Unit-5, Part-1: Isometric views and Projections

Theory Questions

1. What is meant by isometric drawing? What are its advantages?

A. Isometric drawings are drawings done in equal measures, namely taking angles of 30^0, 30^0 and 90^0 for length, breadth and height. The advantages of isometric drawings are that they give clear picture of the objects in all their dimensions. They are helpful in identifying the hidden features of the normal FV,TV,SV,etc. Eg. In building drawings, the isometric view will give the 3-D picture of a house as seen from left,right and top. Hence the side portions, top portions and the front portions of house can be seen in these views. Similarly for all machine elements, components, etc the isometric views or drawings are helpful in giving clear picture of the object.

2. Define isometric axes, isometric line and isometric plane. (refer Art.17.1-17.3 in text book)

A. The 3 principal lines drawn at 120^0 with respect to each other are called as isometric axes.

The lines parallel to the isometric axes are called as isometric lines.

The plane formed by joining all the isometric lines is called as isometric plane.

3. What is meant by isometric scale?

A. It is the scale which gives a relationship between the true length and the isometric length (reduced length). From this scale, graphically it is possible to measure the isometric lengths for the given true lengths.

4. What is the relation between true length and isometric length based on isometric scale?

A. Isometric scale = 0.812 x True length.

5. Draw an isometric scale for a length of 15 cm. (refer notes)

6. What is the difference between isometric views and isometric projections?

A. In isometric views, the true scale of lengths are used for drawings and in isometric projections, the isometric scale (reduced lengths) are used for drawings.

7. What are the two methods adopted for drawing isometric views?

   (box method and offset method—to be referred from article 17.5.2 from text book)

8. Explain the offset method used for drawing isometric views of non square polygons.

9. Explain the box method used for drawing isometric views.

10. Explain the 4 centre V method (4-C-V) used for drawing isometric views of circles. (refer Article 17.5.1 in text book)
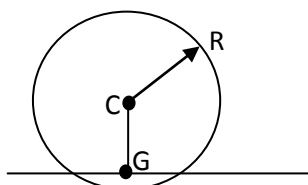
11. The isometric view of a square is _____. (Ans: Rhombus)

12. The isometric view of a circle is _____. (Ans: Ellipse)

13. The isometric view of a sphere is _____. (Ans: Circle)

14. Explain the procedure for drawing the isometric projection of a sphere.

A. In the isometric projection of a sphere, the distance of center of sphere (C) from the base point (G) is always take as isometric radius of sphere (0.8 x Radius of sphere) and the radius of circle is equal to radius of sphere (CR = true radius).

Problems

15. Draw the isometric view of a square prism of base 40 mm sides & height 70 mm when its axis is vertical.(refer notes; try as assignment)

16. Sketch the isometric projection of a 50 mm cube resting on a 100 mm cube. (Assignment)

17. Sketch the isometric view of a square pyramid of 40 mm sides and 75 mm axis when its axis is horizontal. (refer notes; try as assignment).

18. A cylindrical slab of 70 mm diameter & 40 mm thick is surmounted coaxially by a cube of 35 mm edge. Draw the isometric projection of the arrangement.

19. A cylindrical piece of 30 mm diameter & 20 mm thick is resting on the frustum of a cone, top diameter 46 mm & bottom diameter 70 mm & height 25 mm. Draw the isometric view of the arrangement, if the axes of both the solids coincide.

20. A right circular cone of diameter 30 mm base and height 36 mm rests centrally on top of a square block of 48 mm side and 22 mm thick. Draw the isometric projection of the combined solids.

21. A sphere of 60 mm diameter is placed centrally on the top of a frustum of a square pyramid. The base of the frustum is 60 square, tops 40 square & its height 50 mm. Draw the isometric projection of the arrangement.

22. A frustum of a cone of bottom diameter 40 mm, top diameter 30 mm & axis 50 mm long is placed centrally over a frustum of a square pyramid of bottom side 50 mm, top side 40 mm & axis 60 mm long. Draw the isometric view of the arrangement.

23. Draw the isometric projection of a sphere of 40 mm diameter resting centrally on the top of a square prism of side 50 mm & height 25 mm.

24. A sphere of 40 mm diameter is placed centrally over a frustum of a cone of bottom diameter 60 mm, top diameter 40 mm & 60 mm long axis. Draw its isometric projection.

25. A sphere of 30 mm diameter is resting centrally over a frustum of a pyramid. The bottom of the frustum is a pentagon of side 50 mm and the top of the frustum is a pentagon of side 40 mm. Draw the isometric view of the arrangement if the axis of the frustum is 60 mm.

26. A cone of 30 mm base diameter & height 50 mm is resting axially on a frustum of a square pyramid of base 50 mm sides at the top, 100 mm sides at the bottom & 75 mm high. These two solids are in turn resting axially on a square prism of 150 mm side & 50 mm height. Draw the isometric projection of these solids.

27. A sphere of 20 mm radius is kept centrally on the top face of a square prism of base 40 mm side and height 30 mm. The combination is placed on the top of a cylinder of 70 mm diameter and height 40 mm. All the three solids have a common vertical axis. Draw the isometric projection of the combination of the solids.

28. A hexagonal prism having the side of its base 30 mm and height of 70 mm is resting on one of its corners of the base and its axis is inclined at 30^0 to the HP. Draw its projections and prepare the isometric view of the prism in the above stated condition.

29. A hollow cylinder of 60 mm & 35 mm outside & inner diameters & height 75 mm stands vertically on a square prism of 100 mm side & 40 mm height. Draw the isometric projection of the two blocks.

30. A right regular hexagonal prism, edge of base 20 mm & height 50 mm long has a circular hole of diameter 20 mm drilled centrally through it, along the axis. Draw its isometric projection.

31. A square pyramid of 40 mm side & 50 mm long axis is seated on a cube of 60 mm side such that the edges of the base of the pyramid are parallel to the edges of the top of the cube with their vertical axis being the same. Draw the isometric projections of the composite solid.

32. A right hexagonal prism edge of base 22 mm & 60 mm long lies on its rectangular face on the ground plane. A right circular cylinder of diameter 35 mm & 50 mm long axis rests centrally on top of the rectangular face of the prism. Draw the isometric projection of the solid.

33. A right regular hexagonal prism, edge of base 20 mm and height 60 mm lies on one of its rectangular faces. A right circular cone, diameter of base 30 mm and height 35 mm long rests centrally on the upper rectangular face of the prism. Draw the isometric projection of the combination of the two solids.