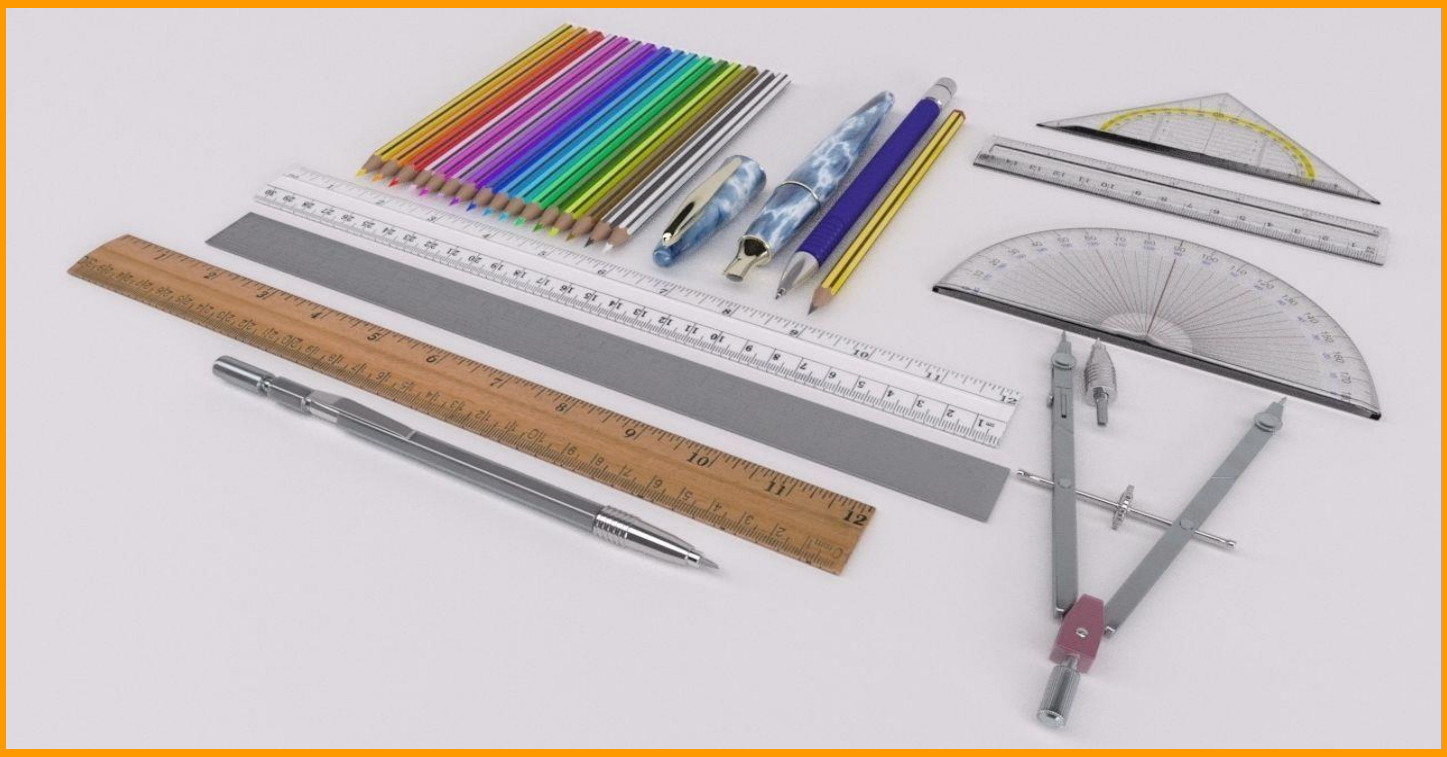
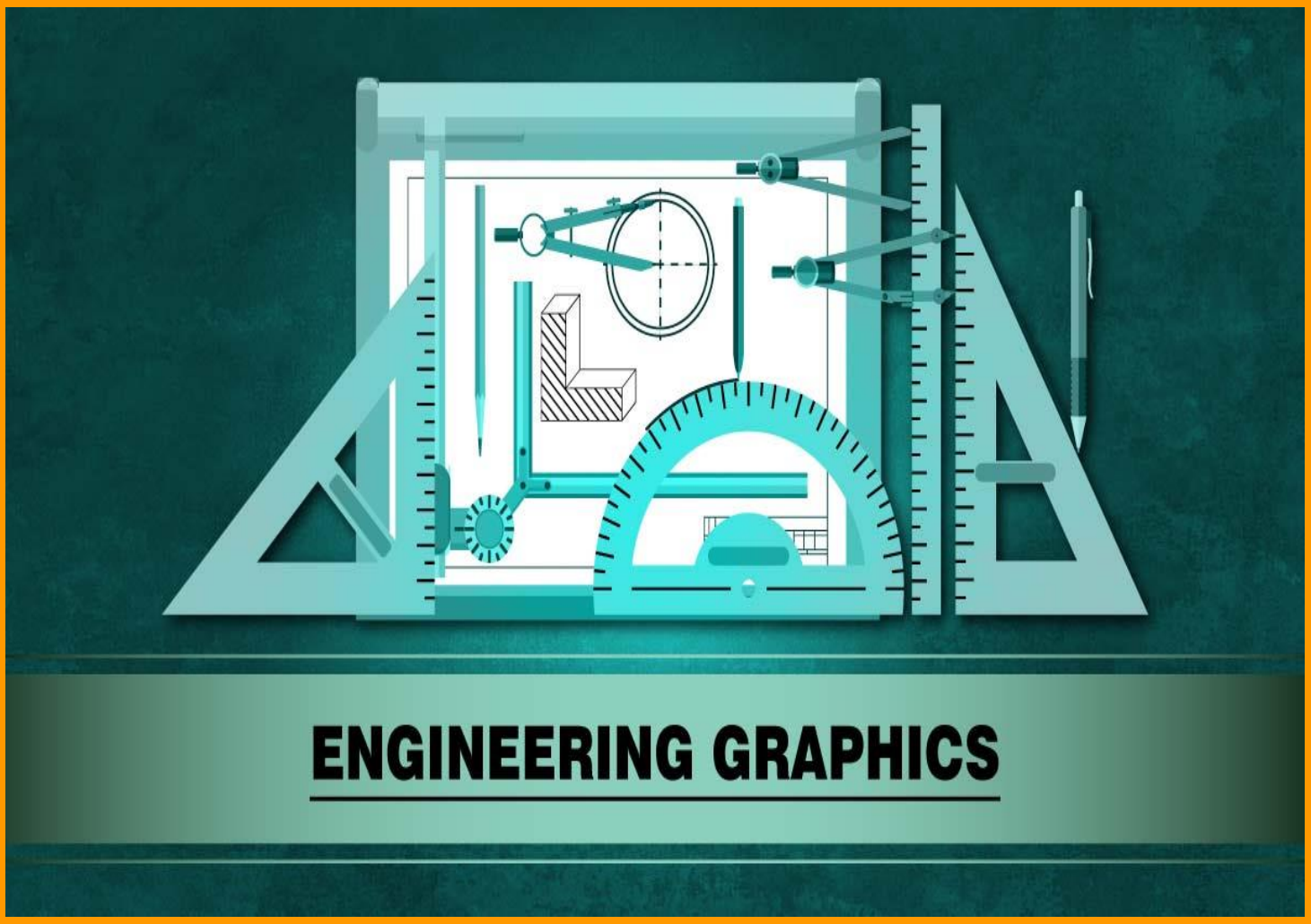
VIT Vidyalankar Institute of Technology
Accredited A+ by NAAC

# Vidyalankar Institute of Technology

**FE- SEM- II**

## FEC204 & FEL203 - ENGINEERING GRAPHICS MANUAL





| Course Code | Course Name | Teaching Scheme (Contact Hours) | | | Credits Assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Pract. | Tut. | Theory | Tut. | Pract. | Total |
| FEC204 | Engineering Graphics | 2 | -- | -- | 2 | -- | -- | 2 |

| Course Code | Course Name | Examination Scheme | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Theory | | | | | Term Work | Pract. /oral | Total |
| | | Internal Assessment | | | End Sem. Exam. | Exam. Duration (in Hrs) | | | |
| | | Test1 | Test 2 | Avg. | | | | | |
| FEC204 | Engineering Graphics | 15 | 15 | 15 | 60 | 3 | -- | -- | 75 |

**Objectives:**

1. To impart and inculcate proper understanding of the theory of projection.
2. To impart the knowledge of reading a drawing.
3. To improve the visualization skill.

**Outcomes:** Learner will be able to…

1. Apply the basic principles of projections in Projection of Lines and Planes
2. Apply the basic principles of projections in Projection of Solids.
3. Apply the basic principles of sectional views in Section of solids.
4. Apply the basic principles of projections in converting 3D view to 2D drawing.
5. Read a given drawing.
6. Visualize an object from the given two views.

| Module | Detailed Contents | Hrs. |
|---|---|---|
| 01 | **Introduction to Engineering Graphics**<br>Principles of Engineering Graphics and their significance, usage of Drawing instruments, Types of Lines, Dimensioning Systems as per IS conventions. Introduction to plain and diagonal scales.<br>**Engineering Curves**<br>Basic construction of Cycloid, Involutes and Helix (of cylinder) only. | 02 |
| 02 | **Projection of Points and Lines**<br>Lines inclined to both the Reference Planes (Excluding Traces of lines) and simple application based problems on Projection of lines.<br>**@ Projection of Planes**<br>Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular planes inclined to either HP or VP only. (Exclude composite planes). | 05 |
| 03 | **Projection of Solids**<br>(Prism, Pyramid, Cylinder, Cone only) Solid projection with the axis inclined to HP and VP. (Exclude Spheres, Composite, Hollow solids and frustum of solids).<br>Use change of position or Auxiliary plane method | 05 |
| 04 | **Section of Solids**<br>Section of Prism, Pyramid, Cylinder, & Cone cut by plane perpendicular to at least one reference plane (Exclude Curved Section Plane). Use change of position or Auxiliary plane method. | 05 |
| 05 | **#Orthographic and Sectional Orthographic Projections**<br>Fundamentals of orthographic projections. Different views of a simple machine part as per the first angle projection method recommended by I.S. Full or Half Sectional views of the Simple Machine parts. | 03 |
| 06 | **#@ Missing Views** | 01 |

| | | |
|---|---|---|
| | The identification of missing views from the given views. Create the third view from the two available views so that all the details of the object are obtained. | |
| 07 | **#Isometric Views**<br>Principles of Isometric projection - Isometric Scale, Isometric Views, Conversion of Orthographic Views to Isometric Views(Excluding Sphere ). | 03 |

**@ only in Term Work (i.e; Questions will not be asked for any examination.)**
**#more problems should be discussed during practical hours to strengthen the concepts.**

| Course Code | Course Name | Teaching Scheme (Contact Hours) | | | Credits Assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Pract. | Tut. | Theory | Tut. | Pract. | Total |
| FEL203 | Engineering Graphics | - | 04 | - | - | - | 2 | 2 |

| Course Code | Course Name | Examination Scheme | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Theory | | | | | | | |
| | | Internal Assessment | | | End Sem. Exam. | Exam. Duration (in Hrs) | Term Work | Pract. /oral | Total |
| | | Test1 | Test 2 | Avg. | | | | | |
| FEL203 | Engineering Graphics | -- | -- | -- | -- | -- | 25 | 50 | 75 |

**Objectives**

1. To inculcate the skill of drawing with the basic concepts.
2. To Use AutoCAD for daily working process.
3. To teach basic utility of Computer Aided drafting (CAD) tool

**Outcomes: Learner will be able to…**

1. Apply the basic principles of projections in 2D drawings using a CAD software.
2. Create, Annotate, Edit and Plot drawings using basic AutoCAD commands and features.
3. Apply the concepts of layers to create drawing.
4. Apply basic AutoCAD skills to draw different views of a 3D object.
5. Apply basic AutoCAD skills to draw the isometric view from the given two views.

**TERM WORK:**

**Component – 1**

**Drawing Sheet – 1:** Projection of Solids (3 Problems)
**Drawing Sheet – 2:** Section of Solids (3 Problems)
**Drawing Sheet – 3:** Orthographic Projection without section & with section (2 Problems)
**Drawing Sheet – 4:** Isometric Views (3 Problems)

**Component -2**

**Assignment to be done on A-3 size sketch book consisting of:-**

1. Engineering Curves. (2 problems)
2. Projection of Lines (2 problems)
3. Projection of planes (2 problems)
4. Projection of solids. (2 problems)
5. Section of solids (2 problems)

6. Orthographic Projection. (With section 1 problem, without section 1 problem).
7. Missing views. (1 problem)
8. Isometric Drawing. (2 problems)

**Component-3**

Printouts **(preferably on A3 size sheet)** of each from:

1. Orthographic Projections without Section – 1 problem
2. Orthographic Projections with Section – 1 problem
3. Reading of Orthographic Projections – 1 problem
4. Isometric Views – 3 problems

**AUTO CAD PRACTICAL EXAMINATION: (2hrs – 50 marks):**

1. Isometric drawing. (1 problem) (20 Marks)
2. Orthographic Projection (With Section) (1 problem). (30 Marks)

**Note: -** Print out of the Answers have to be taken **preferably in A3 size sheets** and should be **Assessed by External examiner only**. Knowledge of concepts and accuracy of drawing should be considered during evaluation.

**INTERNAL ASSESSMENT TEST: (1 hr - 15 marks)**

Among the two tests One is Conventional (manual drawing) and Second using CAD software. Average of the two tests must be considered for Internal Assessment.

