I PROJECTION OF SOLIDS

Introduction:

A solid has three dimensions, the length, breadth and thickness or height. A solid may be represented by orthographic views, the number of which depends on the type of solid and its orientation with respect to the planes of projection. solids are classified into two major groups. (i) Polyhedral, and (ii) Solids of revolution

POLYHEDRAL

A polyhedral is defined as a solid bounded by plane surfaces called faces.

They are:

(i)Regular polyhedral (ii) Prisms and (iii) Pyramids

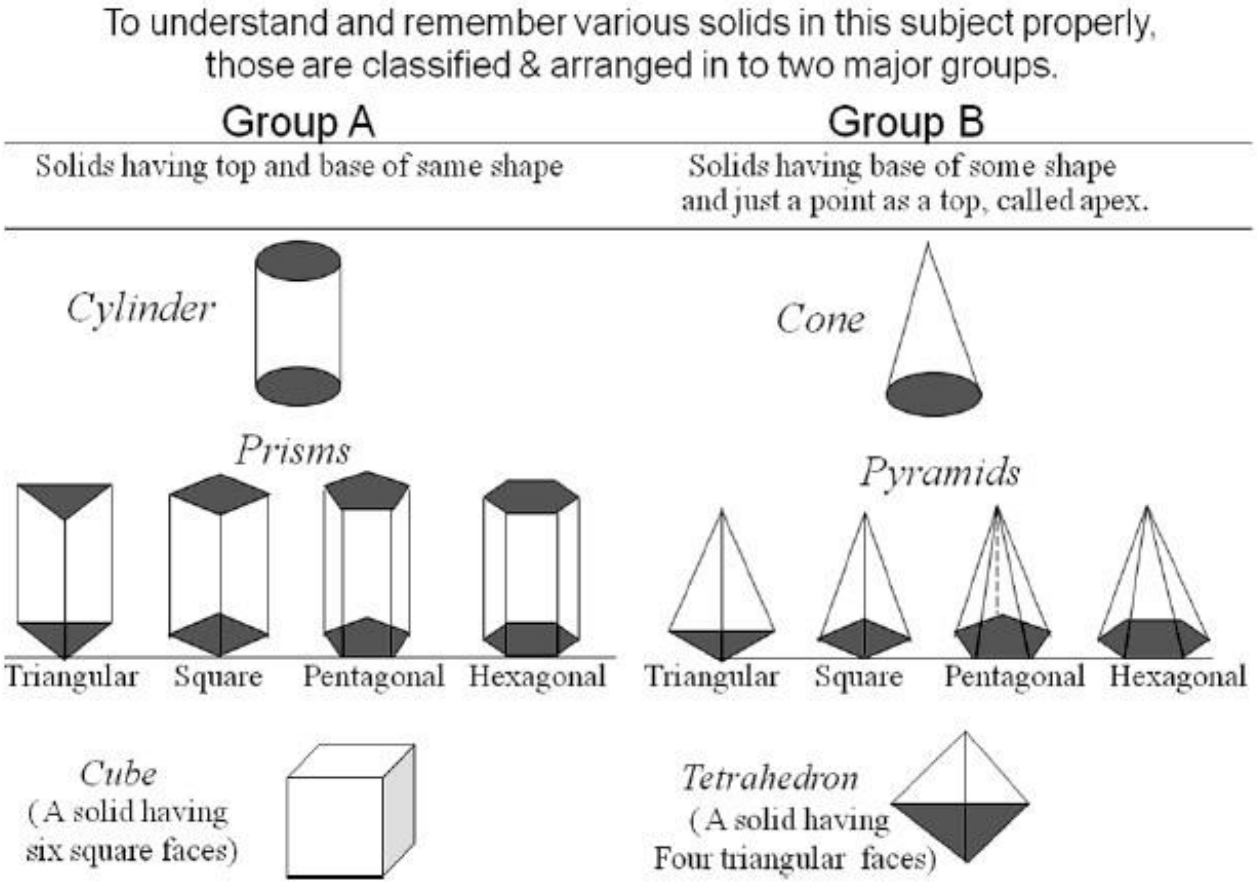
Regular Polyhedral

A polyhedron is said to be regular if its surfaces are regular polygons. The following are some of the regular polyhedral.

SOLIDS

Prisms: A prism is a polyhedron having two equal ends called the bases parallel to each other. The two bases are joined by faces, which are rectangular in shape. The imaginary line passing through the centers of the bases is called the axis of the prism.

A prism is named after the shape of its base. For example, a prism with square base is called a square prism, the one with a pentagonal base is called a pentagonal prism, and so on (Fig) The nomenclature of the prism is given in Fig.



(a) **Tetrahedron:** It consists of four equal faces, each one being a equilateral triangle.

(b) **Hexa hedron(cube):** It consists of six equal faces, each a square.

