

# Engineering Drawing CE-113

Lecture 5

Orthographic Projection.

# Principle of Projection

- If straight lines are drawn from various points on the contour of an object to meet a plane, the object is said to be projected on that plane.
- The figure formed by joining, in correct sequence, the points at which these lines meet the plane, is called the projection of the object.
- The lines from the object to the plane are called projectors.

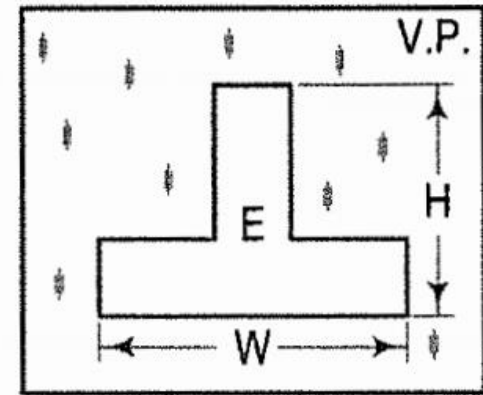
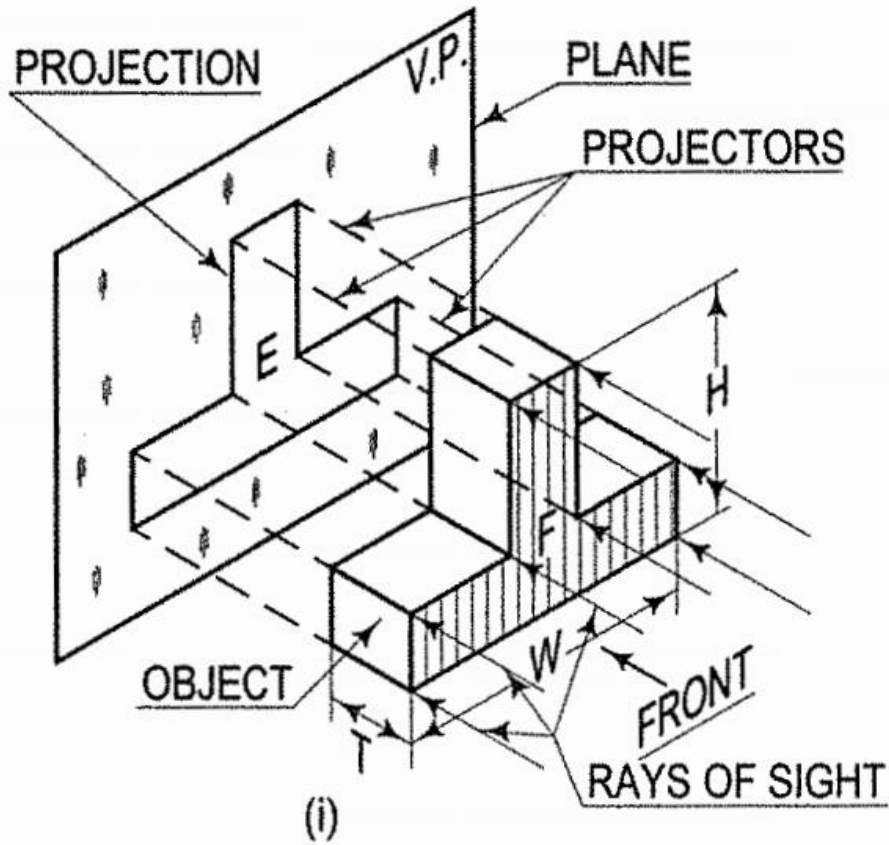
# Method of Projection

- In engineering drawing following *four* methods of projection are commonly used, they are:
  1. Orthographic projection
  2. Oblique Projection
  3. Isometric Projection
  4. Perspective Projection.

