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18/ENG05/040

MECHATRONICS ENGINEERING

ANSWERS TO ENG 232 QUESTIONS

1. How do you represent a sectioned surface on a drawing?

   First of all, it is important to understand that a sectioned surface is one which has the cutting plane. Therefore a sectioned surface is represented by hatching lines. These are thin lines that are inclined at 45 degrees to the horizontal and are evenly spaced. For the same object, every part is for be hatched with the same type of line at 45 degrees and equal spacing but for assembly objects, a principle known as reverse hatching is introduced. Therefore the direction of the hatch lines change as one gets to a different part.

   N/B: *Section lines are very light. When sketching an object or part that requires a sectional view, they are drawn by eye at an angle of approximately 45 degrees, and are spaced about 1/8" apart. Since they are used to set off a section, they must be drawn with care.*

2. List out the various principles to be followed while dimensioning a drawing.

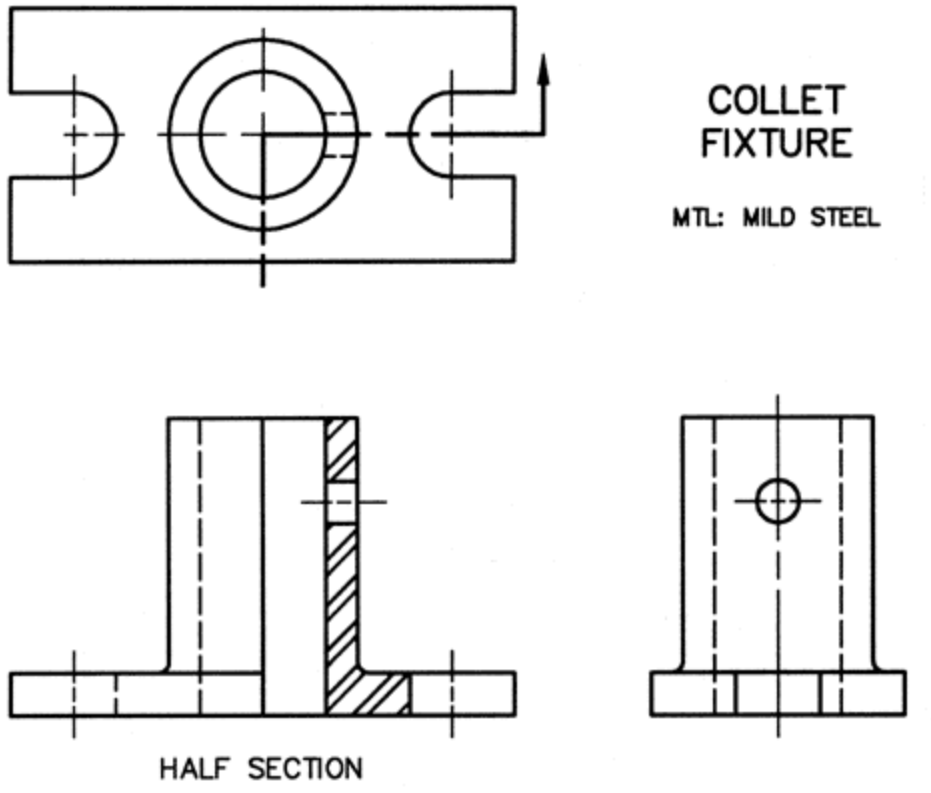
   PRINCIPLES OF DIMENSIONING.

- All dimensional information necessary to describe a component clearly and completely shall be written directly on a drawing.
- Each feature shall be dimensioned once only on a drawing, i.e., dimension marked in one view need not be repeated in another view.
- Dimension should be placed on the view where the shape is best seen.
- As far as possible, dimensions should be expressed in one unit only preferably in millimeters, without showing the unit symbol (mm).
- As far as possible dimensions should be placed outside the view.
- Dimensions should be taken from visible outlines rather than from hidden lines.
- No gap should be left between the feature and the start of the extension line.
- Crossing of centre lines should be done by a long dash and not a short dash..

3. Explain the terms, (*a*) half section, (*b*) Full section

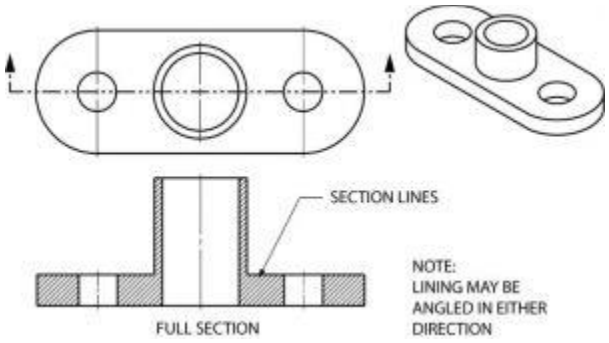
HALF SECTION.