**END SEMESTER EXAMINATION: (3 hrs – 60 marks)**

1. Question paper will comprise of 6 questions, each carrying 15 marks.
2. Any 4 questions need to be solved. **There won't be any compulsory Question.**
3. Marks of each topic should be proportional to number of hours assigned to each Module.

**Text Books.**

1 N.D. Bhatt, "Engineering Drawing (Plane and solid geometry)", Charotar Publishing House Pvt. Ltd.

2 N.D. Bhatt & V.M. Panchal, "Machine Drawing", Charotar Publishing House Pvt. Ltd.

**References.**

1. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publisher.
2. Dhananjay A Jolhe, "Engineering Drawing" Tata McGraw Hill.
3. Prof. Sham Tickoo (Purdue University) &GauravVerma, "( CAD Soft Technologies) : Auto CAD 2012 (For engineers and Designers)", Dreamtech Press NewDelhi.

**********

# Drawing Instruments Required:

1. **A3 size** sketch book (Preferably **Spiral** binded)
2. Clutch or Pen Pencil (**2 nos.**)
3. Set square ( **8″×10″** )
4. Lead: 0.5mm (**HB & 2H**)
5. Eraser
6. Compass (Set not required)
7. French Curve (**S- Type flexible, one piece)**
8. Mini Drafter
9. Roller Scale

# Engineering Graphics - Term Work Components

**Component – 1: - Drawing Sheets**

1) **Drawing Sheet – 1:** Orthographic Projection with section (2 Problems)
2) **Drawing Sheet – 2:** Isometric Views (3 Problems)
3) **Drawing Sheet – 3:** Projection of Solids (3 Problems)
4) **Drawing Sheet – 4:** Section of Solids (2 Problems)

**Component -2: - Assignments on A-3 size sketch book consisting of: -**

1) **Assignment No. 01: -** Two Problems on Engineering Curves
2) **Assignment No. 02: -** Two Problems on Orthographic Projections with section
3) **Assignment No. 03: -** Two Problems on Isometric Views
4) **Assignment No. 04: -** Two Problems on Solids
5) **Assignment No. 05: -** One Problem on Section of Solids
6) **Assignment No. 06: -** Two Problems on Lines

**Component-3: - AutoCAD Printouts of each from:**

1) Three Problems on Orthographic Projections with Section.
2) Three Problems on Isometric Views

**Component-4: - PBL/ Mini-project: -**

1. Floor Plan (Top view) of your home
2. Isometric view of your Bed
3. Isometric view of Kitchen cabinet
4. Isometric view of TV unit
5. Isometric view of Study table

# Engineering Curves

## Involute:

1) Draw an involute of a circle of 40 mm diameter. Also draw tangent and normal at any point of your choice.
2) Trace the paths of the ends of the straight-line AP, 100 mm long, when it rolls, without slipping, on a semicircle having its diameter AB, 75 mm long (Assume the line AP to be tangent to the semicircle in the starting position).
3) A string of length 120 mm is wound around a disc of diameter 30 mm. Draw the curve traced by the string while it is wound around the disc. Name the curve.

## Cycloid:

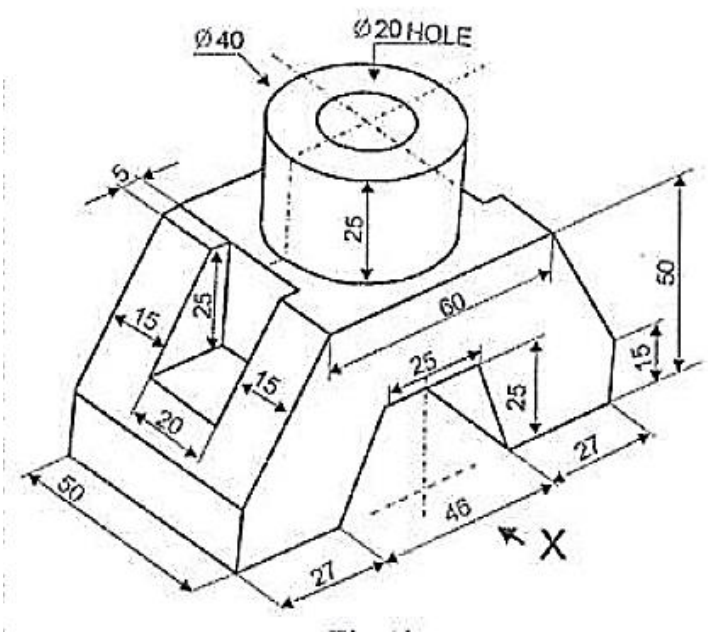
1) A circular disc of diameter 60 mm is rolling without slipping on a straight smooth surface. Draw a curve traced by a point on the circumference of the disc and touching the surface. Also draw tangent at any point of your choice.
2) A wheel of 50mm diameter is rolling up without slipping on 25° inclined surface. Point P is on the circumference of the wheel and touching the surface. Draw a curve traced by point P for one complete revolution of wheel.
3) A wheel of 60 mm diameter rolls downwards on a vertical wall half a revolution and then on the horizontal floor for half a revolution. Draw the locus of a point P on the circumference of the wheel, the initial position of which is the contact point with the wall. Name the curve.

## Helix:

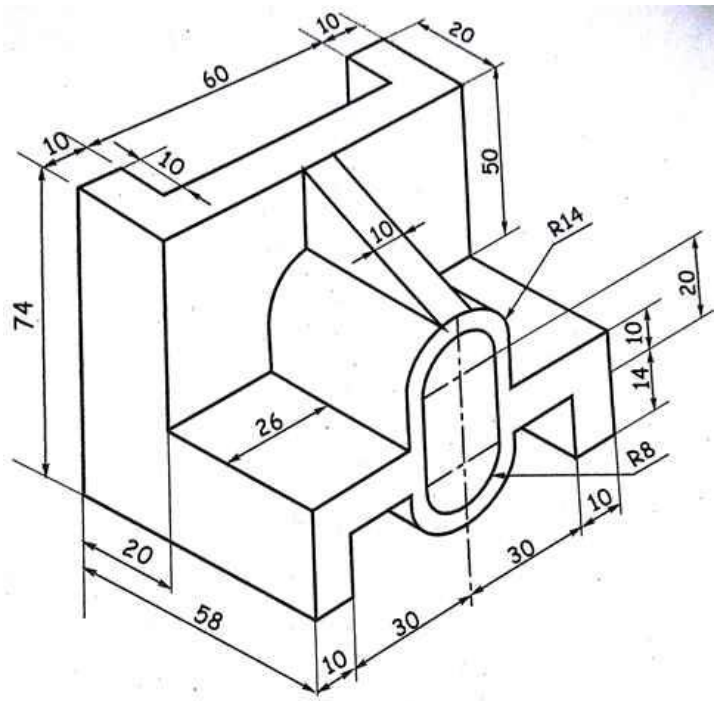
1) Draw a cylindrical helix of pitch 80mm on a cylinder of 46 mm diameter.
2) Draw 2 revolution of cylindrical helix of pitch 60 mm on a cylinder of diameter 40 mm.

# Orthographic Projections

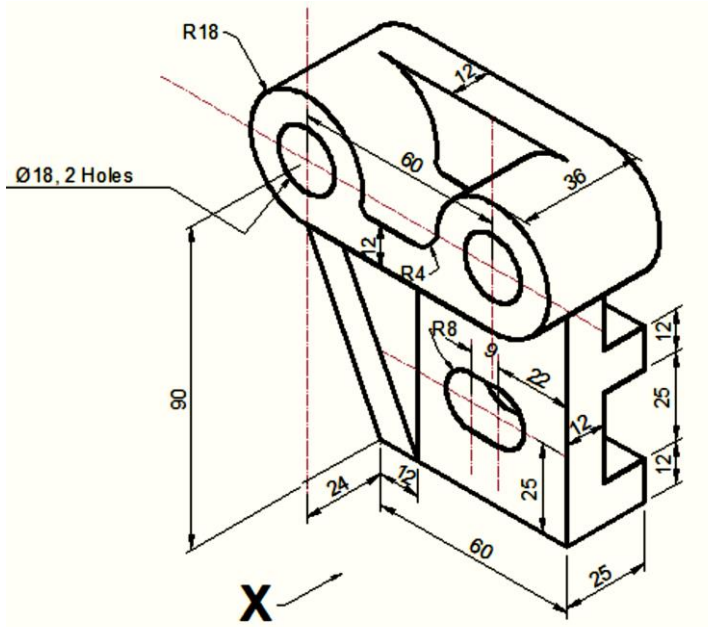
**1) Draw i) F.V.**
**ii) Top view**



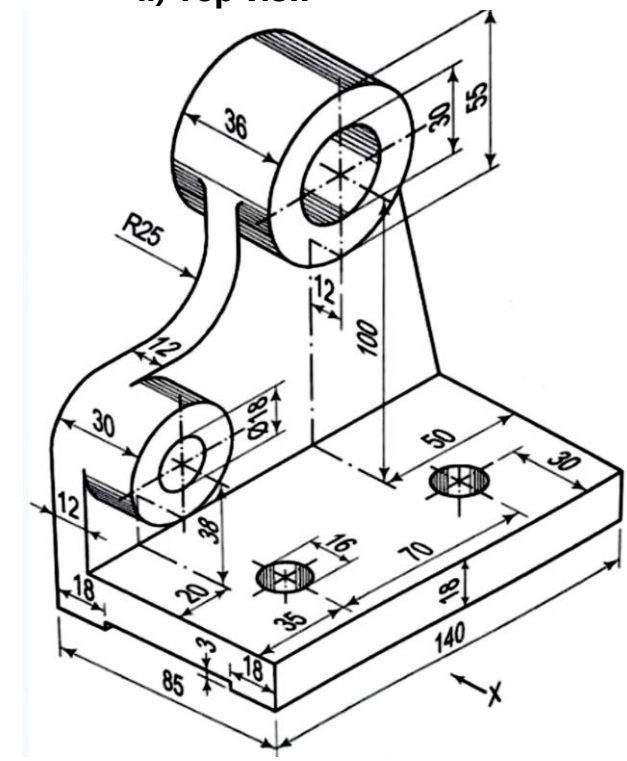

**2) Draw i) F.V.**
**ii) LHSV**



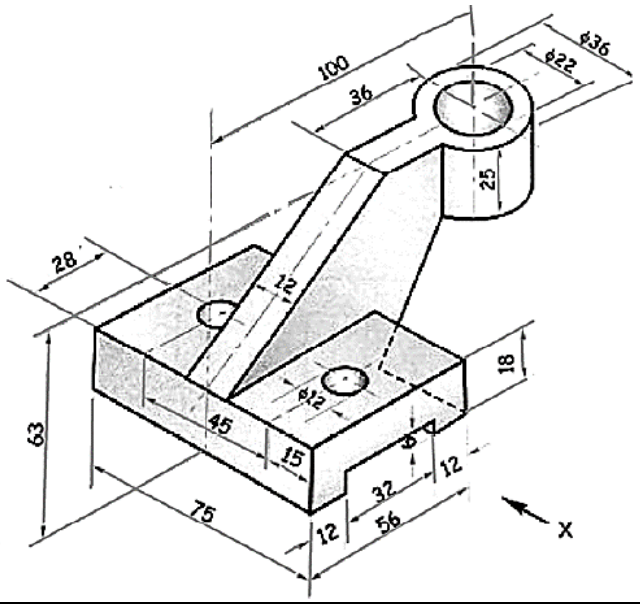

**3) Draw i) F.V.**
**ii) Top view**



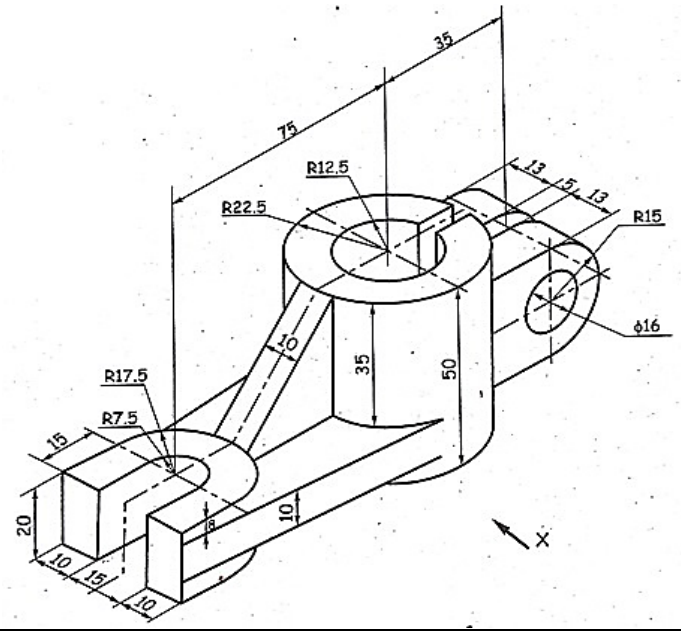

**4) Draw i) F.V.**
**ii) Top view**



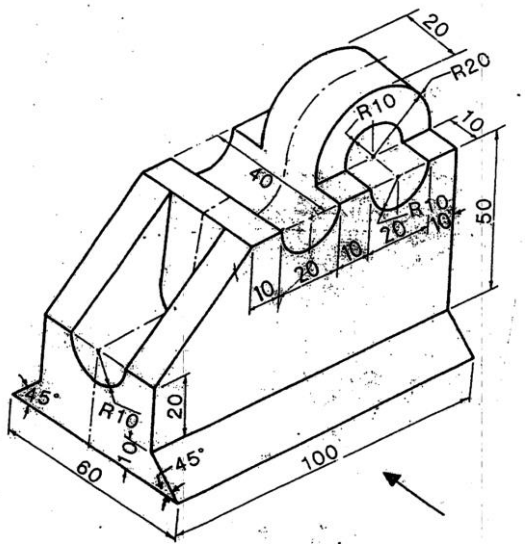
**5) Draw i) F.V.**
**ii) Top view**
**iii) LHSV**