# Orthographic projection

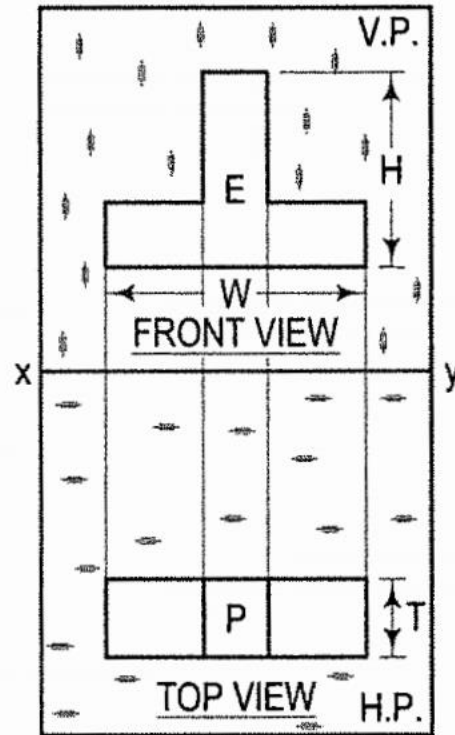
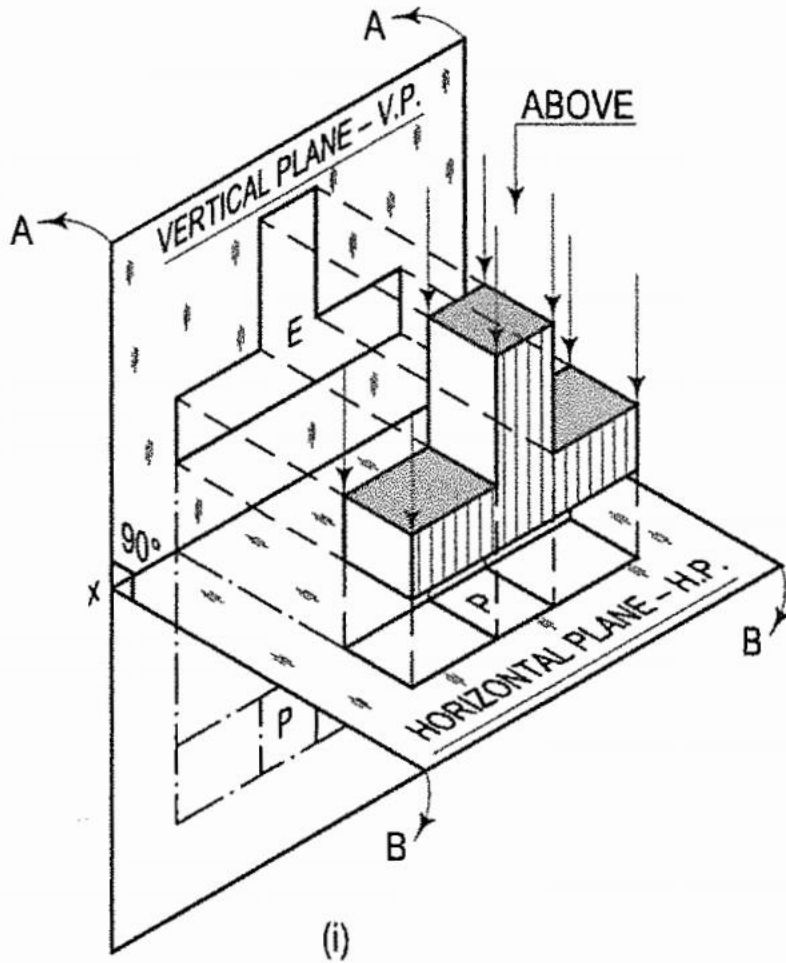
- In the orthographic projection an object is represented by two or three views on the mutual perpendicular projection planes.
- Each projection view represents two dimensions of an object.
- For the complete description of the three dimensional object at least *two* or *three* views are required
- When the projectors are parallel to each other and also perpendicular to the plane, the projection is called *orthographic projection*.