A **half**-**section** is a view of an object showing one-**half** of the view in **section**, as in the drawing below. The diagonal lines(i.e. hatching lines) on the **section** drawing are used to indicate the area that has been theoretically cut. A half section view is effective only on symmetrical objects, and its main purpose is to show an object's internal and external construction in the same drawing.



FULL SECTION.

If the imaginary cutting plane passes through the entire object, splitting the drawn object in two with the interior of the object revealed, this is called a “a full section.” A full section is the most widely-used sectional view. An eample is shown below.



4. How are leader lines terminated?

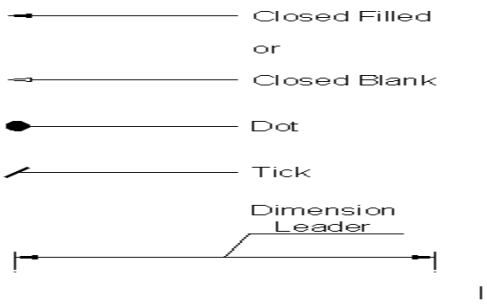
Leader lines has **four** different types of terminators.

Firstly, we have an ***arrow terminator*** which is used to point to the edge of an item. The arrow terminator cold be closed filled or closed blank.

We also have ***the dot terminator*** which is used to point to a face.

Next, ***the architectural thick*** can be used for referring to multiple parallel edges.

The final is ***no terminator*** which is used for pointing at dimension lines or lines of symmetry.



5. What do you understand by, (a) scale = 5:1 and (b) scale = 1:10?
   a. scale 5:1 represents an enlargement scale. That is a unit length of the actual object is represented as 5 times its actual size on paper. Therefore it is a magnification of a real life object on paper. This is multiplying the actual size of the object by 5 therefore increasing the drawing on paper.
   b. Scale 1:10 represent a reduction scale. That is for every unit of length of a drawing in corresponds to 10 times on the actual object. Therefore the object is ten times larger than the representation on paper. This is multiplying the actual size of the object by 1/10 therefore reducing the size of the drawing.

6. Give the shape identification symbols for the following:

(*a*) Diameter= ⌀

(*b*) Radius= " R "

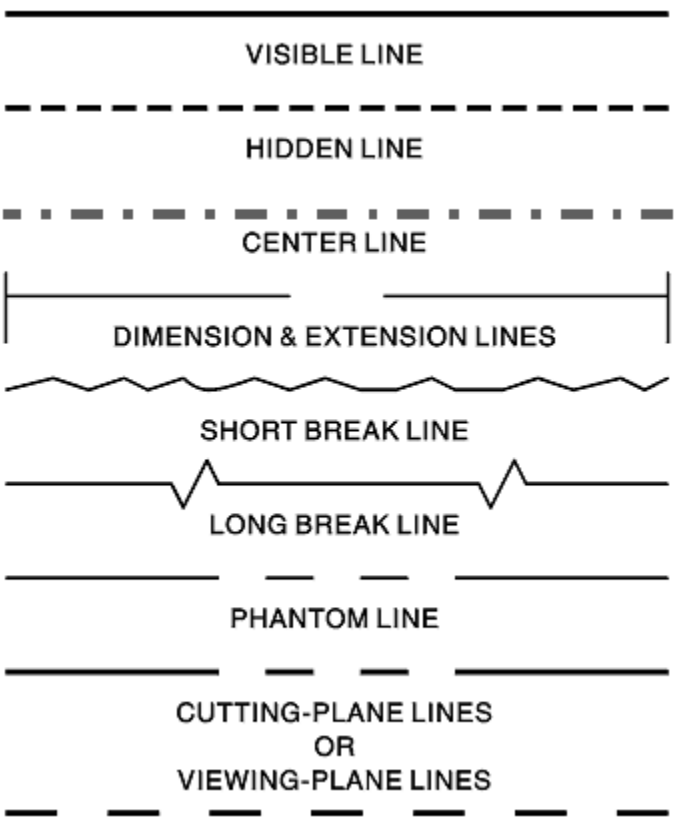
(*c*) Square = □

(*d*)Spherical radius= "SR"

(a) Centre line=

(b) cutting plane line = 

(c) long break= 



7. What are the elements to be considered while obtaining a projection and what is an orthographic projection?

Orthographic projection is a method of projection in which an object is depicted using parallel lines to project its outline on to a plane. In this the object is represented in its 2d form taken face by face. This represents the objects side, front and top views. It is a form of parallel projection. ***The elements to be considered while obtaining a projection include:***

- Object to be projected
- The plane of projection or picture plane
- Rays or lines to sight or projectors
- The observers eye or station point.
- the face of the object intended to be represented i.e in representing the front view, use a projection perpendicular to the vertical plane, also in representing the top view, use a plane perpendicular to the horizontal plane.