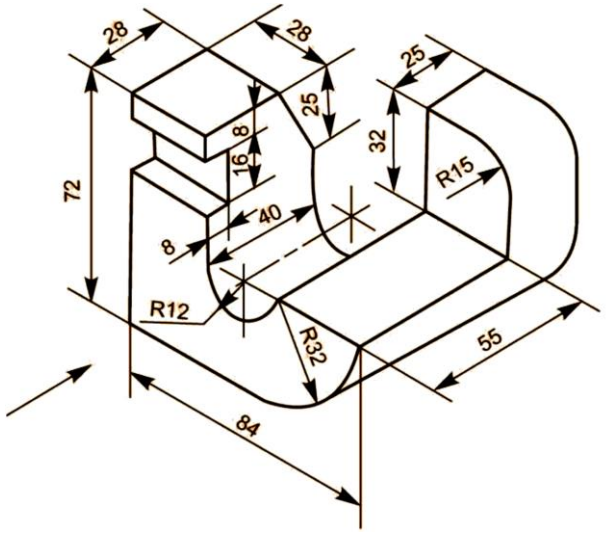

**6) Draw i) F.V.**
**ii) Top view**



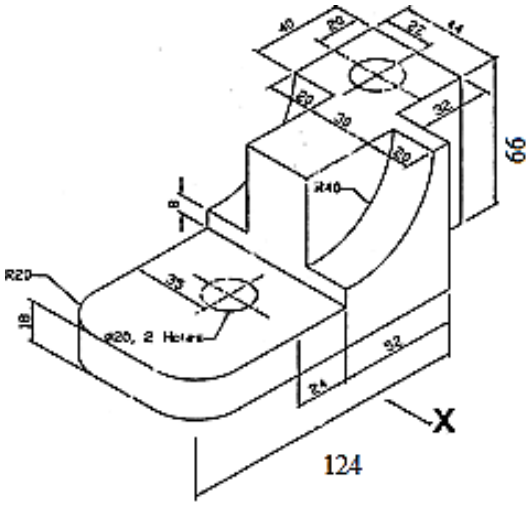

**7) Draw i) F.V.**
**ii) Top view**



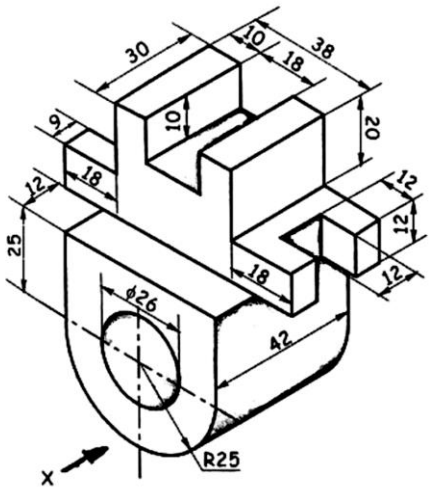

**8) Draw i) F.V.**
**ii) Top view**



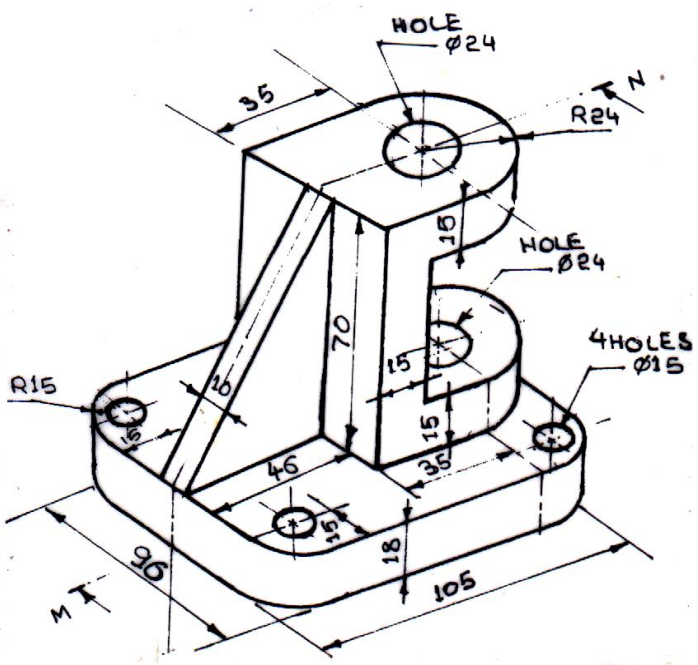
**9) Draw:**
**i) F.V**
**ii) Top view**



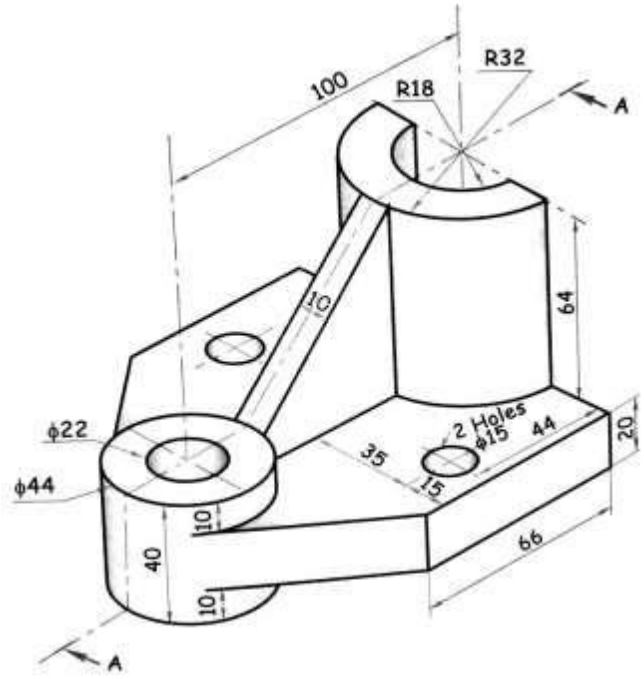

**10) Draw:**
**i) F.V.**
**ii) Top view**



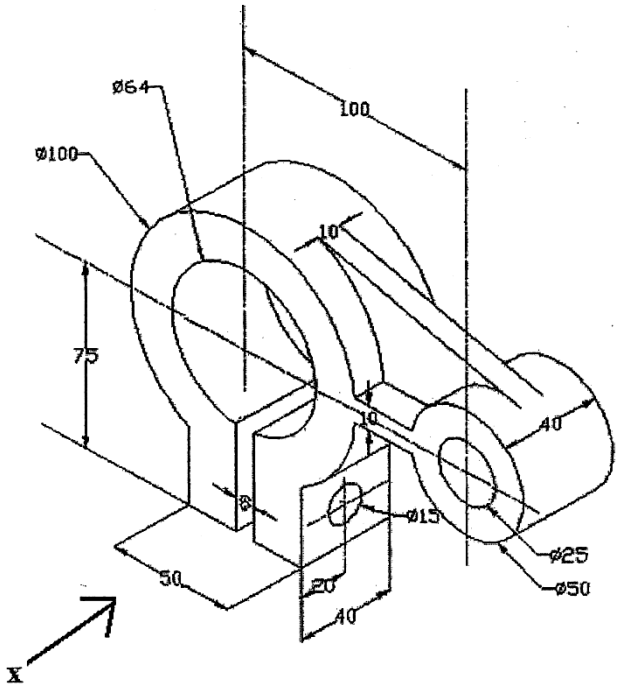

**11) Draw i) S. F.V. along M-N**
**ii) Top view**
**iii) LHSV**



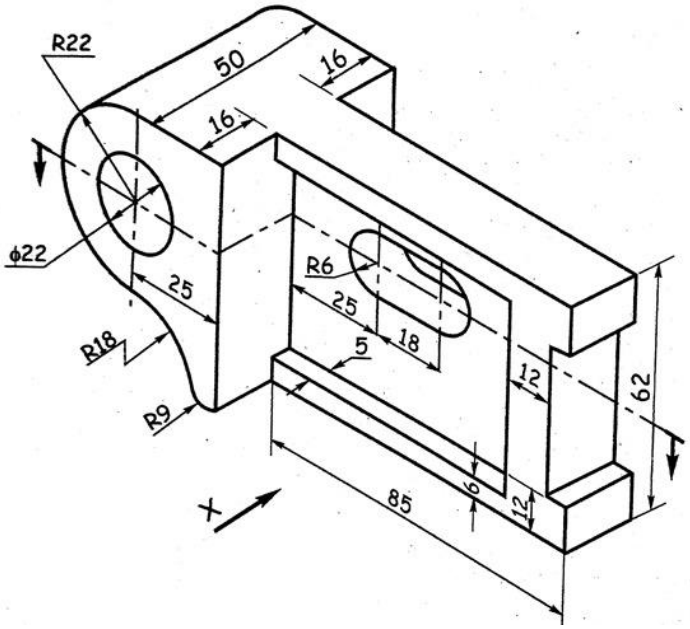

**12) Draw i) S. F.V. along A-A**
**ii) Top view**
**iii) LHSV**



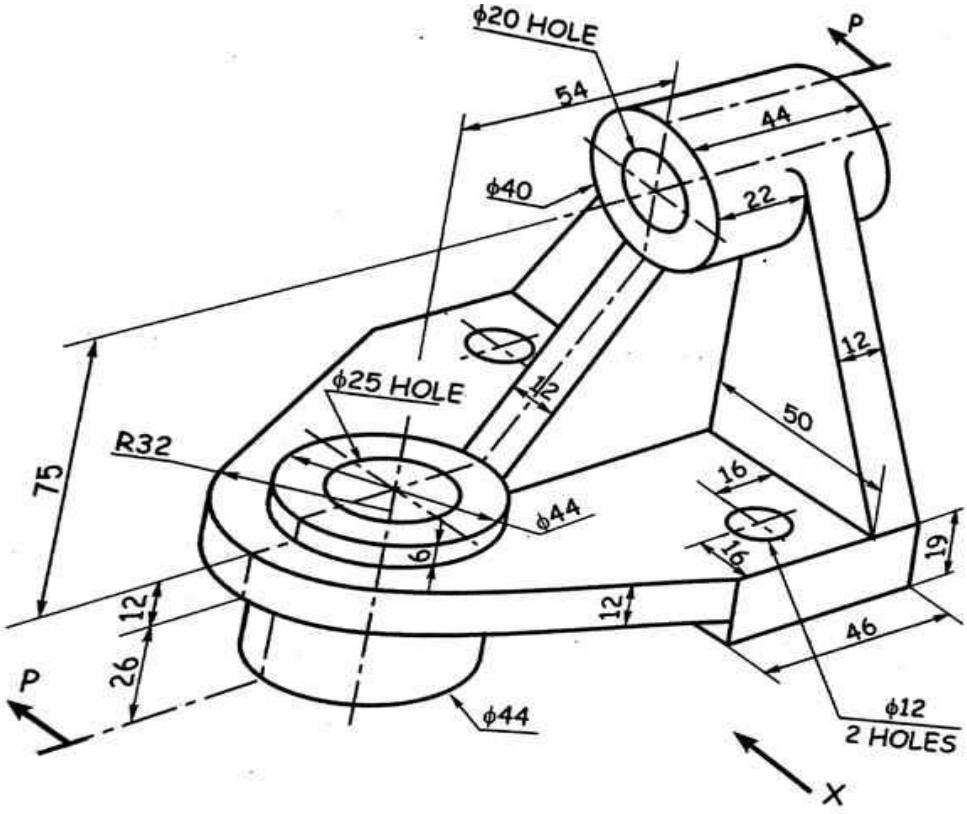
**13) Draw i) F.V. along X**
**ii) RHSV**