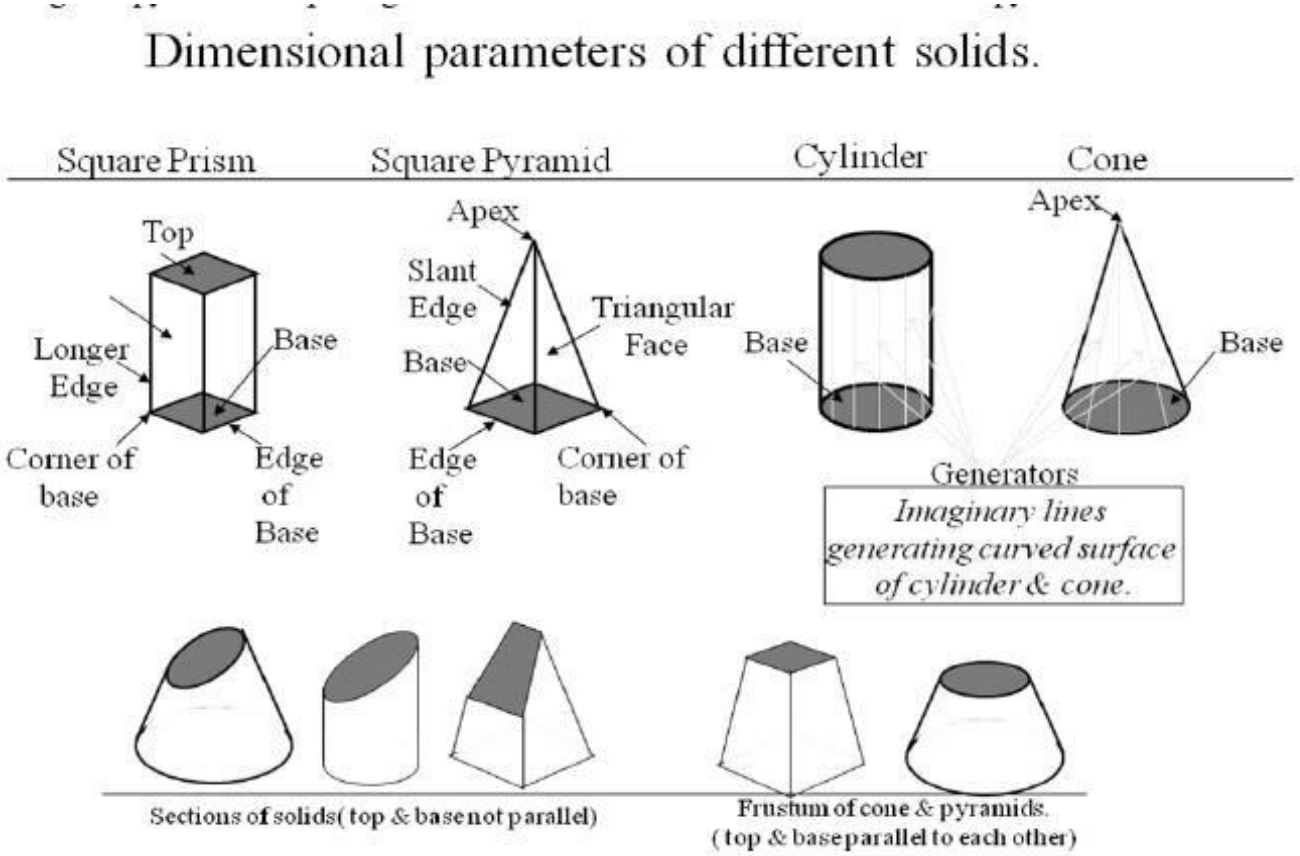
(c) **Octahedron**: It has eight equal faces, each an equilateral triangle.

(d) **Dodecahedron**: It has twelve regular and equal pentagonal faces.

(e) **Icosahedrons**: It has twenty equal, equilateral triangular faces.

Pyramids: A pyramid is a polyhedron having one base, with a number of isosceles triangular faces, meeting at a point called the apex. The imaginary line passing through the centre of the base and the apex is called the axis of the pyramid.

The pyramid is named after the shape of the base. Thus, a square pyramid has a square base and pentagonal pyramid has pentagonal base and so on. The nomenclature of a pyramid is shown in Fig.



Types of Pyramids:

There are many types of Pyramids, and they are named after the shape of their base.

These are Triangular Pyramid, Square Pyramid, Pentagonal pyramid, hexagonal pyramid and tetrahedron

Solids of Revolution: If a plane surface is revolved about one of its edges, the solid generated is called a solid of revolution. The examples are (i) Cylinder, (ii) Cone, (iii) Sphere.

Frustums and Truncated Solids: If a cone or pyramid is cut by a section plane parallel to its base and the portion containing the apex or vertex is removed, the remaining portion is called frustum of a cone or pyramid

Prisms Position of a Solid with Respect to the Reference Planes: The position of solid in space may be specified by the location of either the axis, base, edge, diagonal or face with the principal planes of projection. The following are the positions of a solid considered.

1. Axis perpendicular to HP

2. Axis perpendicular to VP

3. Axis parallel to both the HP and VP

4. Axis inclined to HP and parallel to VP

5. Axis inclined to VP and parallel to HP

6. Axis inclined to both the Planes (VP. and HP)

The position of solid with reference to the principal planes may also be grouped as follows:

1. Solid resting on its base.
2. Solid resting on anyone of its faces, edges of faces, edges of base, generators, slant edges, etc.
3. Solid suspended freely from one of its corners, etc.