# Orthographic Projection



(ii)

# Orthographic Projection

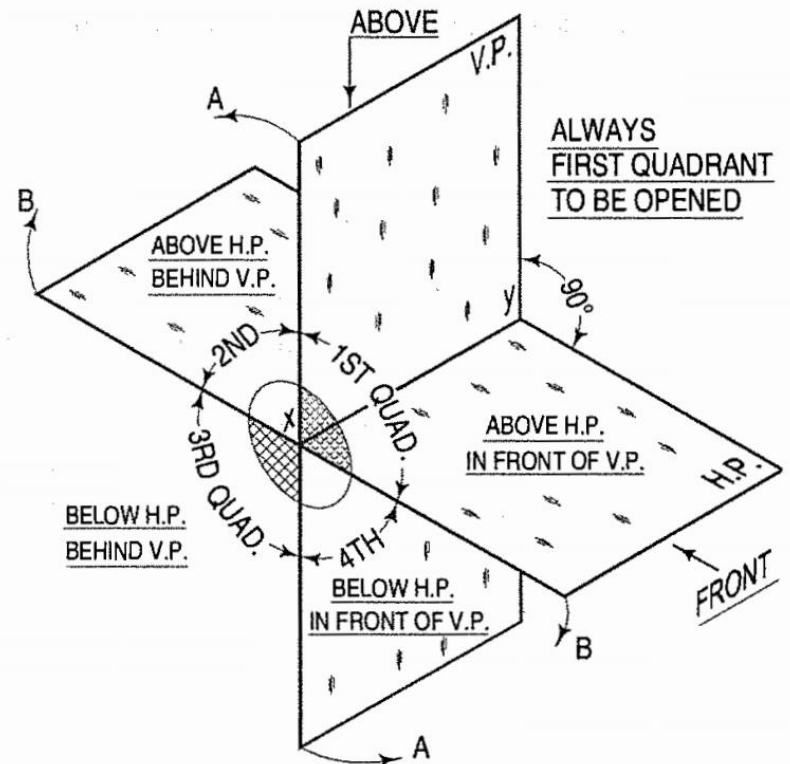


# Planes of Projection

- The two planes employed for the purpose of orthographic projections are called *reference planes or principal planes of projection*. They intersect each other at right angles.
- The *vertical plane* of projection (in front of the observer) is usually denoted by the letters V.P. It is often called the *frontal plane* and denoted by the letters F.P. The projection on the V.P. is called the *front view* or the *elevation* of the object
- The other plane is the *horizontal plane* of projection known as the H.P. The projection on the H.P. is called the *top view* or the *plan*
- The line in which they intersect is termed the *reference line* and is denoted by the letters *xy*.

# Four Quadrants

- When the planes of projection are extended beyond the line of intersection, they form four quadrants.
- The object may be situated in any one of the quadrants.  
The planes are assumed to be transparent.
- The positions of the views with respect to the reference line will change according to the quadrant in which the object may be situated.