**14) Draw i) F.V. ii) S. T. View iii) RHSV**



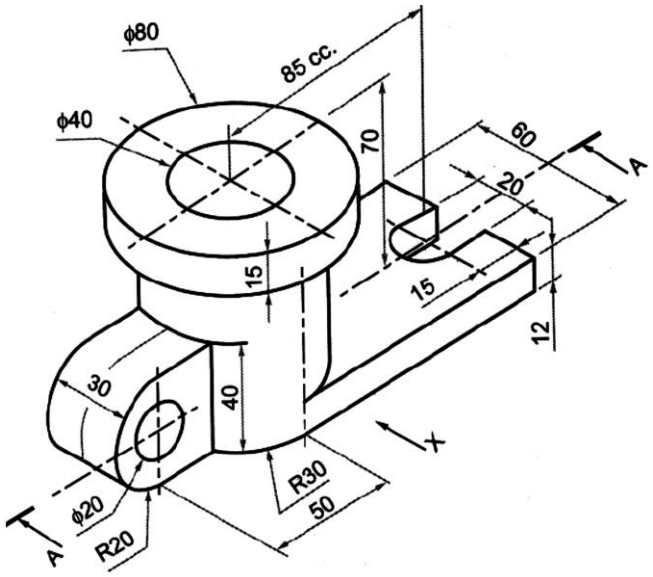

**15) Draw i) S. F.V. along P-P**
**ii) Top view**
**iii) LHSV**



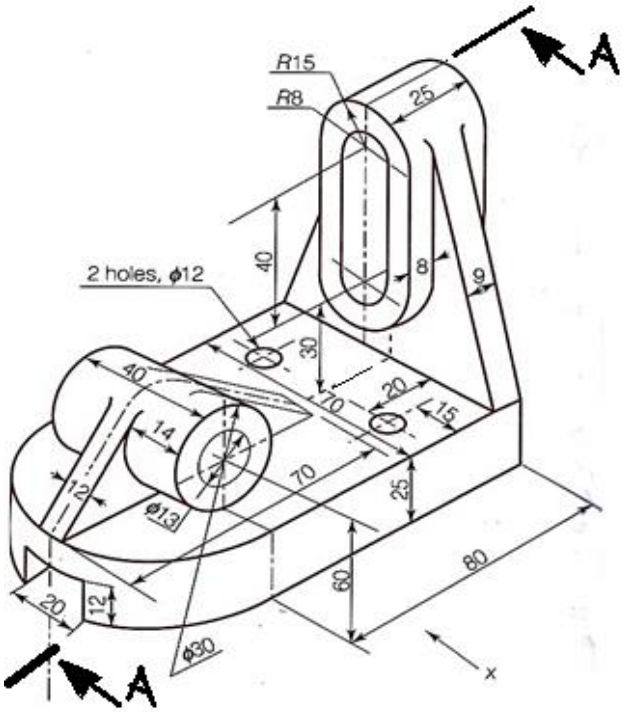
**16) Draw i) F.V. along X**
**ii) TV**

**OR**

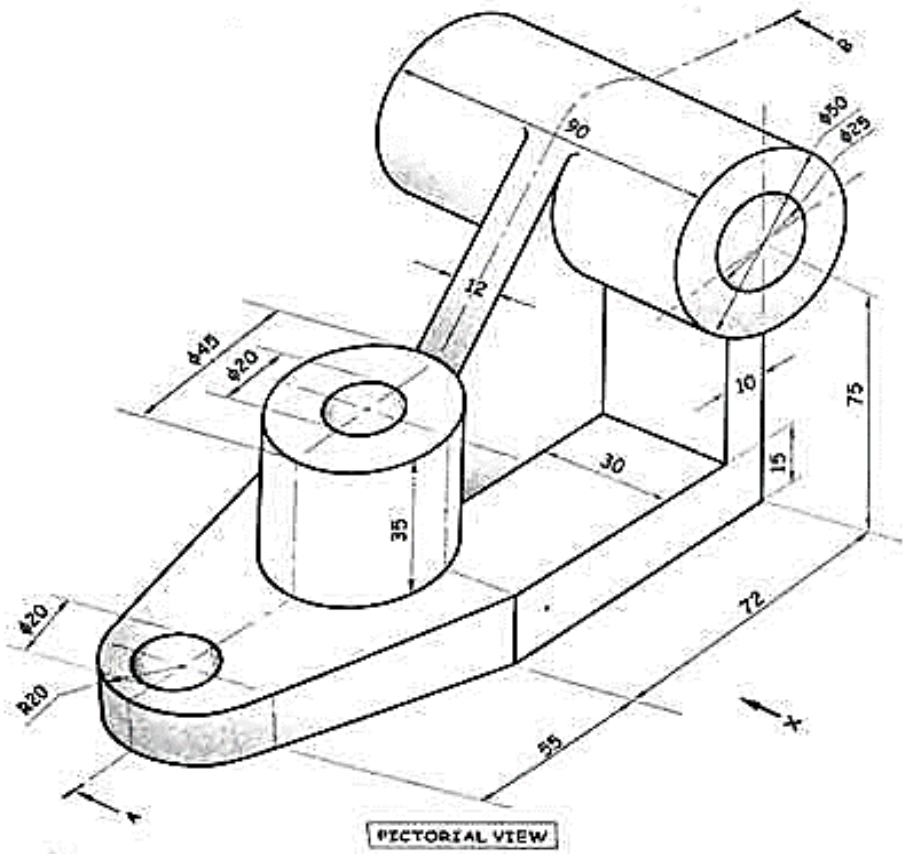
**i) Sectional Front View looking along 'X' (Section A-A)**
**ii) Top view**
**iii) LHSV**



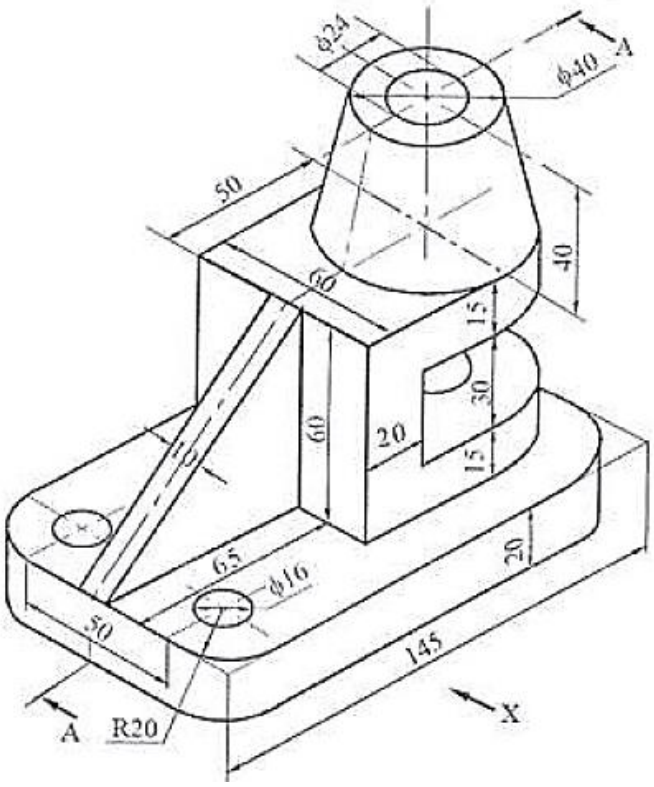

**17) Draw i) S. F.V. along A-A**
**ii) Top view**
**iii) LHSV**



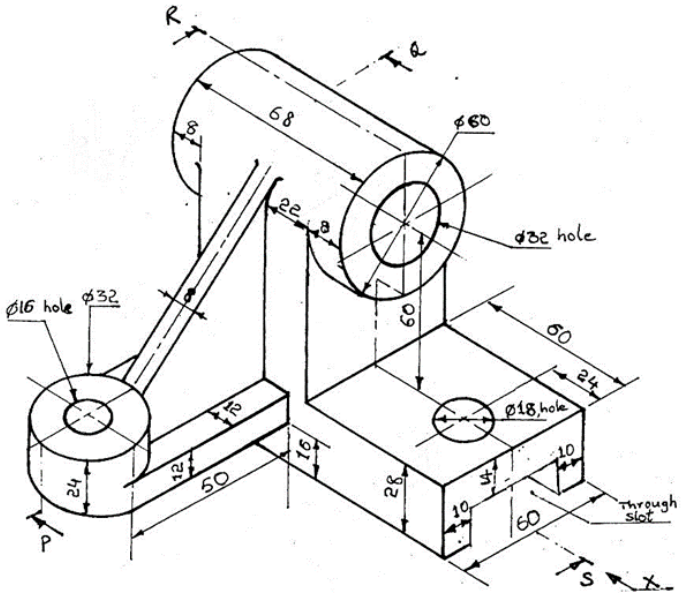

**18) Draw i) S. F.V. along A-B**
**ii) Top view**
**iii) LHSV**



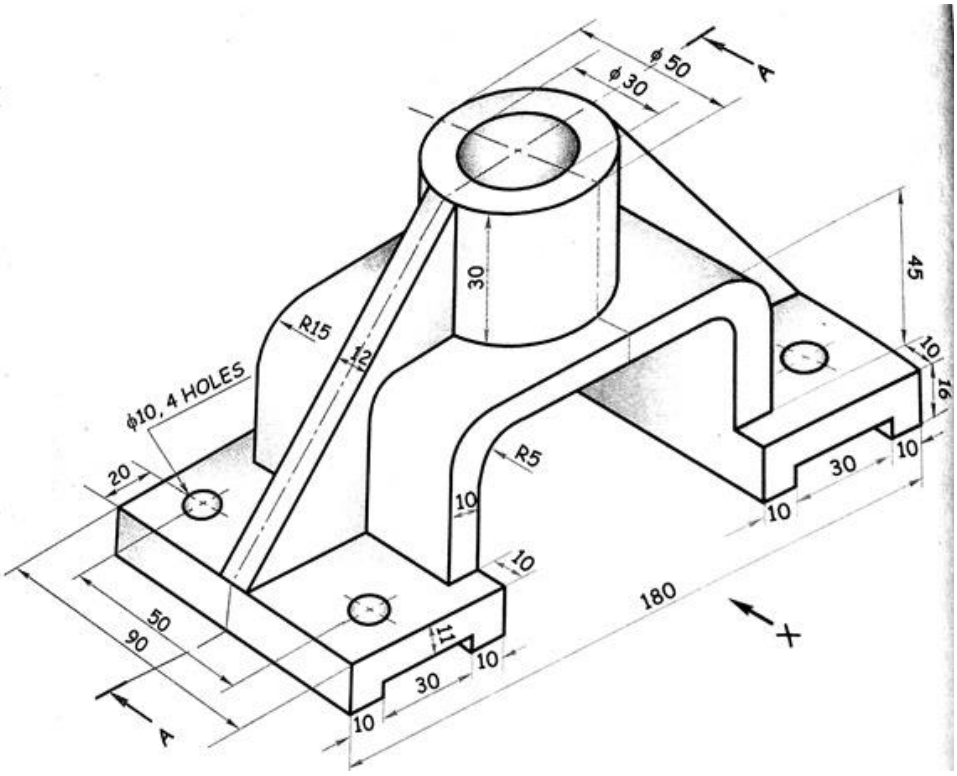
**19) Draw i) S.F.V. along A-A**
**ii) Top view**
**iii) LHSV**



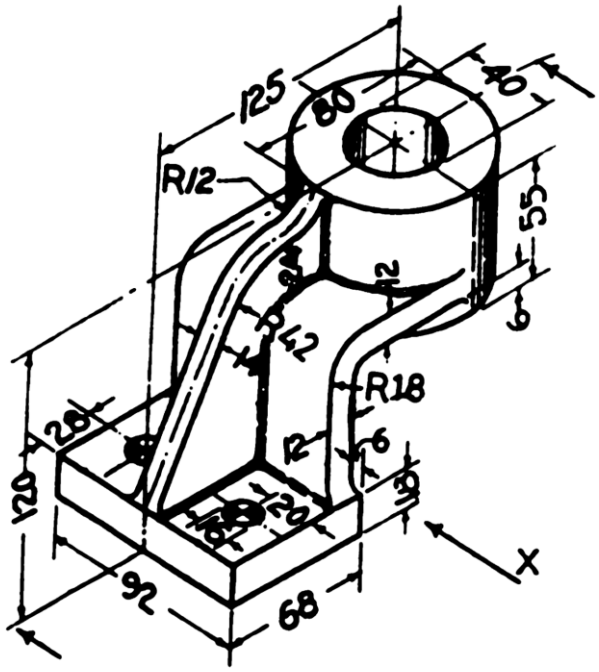

**20) Draw i) S.F.V. along P-Q**
**ii) Top view**
**iii) Sec. LHSV along R-S**



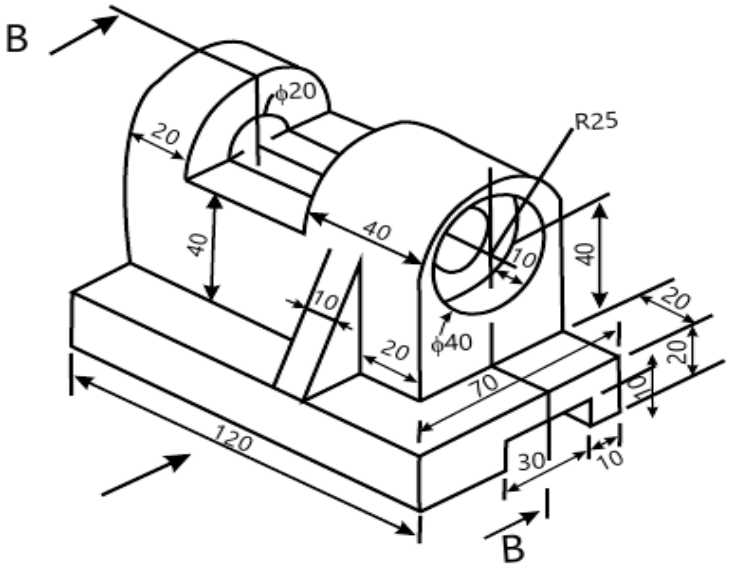

**21) Draw i) S.F.V. along A-A**
**ii) Top view**
**iii) LHSV**



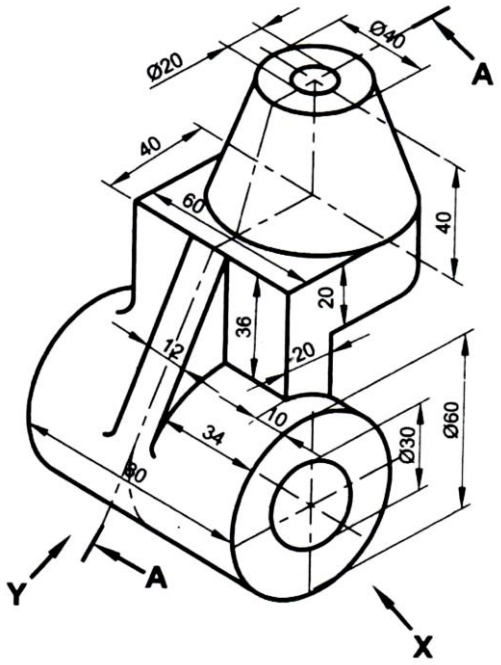
**22) Draw i) Sec. F.V. along X**
**ii) TV**
**iii) LHSV**