8. When is a projection of an object called an orthographic projection?

The projection of an object is termed an orthographic when the projection lines are taken at 90 degrees to the surface. That is one looks at the object at 90 degrees. Orthographic projection yields the true size and shape of every such surface in the front, the top, or the

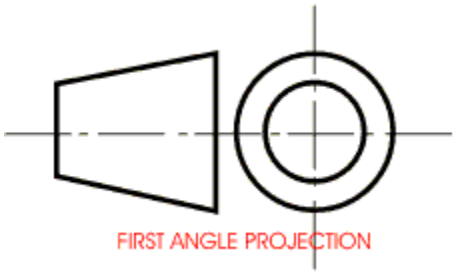
side view. The term *orthographic* is sometimes reserved specifically for depictions of objects where the principal axes or planes of the object are also parallel with the projection plane.

9. Explain the following, indicating the symbol to be used in each case: (*a*) First angle projection, (*b*) Third angle projection

FIRST ANGLE PROJECTION.

this is a method of orthographic projection that is commonly practiced in Europe. In this the top view is placed just below the front view and the side view is placed beside the front view. Here, the left side view is placed on the right side of the front view while the right side view is placed on the left side of the drawing during representation.

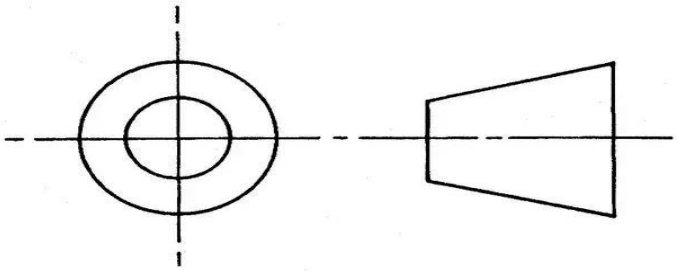
The symbol for this is:



THIRD ANGLE PROJECTION

This method of orthographic projection is used in the united states of America. In this, the top view is placed ontop of the front view and the side view remains beside the front view. Here, the left side of the object is drawn on the left side of the front view and the right on the right side unlike the first angle projection.

Third angle symbol:



Objectives

1. To project the auxiliary view, an imaginary plane known as …….

   a) Reference Plane

   b) Principle plane

   c) Normal plane

   d) Inclined plane

   Answer= reference Plane

2. Reference plane is parallel to the direction of view

   a) True

   b) False

   Answer= false

3. Dimension of one side of the inclined surface can be……projected on the reference plane

   a) Indirectly

   b) Equally

   c) Directly

   d) Normally

Answer= indirectly

4. In isometric projection the three edges of an object are inclined to each other at

(a) 60º (b) 120º (c) 100º (d) 90º

Answer= 60

5. The angle between the flanks of a metric thread is

(a) 60º (b) 90º (c) 75º (d) 55º

Answer= 60

6. Which one among the following represents a permanent fastener

a) Nut b) Rivet c) Screw d) Bolt

Answer= Rivets

7. The convexity provided on the rim of the solid web cast iron pulley is called

a) Bending b) Curving c) Crowning d) Riveting

Answer= Crowning

8. Section lines are generally inclined with the base, at an angle of

a) 30º b)45º c)60º d)90º

Answer= 45

9. The isometric view of a sphere is always

a) a circle b) an ellipse c) a Parabola d) a Semicircle

Answer= Ellipse

10. In isometric projection, the four center method is used to construct

a) an ellipse b) a square c) a triangle d) a rectangle

answer= ellipse

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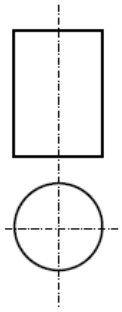
(i) With respect to the elevation and plan given below, name the solid



(a) Cone
(b) hexagonal prism
(c) cylinder
(d) hexagonal pyramid

Answer= Cylinder.

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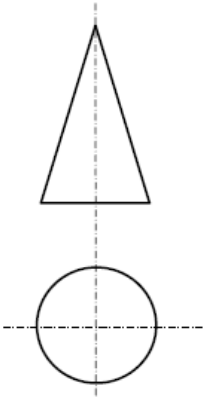
(v) With respect to the front view and top view given below, name the solid



(a) Cone
(b) Cylinder
(c) Cube
(d) Frustum

Answer= Cone.

13. A footstep bearing is a

a) journal bearing b) thrust bearing c) pivot bearing d) pedestal bearing

Answer= pivot bearing

14. The angle between the flanks of B.S.W. thread is

a) 60^o b) 65^o c) 55^o d)75^o

Answer= 55

15. Top view is projected on the ***Horizontal Plane.***

a) Vertical Plane b) Corner Plane c) Side Plane d) Horizontal Plane

Answer= Horizontal plane