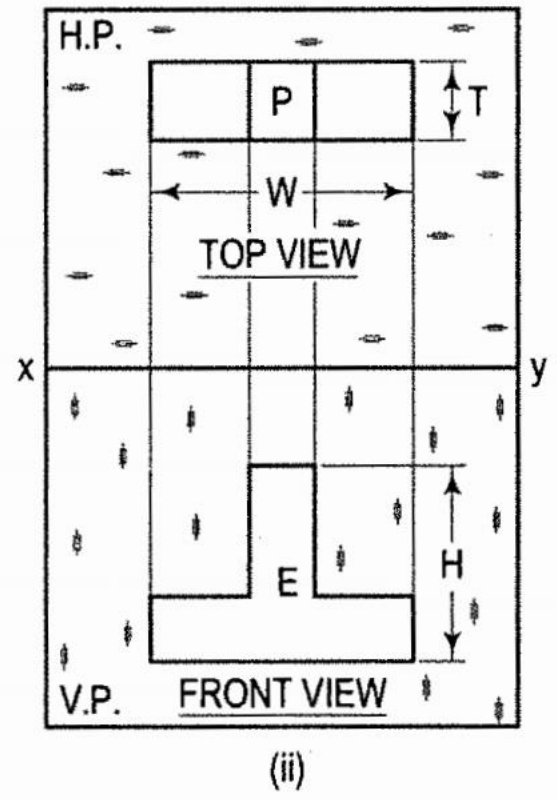
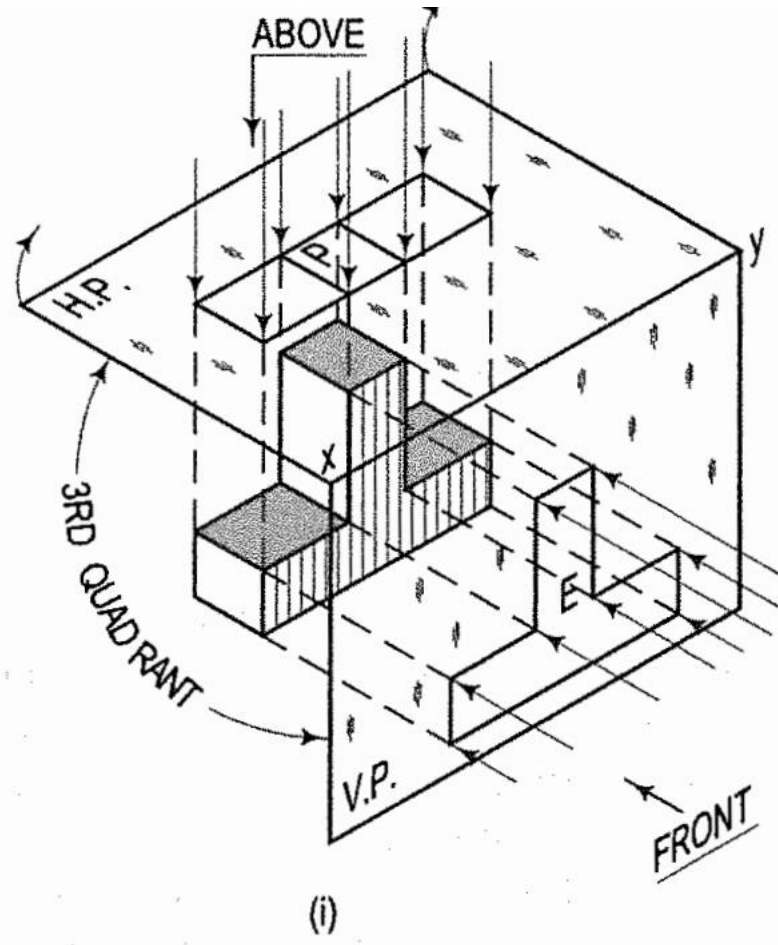
# 1<sup>st</sup> Angle projection

- The object is kept in the *first quadrant*.
- The object lies between the observer and the plane or projection.
- The plane of projection is assumed to be non-transparent.
- In this method, when the views are drawn in their relative positions, the *plan* comes *below* the *elevation*, the view of the object as observed from the *left-side* is drawn to the *right of elevation*.