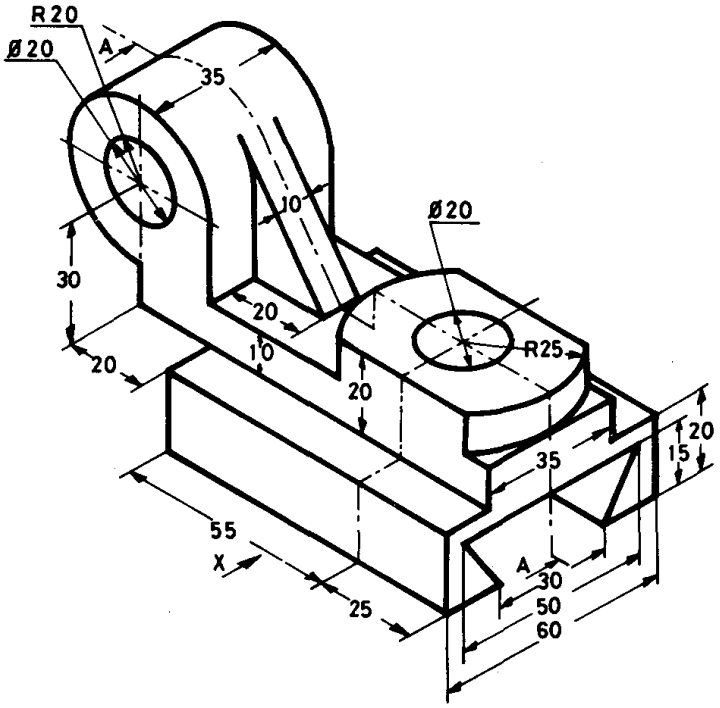

**23) Figure shows a pictorial view of object.**
**Draw following views :**
**i) Sectional F.V. along section B–B.**
**ii) Top View**
**iii) Right Hand Side View.**




**24) For the object shown in figure draw the following views –**
**i. Sectional front view from X direction section along A- A**
**ii. Side view from Left**
**iii. Top view**

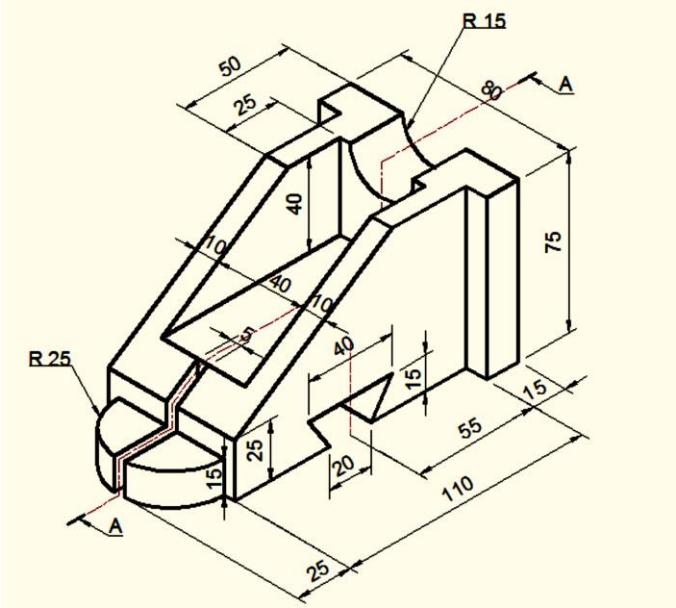



**25) For the object shown in figure draw the following views –**
**i. Sectional front view from X direction section along A- A**
**ii. Side view from Right**
**iii. Top view**



**26) For the object shown in figure draw the following views –**

i. Sectional front view from X direction section along A- A
ii. Side view from Right
iii. Top view

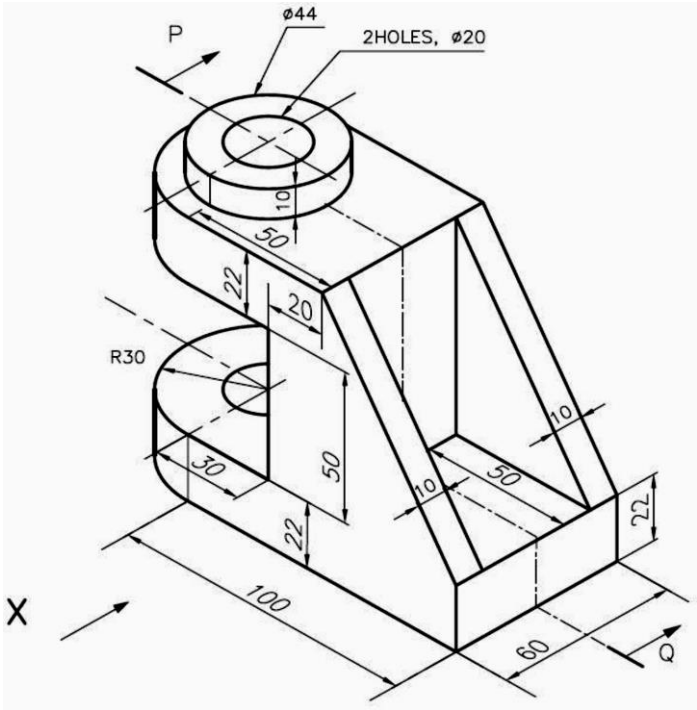



**27) Following figure shows the pictorial view of an object, draw**

**i) Sectional front view along section P-Q**

**ii) Top view.**

**iii) Right Hand Side view**

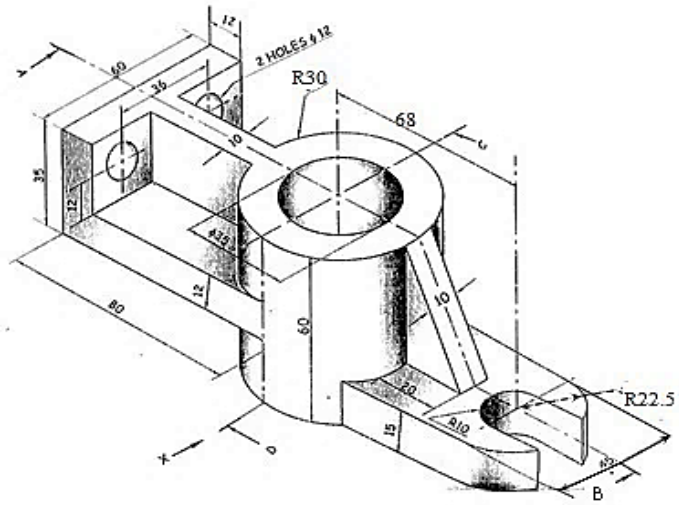



**28) Figure given below shows pictorial view of an object.**

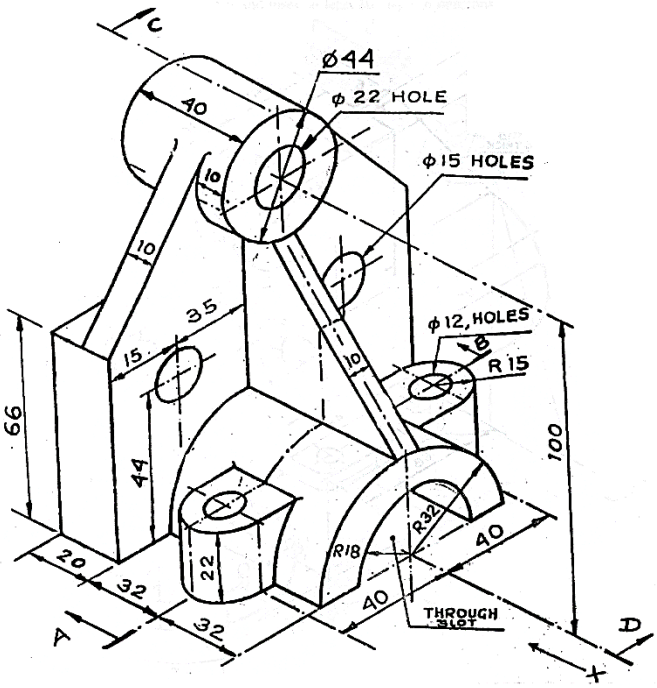
**i) Sectional front view along A-B**

**ii) Left hand side view**

**iii) Top view**




**29) Draw: (i) F.V. (ii) Sectional side view section CD (iii) Top view.**

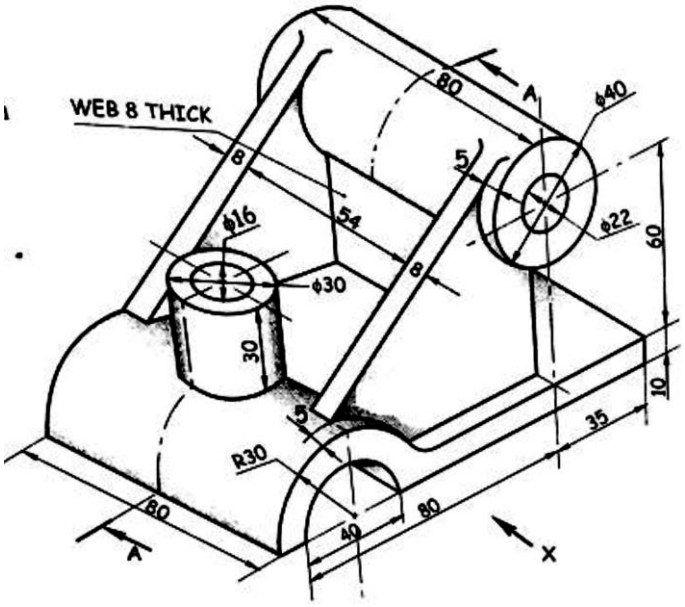


**30) Draw the following views to full scale.**

**i) Sectional front view along section A-A**

**ii) Left hand side view**

**iii) Top view**

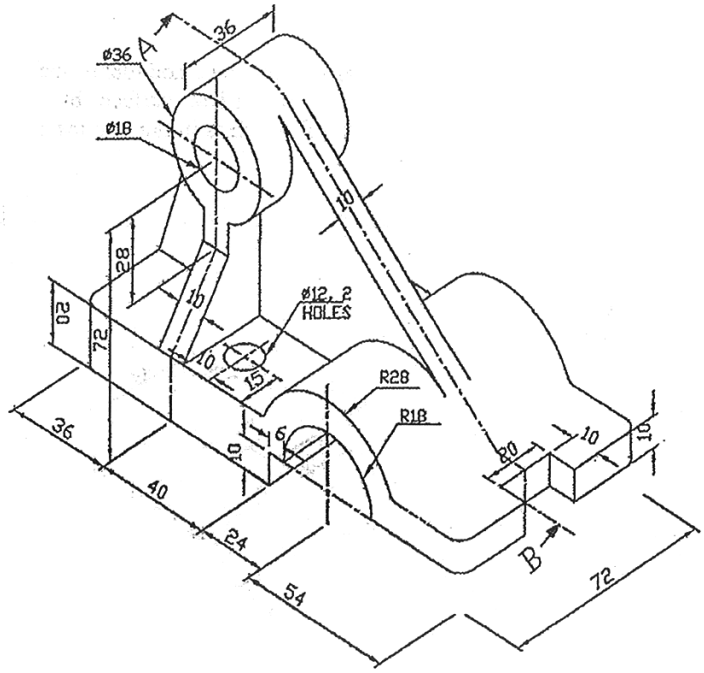



**31) Following figure shows the pictorial view of an object, draw**

**i) Sectional front view along section P-Q**

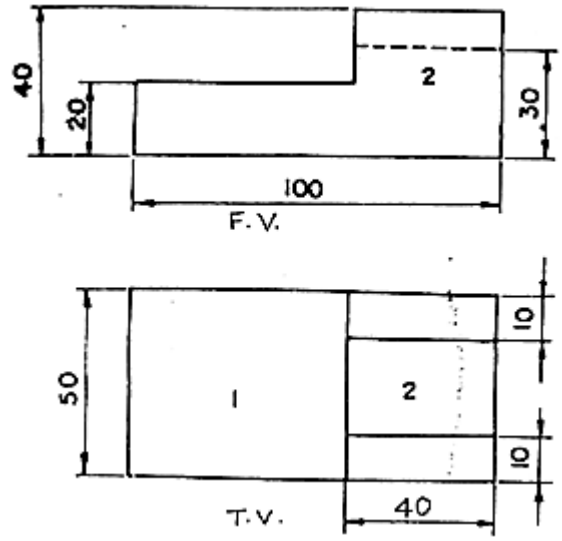
**ii) Top view.**

**iii) Right Hand Side view**

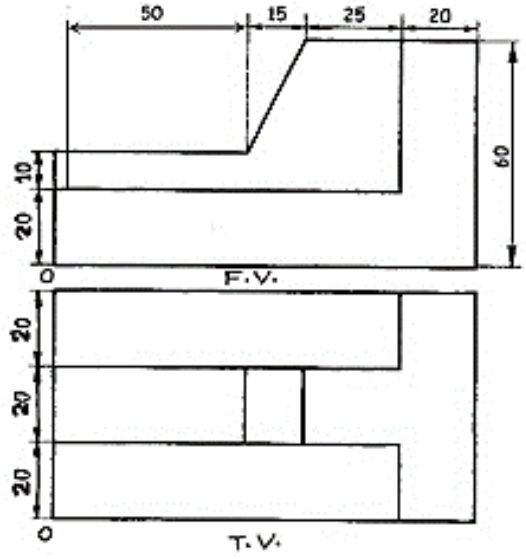


# TOPIC – ISOMETRIC VIEWS

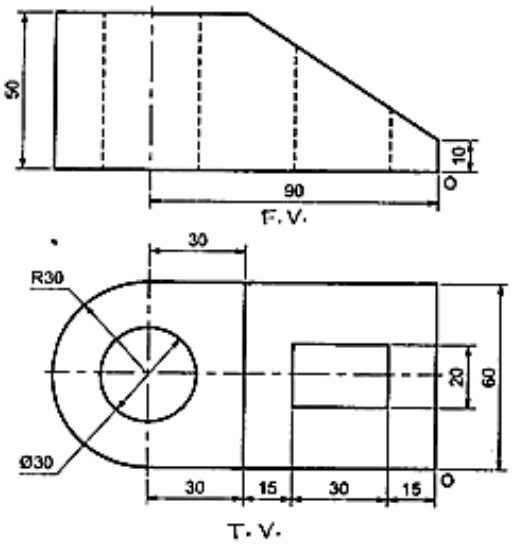
**1) Draw isometric view of the object.**



