

# Engineering Graphics Module-05 Notes

## MODULE-05 TOPICS

- Principles of Isometric Projection
- Isometric Scale
- Isometric Views
- Conventions of Isometric Drawing
- Isometric Views of Lines and Planes
- Isometric Views of Simple Solids
- Isometric Views of Compound Solids
- Conversion of Isometric Views to Orthographic Views
- Conversion of Orthographic Views to Isometric Views

### 1. ISOMETRIC PROJECTION

Isometric projection is a method of representing three-dimensional objects on two-dimensional paper.

In isometric projection, three principal axes are equally inclined at  $120^\circ$  to each other.

#### Characteristics of Isometric Projection

1. Three dimensions are shown in one view.
2. Length, width and height are equally foreshortened.
3. Angles between axes are  $120^\circ$ .
4. Vertical lines remain vertical.

### 2. ISOMETRIC SCALE

Isometric scale is used to convert true lengths into isometric lengths.

#### Construction of Isometric Scale

1. Draw a horizontal line.
2. Draw two lines at  $30^\circ$  and  $45^\circ$ .
3. Mark true lengths on  $45^\circ$  line.
4. Transfer corresponding points to  $30^\circ$  line.

### 3. ISOMETRIC VIEW

Isometric view is drawn using true lengths directly without using isometric scale.

#### Difference Between Isometric Projection and Isometric View

- Isometric Projection uses isometric scale.
- Isometric View uses actual dimensions.

### 4. CONVENTIONS OF ISOMETRIC DRAWING

1. Vertical edges are drawn vertically.
2. Horizontal edges are drawn at  $30^\circ$ .
3. Hidden lines are generally omitted.
4. Circles appear as ellipses in isometric view.

### 5. ISOMETRIC VIEWS OF LINES

Lines parallel to isometric axes are called isometric lines.

Lines not parallel to isometric axes are called non-isometric lines.

## **6. ISOMETRIC VIEWS OF PLANES**

Plane surfaces are represented by connecting corner points carefully in isometric axes.

### **Common Plane Figures**

1. Square
2. Rectangle
3. Circle
4. Triangle

## **7. ISOMETRIC VIEWS OF SIMPLE SOLIDS**

Simple solids include:

- Cube
- Prism
- Pyramid
- Cylinder
- Cone
- Sphere

## **8. ISOMETRIC VIEWS OF COMPOUND SOLIDS**

Compound solids are formed by combining two or more simple solids.

### **Examples**

1. Cylinder on cube
2. Cone on prism
3. Sphere on cylinder

## **9. CONVERSION OF ISOMETRIC VIEW TO ORTHOGRAPHIC VIEW**

Orthographic views include front view, top view and side view obtained from isometric object.

### **Procedure**

1. Identify dimensions.
2. Draw front view.
3. Draw top view.
4. Draw side view if required.

## **10. CONVERSION OF ORTHOGRAPHIC VIEW TO ISOMETRIC VIEW**

Orthographic views are converted into 3D isometric representation.

### **Procedure**

1. Draw isometric axes.
2. Transfer dimensions carefully.
3. Draw visible edges properly.

## **11. ADVANTAGES OF ISOMETRIC PROJECTION**

1. Easy visualization of objects.

2. Simple and quick method.
3. Used in engineering and architecture.
4. Gives realistic appearance.

**MOST IMPORTANT 14 MARK QUESTIONS**

1. Explain principles of isometric projection.
2. Construct isometric scale with neat diagram.
3. Draw isometric view of prism and pyramid.
4. Draw isometric projection of cylinder and cone.
5. Draw isometric view of compound solids.
6. Convert orthographic views into isometric views.
7. Convert isometric view into orthographic projections.
8. Explain conventions used in isometric drawings.
9. Draw isometric view of sphere and hemisphere.
10. Explain differences between isometric projection and isometric view.

**IMPORTANT 7 MARK QUESTIONS**

1. Define isometric projection.
2. Define isometric scale.
3. Define isometric view.
4. Explain conventions of isometric drawing.
5. Define isometric lines.
6. Define non-isometric lines.
7. Explain advantages of isometric projection.
8. Explain conversion of orthographic to isometric views.

**EXAM PREPARATION TIPS**

- Practice isometric drawings daily.
- Learn isometric conventions carefully.
- Use proper 30° axes construction.
- Practice conversion problems regularly.
- Revise simple and compound solids properly.

**Topic Weightage Analysis**

Topic	Importance
Isometric Projection	★★★★★

Orthographic to Isometric Conversion	★★★★★
Simple & Compound Solids	★★★★
Isometric Scale	★★★★
Conventions	★★★
Isometric Lines & Planes	★★★