# 3<sup>rd</sup> Angle Projection

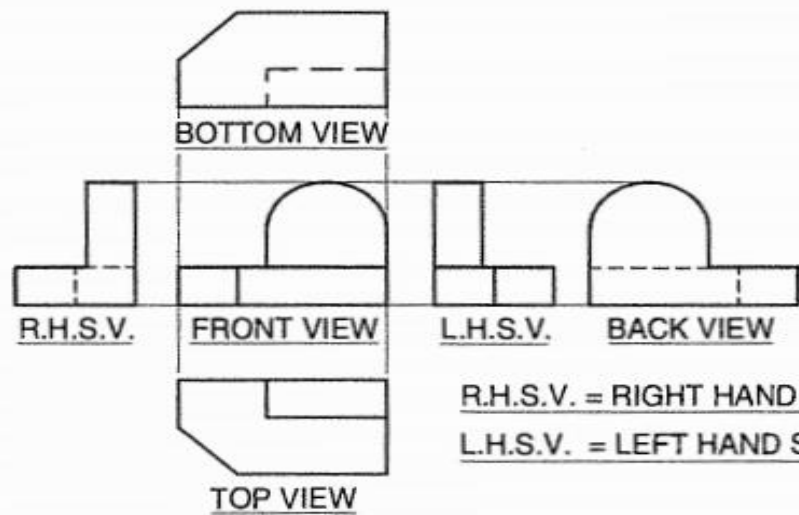
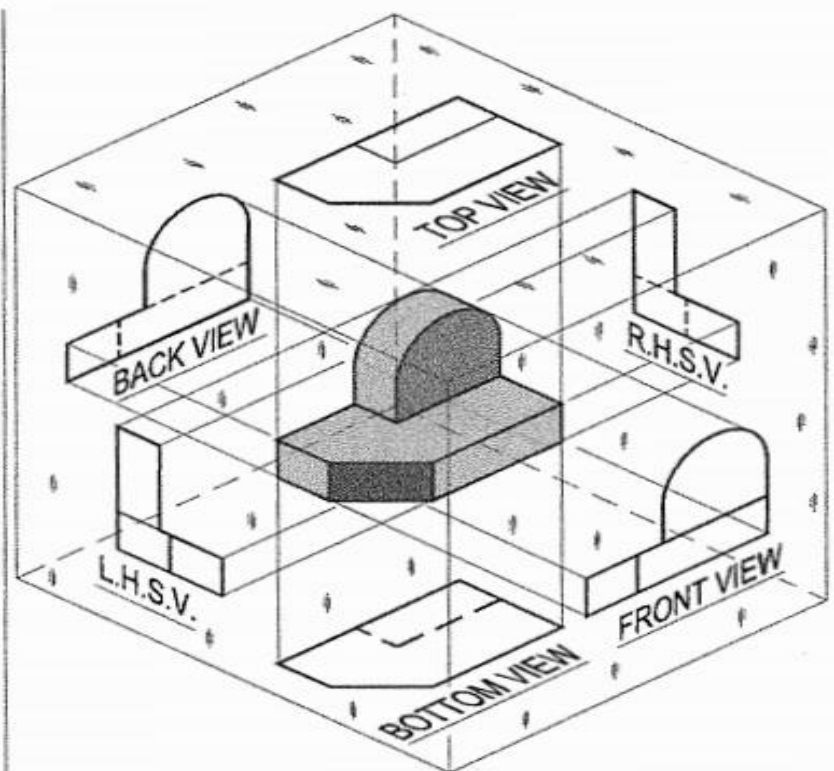
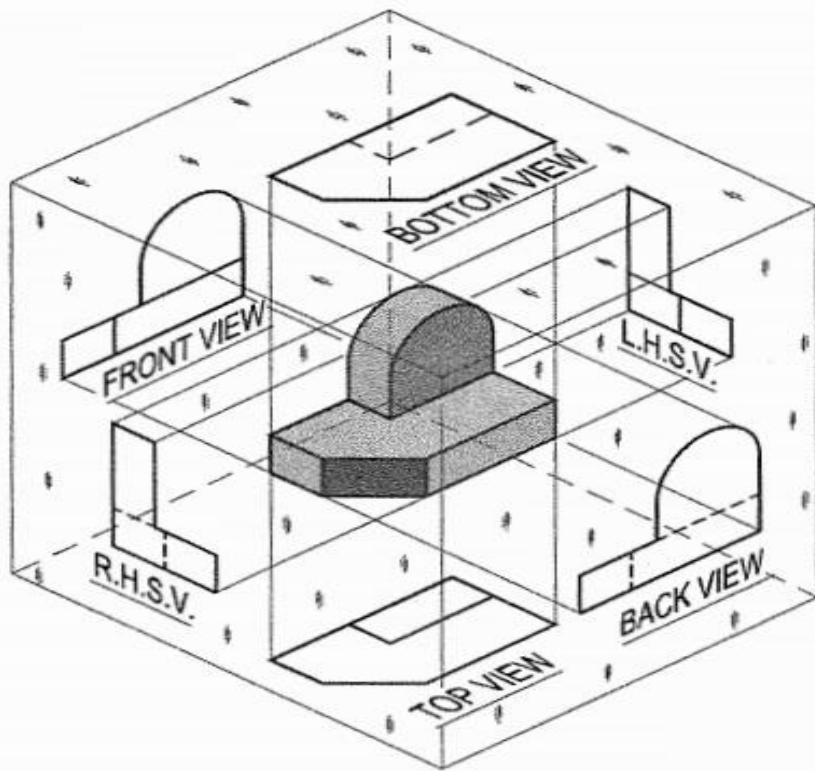
- The object is assumed to be kept in the *third quadrant*.
- The plane of projection lies between the observer and the object.
- The plane of projection is assumed to be *transparent*.
- In this method, when the views are drawn in their relative positions, the *plan* comes *above* the elevation, *left hand side view* is drawn to the *left hand side* of the *elevation*.
- This method of projection is used in U.S.A. and also in other countries.