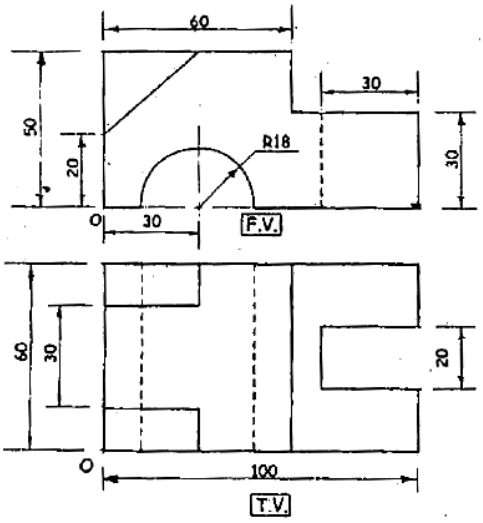

**2) Draw isometric view of the object.**



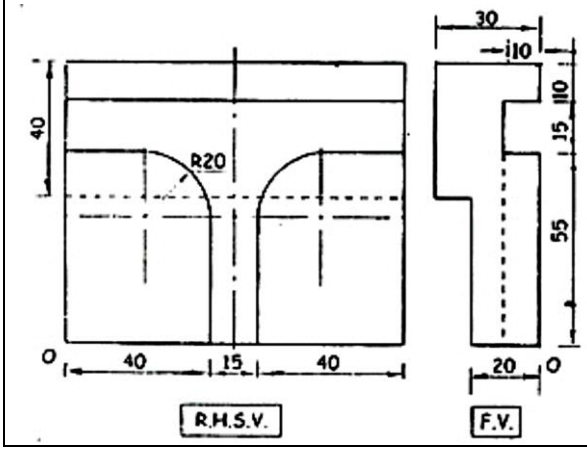

**3) Draw isometric view of the object.**



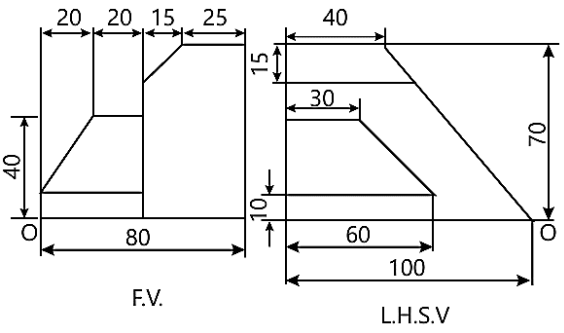

**4) Draw isometric view of the object.**



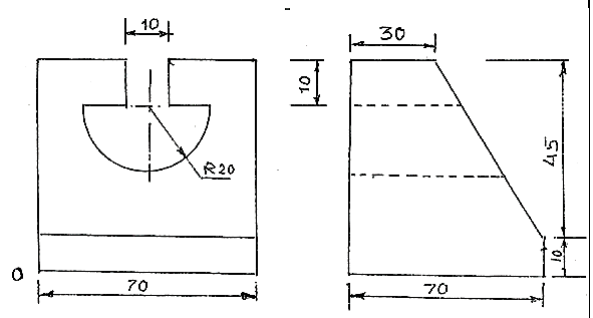

**5) Draw isometric view of the object**



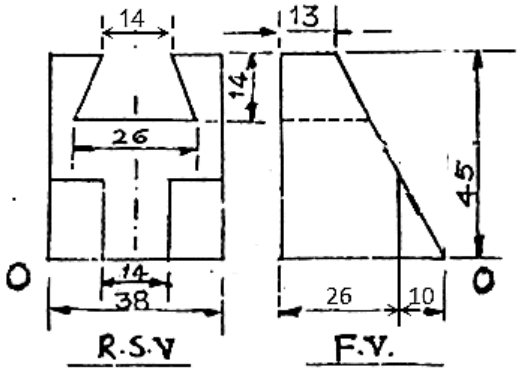

**6) Draw isometric view of the object.**



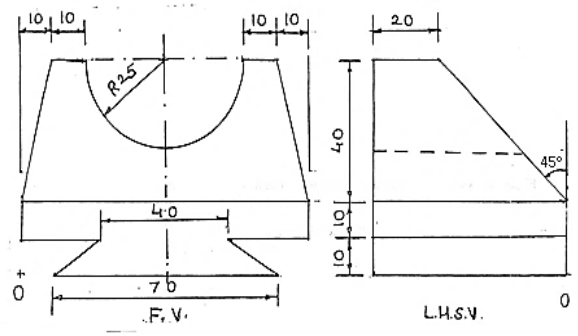
**7) Draw isometric view of the object.**



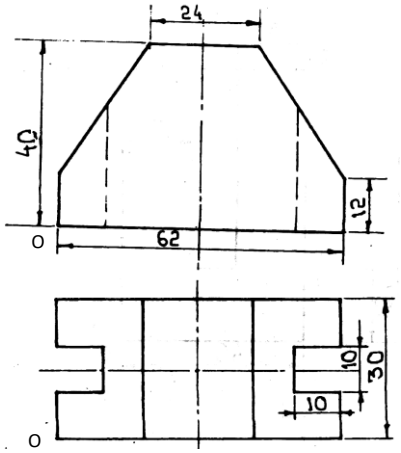

**8) Draw isometric view of the object.**



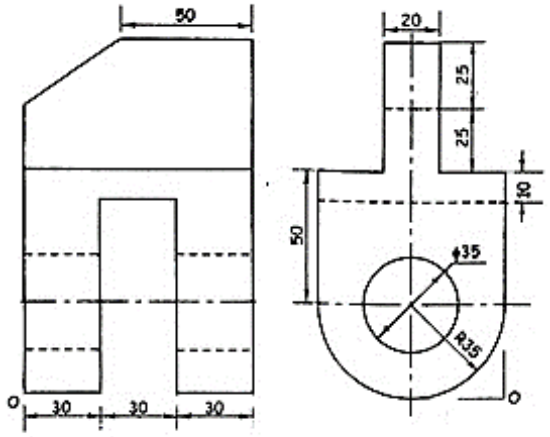

**9) Draw isometric view of the object.**



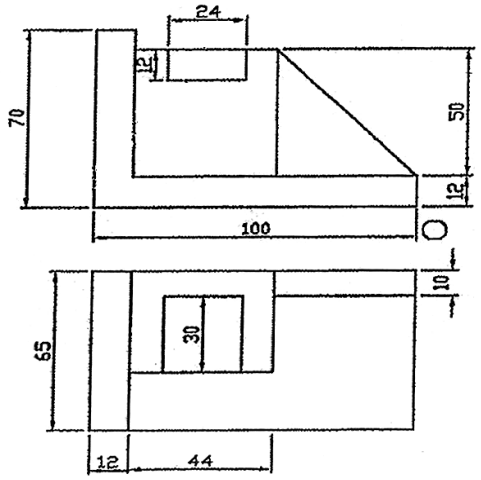

**10) Draw isometric view of the object.**



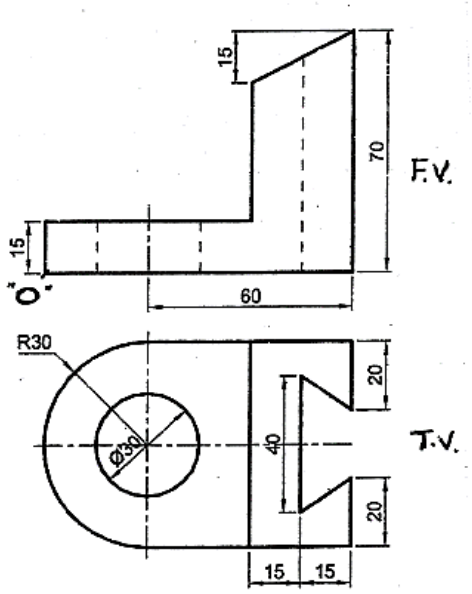

**11) Draw isometric view of the object.**



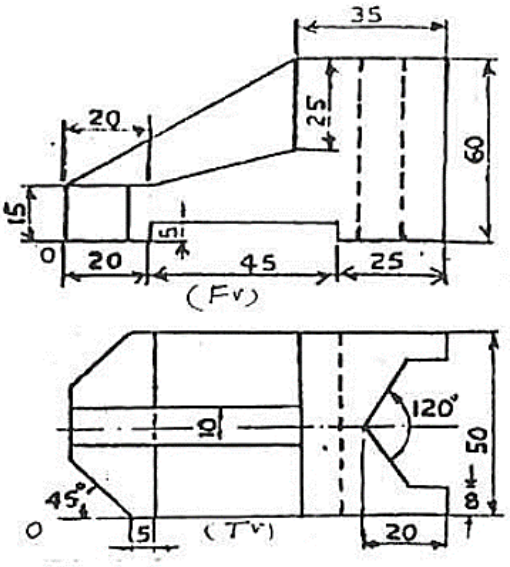

**12) Draw isometric view of the object.**



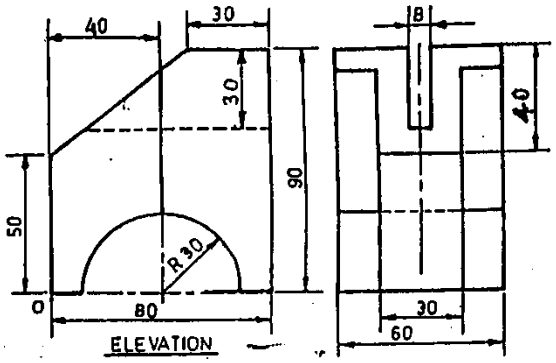
**13) Draw isometric view of the object.**



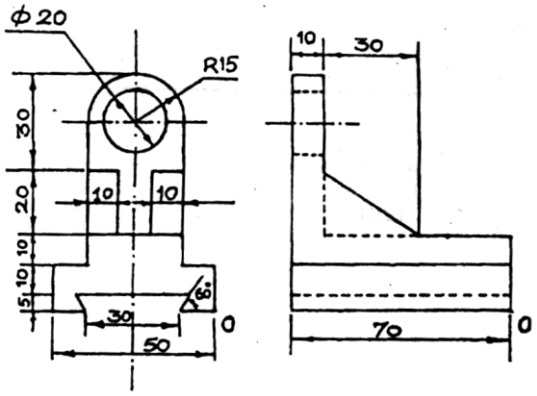

**14) Draw isometric view of the object.**




**15) Draw isometric view of the object.**

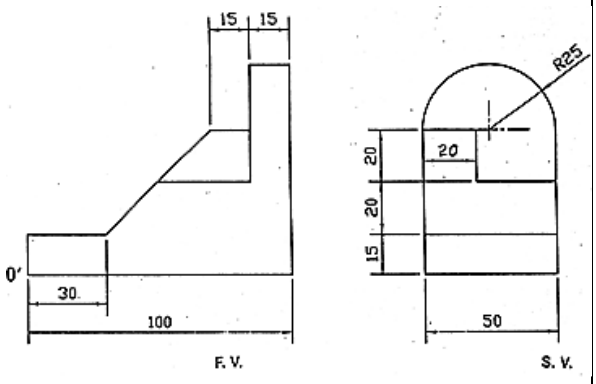



**16) Draw isometric view of the object.**

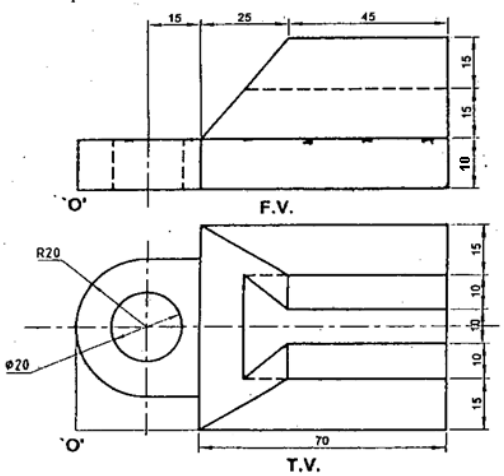



Front View Left Side View

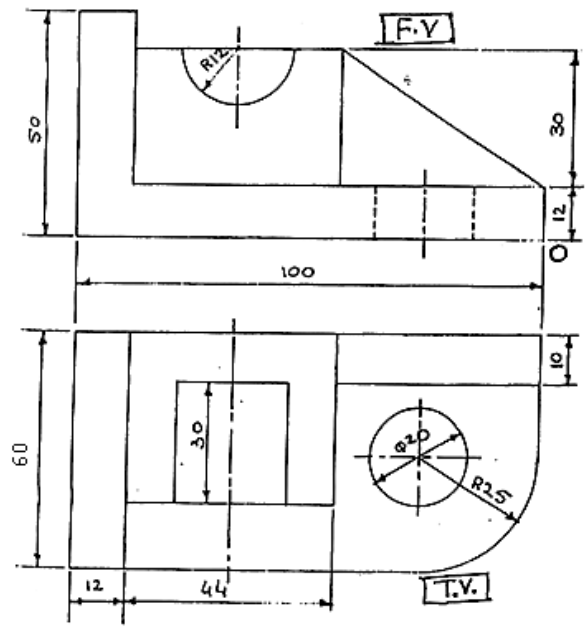
**17) Draw isometric view of the object.**



