Registration Number	**BSTM/3-17/M05013**
Student Name	**Navaid Rasheed**
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Name Of Faculty Member	**Mudassir Ejaz**
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QUESTION NO 01: Write In Detail About The Orthographic To Isometric Projections?

Answer:

Orthographic projection sometimes referred to as orthogonal projection, used to be called analemma is a means of representing three-dimensional objects in two dimensions. It is a form of parallel projection, in which all the projection lines are orthogonal to the projection plane, resulting in every plane of the scene appearing in affine transformation on the viewing surface. The obverse of an orthographic projection is an oblique projection, which is a parallel projection in which the projection lines are not orthogonal to the projection plane.

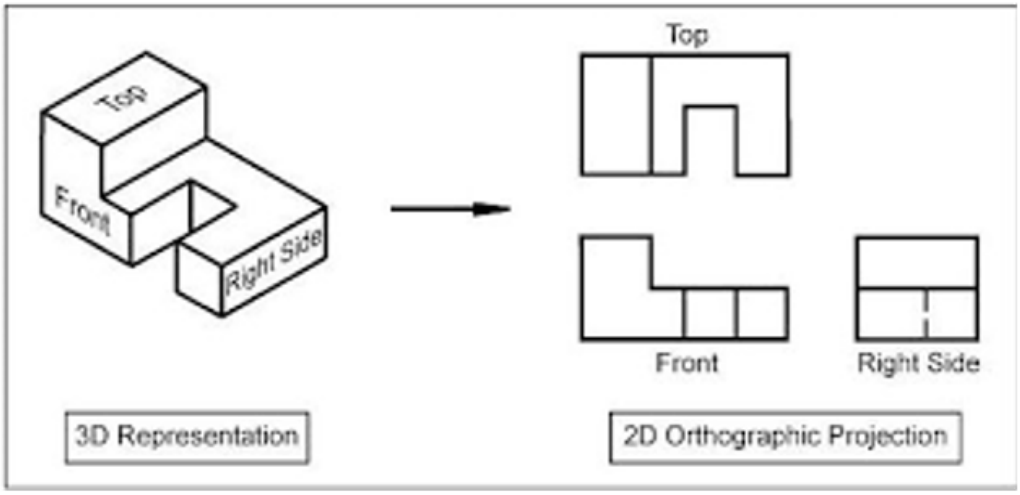
The term orthographic is sometimes reserved specifically for depictions of objects where the principal axes or planes of the object are also parallel with the projection plane. However these are better known as primary views in multiview projection. Furthermore when the principal planes or axes of an object in an orthographic projection are not parallel with the projection plane the depictions are sometimes referred to as axonometric. However these are better known as auxiliary views. Sub-types of primary views include plans, elevations and sections. Sub-types of auxiliary views might include isometric, diametric and trimetric projections.

For example, an orthographic projection of a house typically consists of a top view or plan and a front view and one side view (front and side elevations).

The term "isometric" comes from the Greek for equal measure reflecting that the scale along each axis of the projection is the same (unlike some other forms of graphical projection).

Isometric projection is a method for visually representing three-dimensional objects in two dimensions in technical and engineering drawings. It is an axonometric projection in which the three coordinate axes appear equally foreshortened and the angle between any two of them is 120 degrees. The term isometric comes from the Greek for equal measure reflecting that the scale along each axis of the projection is the same (unlike some other forms of graphical projection).

An isometric view of an object can be obtained by choosing the viewing direction such that the angles between the projections of the axes are all the same, or 120°. For example, with a cube, this is done by first looking straight towards one face. Next, the cube is rotated ±45° about the vertical axis, followed by a rotation of approximately 35.264° (precisely $\arcsin 1/\sqrt{3}$ or $\arctan 1/\sqrt{2}$, which is related to the Magic angle) about the horizontal axis. Note that with the cube (see image) the perimeter of the resulting 2D drawing is a perfect regular hexagon: all the black lines have equal length and all the cube's faces are the same area. Isometric graph paper can be placed under a normal piece of drawing paper to help achieve the effect without calculation.



QUESTION NO 02: What is orthographic projection? Write its types in detail.

ANSWER: A method of projection in which an object is depicted using parallel lines to project its outline on to a plane.

Orthographic projection:

Orthographic projection is a means of representing a three-dimensional object in two dimensions. It is a form of parallel projection, where all the projection lines are orthogonal to the projection plane, resulting in every plane of the scene appearing in affine transformation on the viewing surface. It is further divided into multiview orthographic projections and axonometric projections. A lens providing an orthographic projection is known as an telecentric lens. The term orthographic is also sometimes reserved specifically for depictions of objects where the axis or plane of the object is also parallel with the projection plane, as in multiview orthographic projections.

Types of Orthographic Projection:

Three sub-types of orthographic projection are:

- **Isometric projection.**
- **Dimetric projection.**
- **Trimetric projection.**

Isometric Projection:

In **isometric projection**, the most commonly used form of axonometric projection in engineering drawing the direction of viewing is such that the three axes of space appear equally foreshortened,

and there is a common angle of 120° between them. As the distortion caused by foreshortening is uniform, the proportionality between lengths is preserved, and the axes share a common scale; this eases one's ability to take measurements directly from the drawing. Another advantage is that 120° angles are easily constructed using only a compass and straightedge**.**

Dimetric Projection:

In **dimetric projection**, the direction of viewing is such that two of the three axes of space appear equally foreshortened, of which the attendant scale and angles of presentation are determined according to the angle of viewing; the scale of the third direction is determined separately. Dimensional approximations are common in dimetric drawings.

Trimetric projection.

In **trimetric projection**, the direction of viewing is such that all of the three axes of space appear unequally foreshortened. The scale along each of the three axes and the angles among them are determined separately as dictated by the angle of viewing. Dimensional approximations in trimetric drawings are common and trimetric perspective is seldom used in technical drawings.

QUESTION NO 03: What do you know about the sectional view of solids? Write In detail.

Answer:

SECTIONING A SOLID: An object here a solid is cut by some imaginary cutting plane to understand internal details of that object. The action of cutting is called sectioning place a solid & the plane of cutting is called SECTION PLANE.

Sectional View of Solids:

A sectional view or a section looks inside an object. Sections are used to clarify the interior construction of a part that cannot be clearly described by hidden lines in exterior views. By taking an imaginary cut through the object and removing a portion, the inside features may be seen more clearly.

A sectional view of an object is obtained by projecting the retained portion of the jet which is left behind when object is cut by imaginary section plane and the portion the object between the section plane and observer is assumed as removed.

The object is cut by a section plane AA. The front half of the object between the section plane and the observer are removed.

Types of Sectional View of Solids:

Obtain the following five types of sectional views of solids by using the two types of perpendicular section planes we obtain the following two types of sectional views of solids.

- Section of solids obtained by horizontal planes.
- Section of solids obtained by vertical planes.