# 3<sup>rd</sup> Angle Projection



# Six Views of an Object

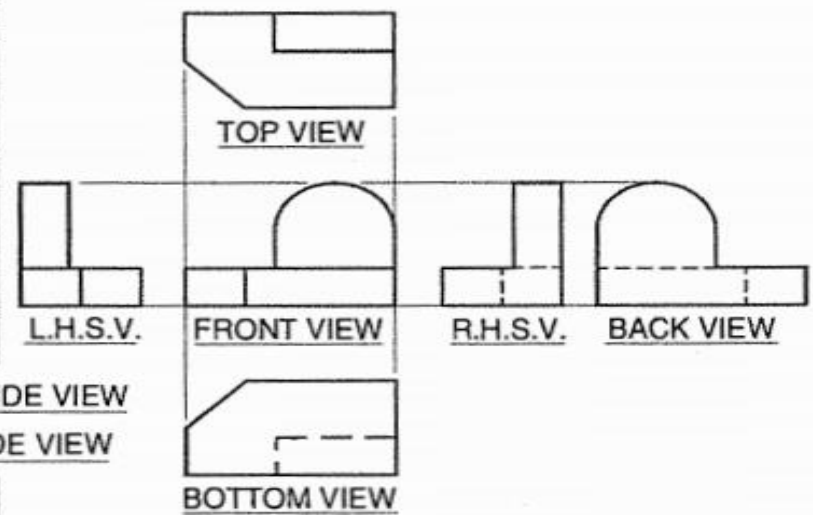
- There are *three* important elements of this projection system, namely
  - (a) an object, (b) plane of projection
  - (c) an observer.
- Very often, two views are not sufficient to describe an object completely. The planes of projection being imaginary, following six views are obtained: (1) Front view, (2) Top view, (3) Left hand side view, (4) Right hand side view, (5) Back view and (6) Bottom view.
- Ordinarily, two views - the front view and top view are shown. Two other views i.e. L.H.S.V. or R.H.S.V. may be required to describe an object completely.
- Only in exceptional cases, when an object is of a very complex nature, five or six views may be found necessary.



FIRST ANGLE PROJECTION

R.H.S.V. = RIGHT HAND SIDE VIEW

L.H.S.V. = LEFT HAND SIDE VIEW



THIRD ANGLE PROJECTION

# Conventions Employed

- Actual points, ends of lines, corners of solids etc., in space are denoted by capital letters  $A, B, C$  etc.
- Their *top views* are marked by corresponding small letters  $a, b, c$ , etc., their *front views* by small letters with dashes  $a', b', c'$ , their side views by  $a_1, b_1, c_1$  etc.
- In orthographic views, the projectors and other construction lines are shown continuous, but thinner than the lines for actual projections.

# Assignment Problem

- A pictorial view of a machine bracket is shown in the figure. Draw using the first angle projection method front view, top view and right end side view.