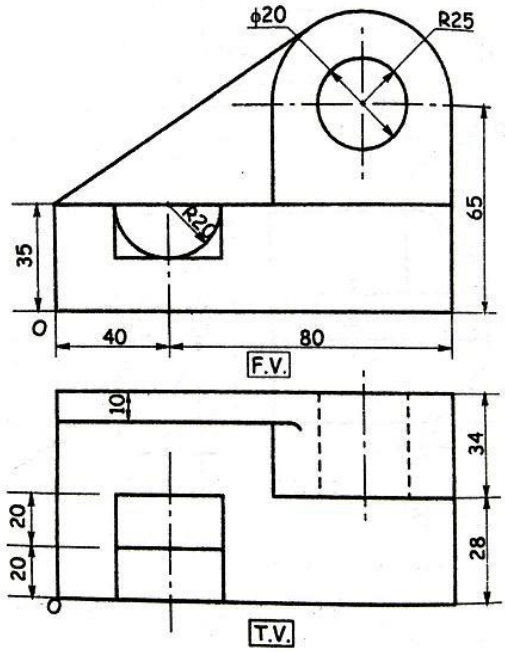

**18) Draw isometric view of the object.**



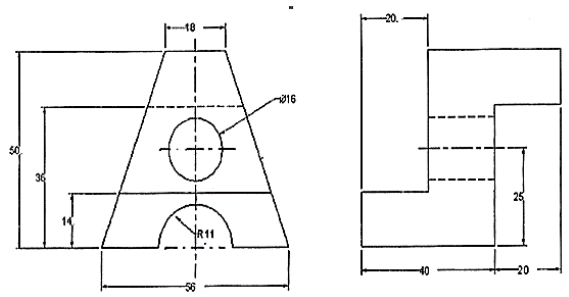
**19) Draw isometric view of the object.**



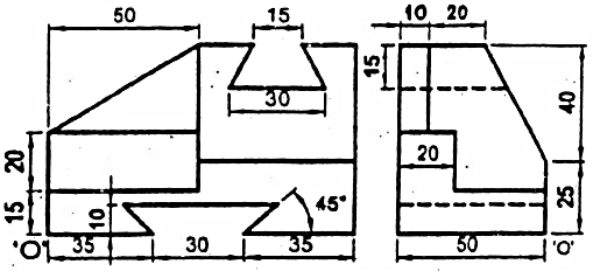

**20) Draw isometric view of the object.**



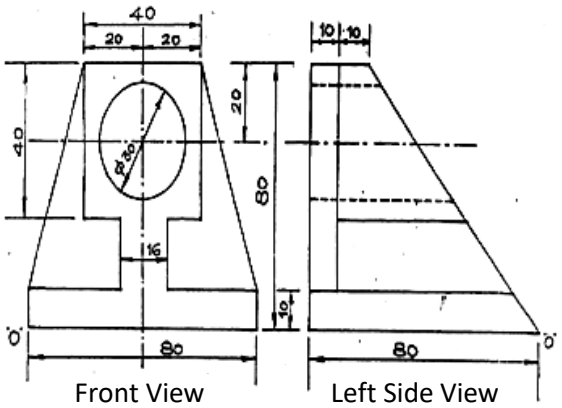

**21) Draw isometric view of the object.**



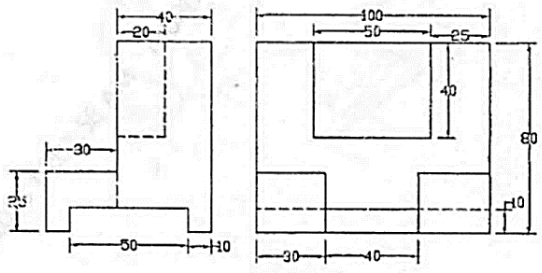

**22) Draw isometric view of the object.**



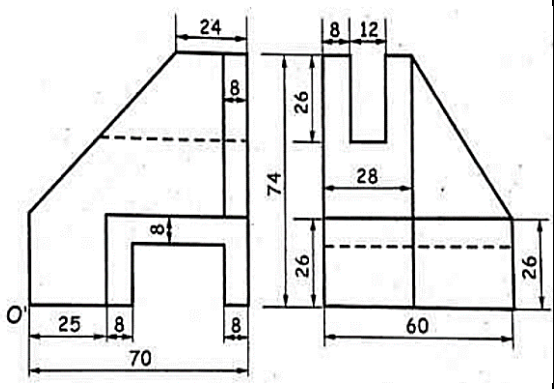

**23) Draw isometric view of the object.**



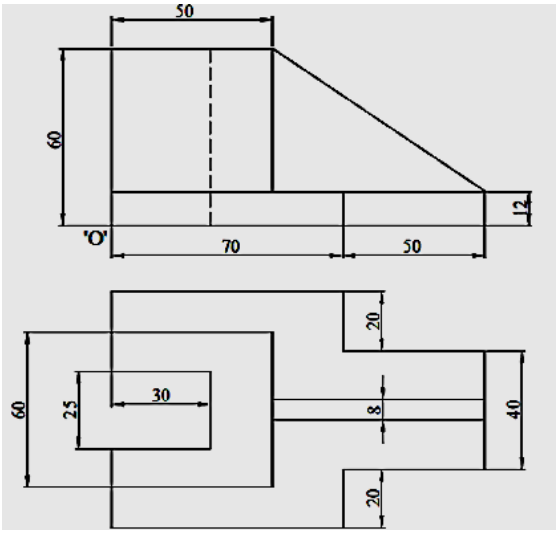

**24) Draw isometric view of the object.**



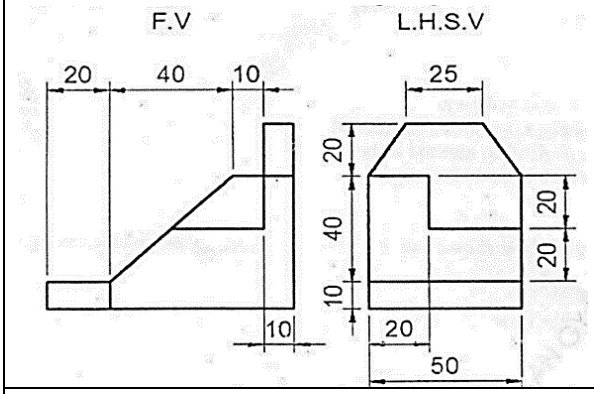
**25) Draw isometric view of the object.**



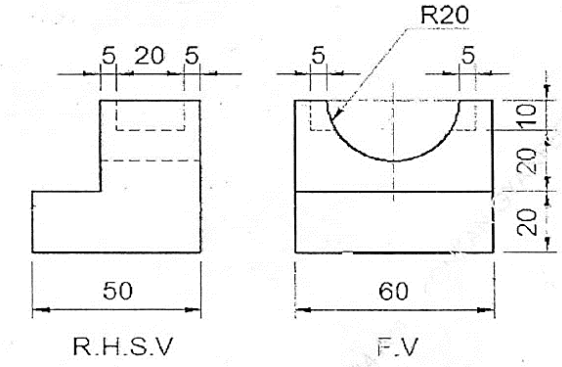

**26) Draw isometric view of the object.**



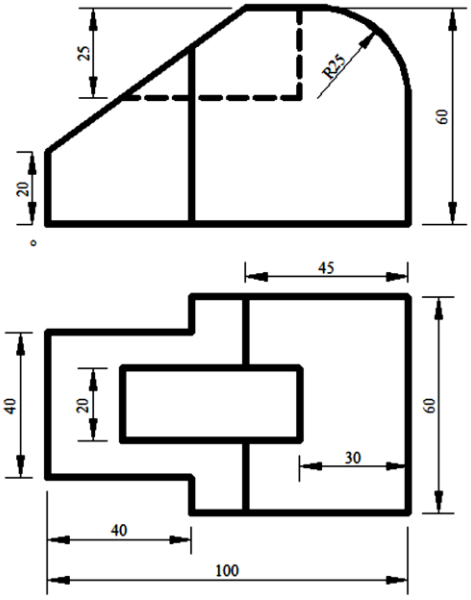

**27) Draw isometric view of the object.**



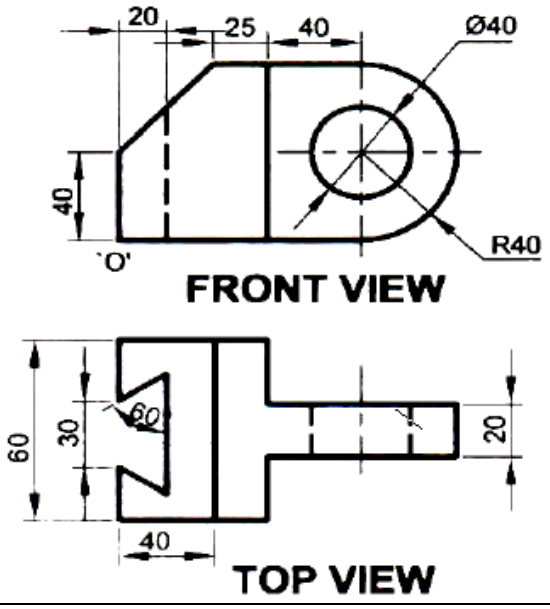

**28) Draw isometric view of the object.**



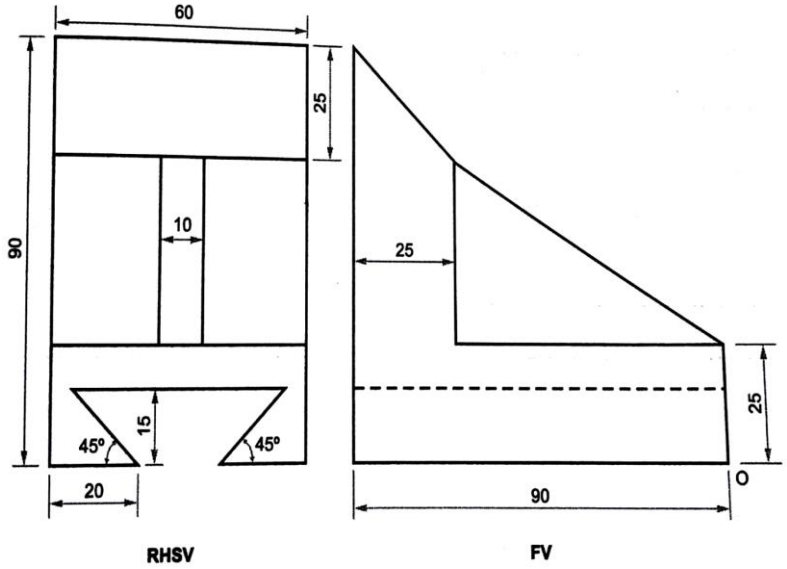

**29) Front view and top view of an object is shown in figure, draw an Isometric View.**



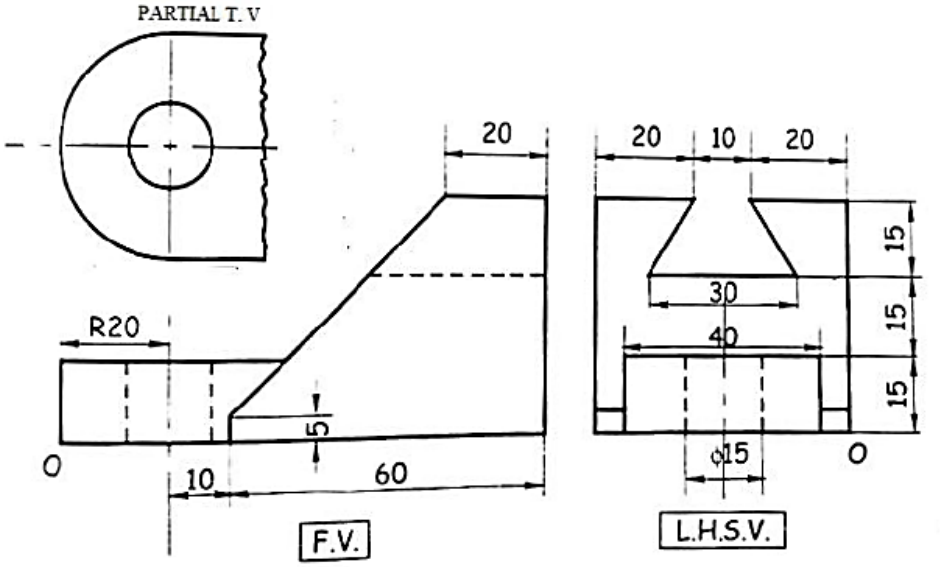

**30) Front view and Top view of an object is shown in figure, draw an Isometric View.**



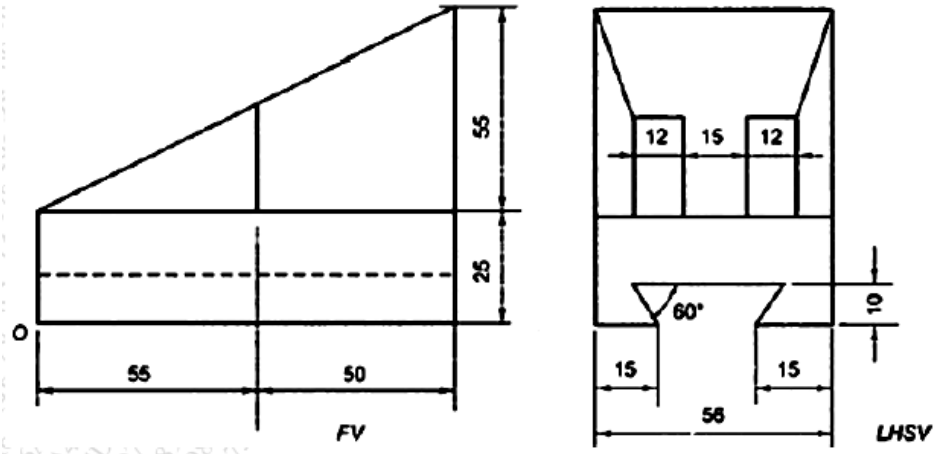
**31) Draw isometric view of the object.**



