.units.

(ii) Curved surface area $= 2\pi h(R + r)$ sq.units where R, r is

the radius of the external and internal cylinders respectively.

(iii) Total surface area of the hollow cylinder
$= 2\pi (R + r)(R + h - r)$ sq.units.

4. Cone:

(i) Volume $= \frac{1}{3}\pi r^2 h$ cu.units

(ii) Curved surface area of a cone $= \pi r l$ sq.units.

(iii) Total surface area $= \pi r (l + r)$ sq.units

where $l = \sqrt{h^2 + r^2}$

5. Sphere:

(i) Volume $= \frac{4}{3}\pi r^3$ cu.units

(ii) Surface area $= 4\pi r^2$ sq.units

(iii) Volume of spherical shell $= \frac{4}{3}\pi (R^3 - r^3)$ cu.units.

Hemi-sphere:

(i) Volume $= \frac{2}{3}\pi r^3$ cu.units

(ii) Curved surface area $= 2\pi r^2$ sq.units

(iii) Total surface area $= 3\pi r^2$ sq.units

(iv) Volume of hemi-spherical shell

$= \frac{2}{3}\pi (R^3 - r^3)$ cu.units.