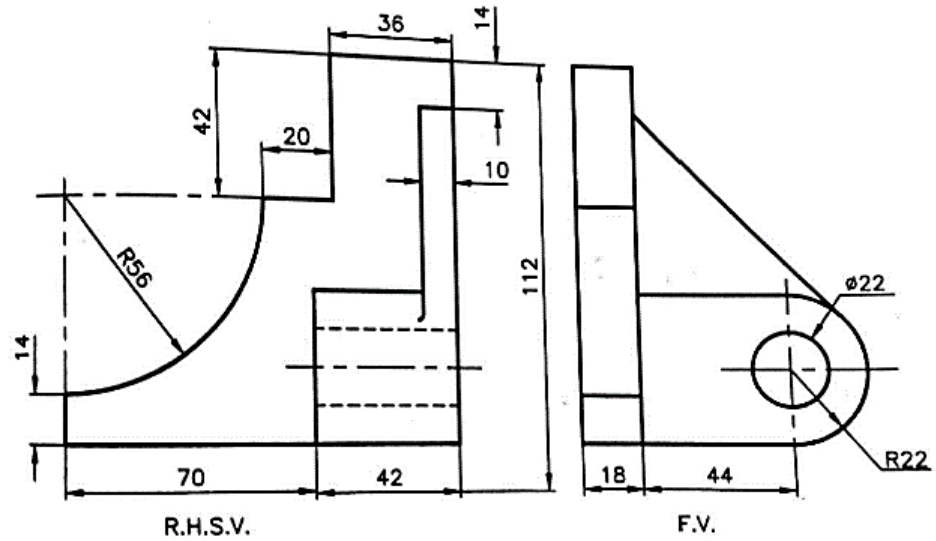

**32) Draw isometric view of the object.**



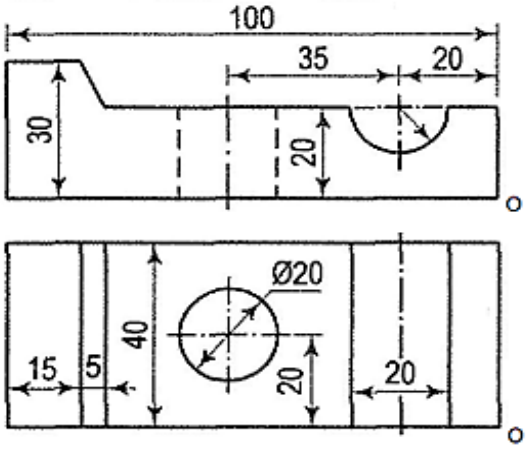

**33) Draw isometric view of the object.**



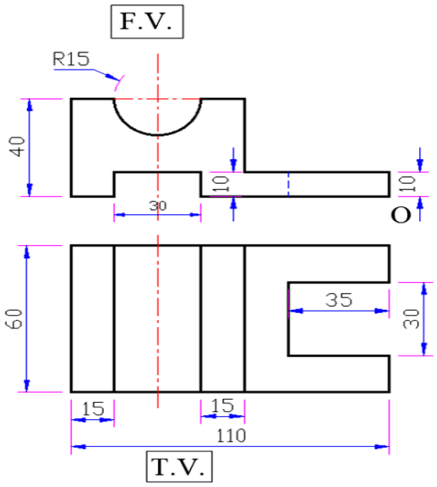
**34) Draw isometric view of the object.**



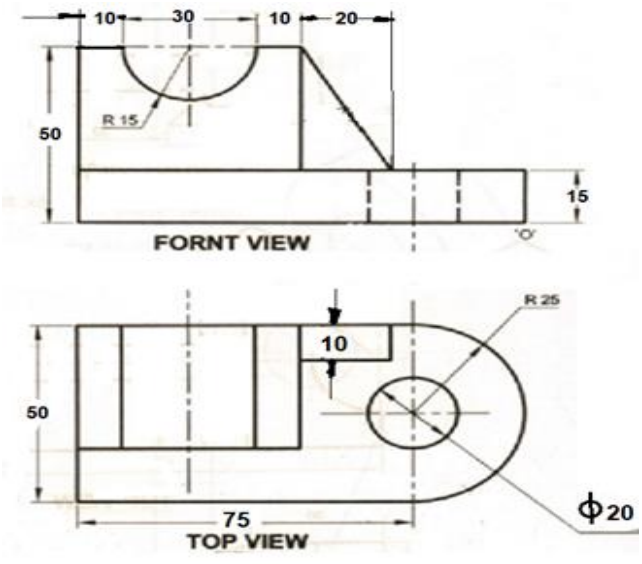

**35) Draw isometric view of the object.**




**36) Draw isometric view of the object.**




**37) Draw isometric view of the object.**



# Projection of Lines

1) A line AB measuring 70 mm has its end A 20 mm above H.P. and 15 mm in front of V.P. The end B is 50 mm above HP and 60 mm in front of VP. Draw the projections of the line AB and find its inclination with H.P. and V.P.
2) A line AB has its end point A 16 mm above the HP and 25 mm in front of the VP. The length of the line in the plan is 60 mm and length of the elevation is 65 mm. Distance between the projectors of end points A and B is 45 mm. Draw projections of line. Also find true length and true inclinations of line.
3) The top view and the front view of a line AB measures 70 mm and 58 mm respectively. The line AB is inclined at an angle of $35^0$ to the HP. The end A is 15 mm above the HP and 12 mm in front of the VP. The other end B is also in the first quadrant. Draw the projections of line AB and find its true length and true inclination with the VP.
4) Line AB 70 mm long is inclined $30^0$ to H.P and $60^0$ to VP. Its end A is 10mm above and 20mm in front of V.P., while its end B is in third quadrant. Draw the projections of line AB.
5) The FV of 85 mm long straight-line AB measures 60 mm while its TV measures 70 mm. Draw the projections of AB if its end A is 10 mm above the HP & 20 mm in front of the VP while its end B is in the first quadrant. Determine the inclination of the line AB with the reference plane.
6) The end P of a line PQ, 120 mm long is in $II^{nd}$ quadrant and 20 mm from both the reference planes. End Q is in $III^{rd}$ quadrant. The line is inclined at 30° with H.P. and the distance between the end projectors measured parallel to XY line is 80 mm.
7) Line AB 70 mm long is inclined 30° to HP and 60° to VP. Its end A is 10 mm above HP and 20 mm in front of VP, while its end B is in $3^{rd}$ Quadrant. Draw projections of line AB.
8) Draw the projections of a line AB 90 mm long. Its midpoint M being 50 mm above the H.P. and 40 mm in front of the V.P. The end A is 20 mm above the H.P. and 10 mm in front of the V.P. Show the inclinations of the line with H.P. and the V.P.

# Projection of Solids

1) A square pyramid, 40 mm base sides and axis 60 mm long, has a triangular face on the ground and the vertical plane containing the axis makes an angle of $45^0$ with the VP. Draw its projections. Take apex nearer to VP.
2) A pentagonal pyramid side of base 30 mm, axis height 65 mm has one of the base corner in the V.P. and triangular face apposite to this base corner inclined to the V.P. at 30 degrees. Draw the projections of a pyramid if the side of the base contained by a triangular face which is opposite to the corner is inclined to the H.P. at 30 degrees and apex nearer to the observer.
3) A regular pentagonal pyramid with the sides of its base 30 mm and height 80 mm rests on an edge of base. The base is tilted until its apex is 50 mm above the level of the edge of the base on which it rests. Draw the projection of the pyramid when the edge, on which it rests, is parallel to the V.P. and the apex of the pyramid points towards V.P.
4) A hexagonal pyramid, side of base 30 mm and axis length 65 mm is kept on HP on one of its base edges in such a way that the triangular face containing that base edge is perpendicular to HP. Draw its projection if that triangular face is parallel to VP and nearer to it.
5) A Cylinder of diameter 45 mm is resting on its base rim in the VP and its axis is inclined at 35° to the VP and parallel to HP. Draw its projections if its axis height is 65mm.
6) A right circular cylinder with 40 mm diameter of its base and axis measuring 60 mm has its axis is inclined to 300 to V.P. Draw the projections of the cylinder when the solid is resting on one of the points of the circumference of the base on V.P.
7) A square pyramid of base edge 30 mm and the height 60 mm is resting on HP on its triangular face such that the square face edge on HP is inclined $30^0$ to VP. Draw its projections.
8) A cone, base 50 mm diameter and axis 60 mm long rests on its circular rim on the HP. with the axis making an angle of 30 degree with the H.P. and its top view making an angle of 45 degree with the V.P. Draw its projections if apex is nearer to observer.
9) A cone, diameter of base 60 mm and height 70 mm has one of the generators in the HP and the plane containing the axis and that generator makes an angle $45^0$ with VP. Draw the projections of the cone when the apex is away from the observer.
10) A cone base diameter 50 mm, axis length 75 mm has its vertex in H.P. & V.P. Its axis being inclined at 300 to H.P. and 600 to V.P. Draw its projections.
11) A cylinder of 40 mm diameter and axis 60 mm long has a point on its rim of base in V.P. its axis is inclined at $30^0$ to V.P. Draw its projections.
12) A cylindrical block of base diameter 80 mm and height 50 mm is resting on one of the base point on H.P. with axis inclined at $60^0$ to H.P. Draw its projections.
13) A pentagonal prism of 40 mm edge of base and 70 mm length of axis is having an edge of base in the HP and the rectangular face containing that edge is inclined $30^0$ to HP and perpendicular to VP. Draw the projections.
14) A hexagonal prism with edge of bars 30 mm and height 70 mm has its edge of base in the VP and the base surface is inclined at $30^0$ to VP and perpendicular to HP. Draw its projections.

# Section of Solids

1) A hexagonal pyramid, base 30 mm side and axis 65 mm long is resting on its base on the HP, with two edges of the base parallel to the VP. It is cut by a section plane perpendicular to VP and inclined at 45º to the HP, intersecting the axis at a point 25 mm above the base. Draw the front view, sectional top view, sectional side view and true shape of the section.
2) A cone base 60 mm diameter and axis 60mm long is lying on the H.P. on one of its generators with the axis parallel to V.P. A vertical section plane parallel to the generator cuts the cone in such a way that the cutting plane bisects the axis and removing a portion containing the apex. Draw its sectional front view and the true shape of the section.
3) A solid cylinder with 40 mm diameter of base and 80 mm height is resting on the ground with the axis making $60^0$ with the ground. It is cut by a section plane such that the true shape of the section is an ellipse of major axis 70 mm and minor axis 40 mm. Draw sectional top view and true shape of section.
4) A horizontal pentagonal prism, side of base 32 mm and axis 70 mm long has its rectangular face on H.P. Its axis is parallel to H.P. and perpendicular to V.P. A cutting plane, perpendicular to H.P. but at 45° to V.P. cuts its axis at a point 20 mm from the centre of base. Draw its sectional front view, top view, sectional side view and true shape of section.
5) A vertical pentagonal pyramid, side of base 36 mm and axis 75 mm long rests on its base on the H.P. with one side of the base parallel to V.P. and away from V.P. A cutting plane, perpendicular to H.P. and inclined at 30° to V.P. cuts the pentagonal pyramid. The cutting plane is 16 mm away from the axis of pyramid. Select the cutting plane in such a way that larger portion of the pentagonal pyramid is retained. Draw the sectional front view, sectional side view and top view of the pentagonal pyramid.
6) A cone base 70 mm diameter and axis 90 mm long is resting on its base on the H.P. It is cut by a section plane perpendicular to the V.P. and parallel to and 15 mm away from one of its end generators. Draw front view, sectional top view, sectional side view and true shape of section. Name the shape of true shape of section.
7) A hexagonal pyramid of 25 mm edges of the base axis 50 mm long is resting on one of its triangular faces in HP with the axis parallel to the VP. It is cut by a section plane perpendicular to the HP, inclined at $30^0$ to the VP and passing through a point P on the axis, 20 mm from the base. Draw Top View, sectional front view and true shape of the section when apex is removed.
8) A cone of 60 mm diameter and 75 mm axis height rests on the ground on one of its generators so that the axis is parallel to the VP. It is cut by a section plane perpendicular to the HP, inclined at $30^0$ to the VP and bisecting the axis. Draw the sectional front view top view and the true shape of the section.
9) A pentagonal pyramid edge of base 40 mm long and height 75 mm is lying in the HP on the triangular face with an axis parallel to the VP. It is cut by the section plane perpendicular to the HP, inclined at $30^0$ to the VP and bisecting the axis of a pyramid. Draw the sectional front view, top view and true shape of a section of the pyramid when the apex is retained.