



VIT[®]

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Daniel Jose Blessy
25BB50040

Fall Semester
Computer Science and Business
System

T1 + TG1

PRP128

**SCHOOL OF
MECHANICAL
ENGINEERING**

**BAEEE101 - BASIC ENGINEERING
[MODULE - III]**

MODULE - III ENGINEERING GRAPHICS & CAD - WORK BOOK

FALL SEMESTER 2025 - 26



CONTENTS

S. No.	Topic	Page Number
1.	Introduction to Engineering Drawing	2
2.	Types of Lines	4
3.	Lettering Practice	7
4.	Drawing a Title Block	9
5.	Dimensioning Practice	10
6.	Orthographic projection of Simple Components	16
7.	Orthographic projection of Simple Components - Practice	20
8.	Projection of Solids in Simple Position	25
9.	Projection of Solids in Simple Position - Practice	27
10.	Isometric Projection of Solids	31
11.	Isometric Projection of Solids - Practice	32
12.	Free Hand Sketching	35

Introduction to Engineering Drawing

Have you ever wondered how the components we use in our daily lives—such as mobile phones, automobiles, kitchen appliances, or even simple tools like screwdrivers—are designed and manufactured with such precision? Imagine the countless components that come together to form a passenger car shown in Fig.1. Behind every physical object we see and use lies a blueprint. This blueprint is known as an **Engineering Drawing**, and it serves as the universal language of engineers. Whether it's a small machine part or a large industrial assembly, engineering drawings are essential for communicating the shape, size, material, and other specifications required for manufacturing a component.

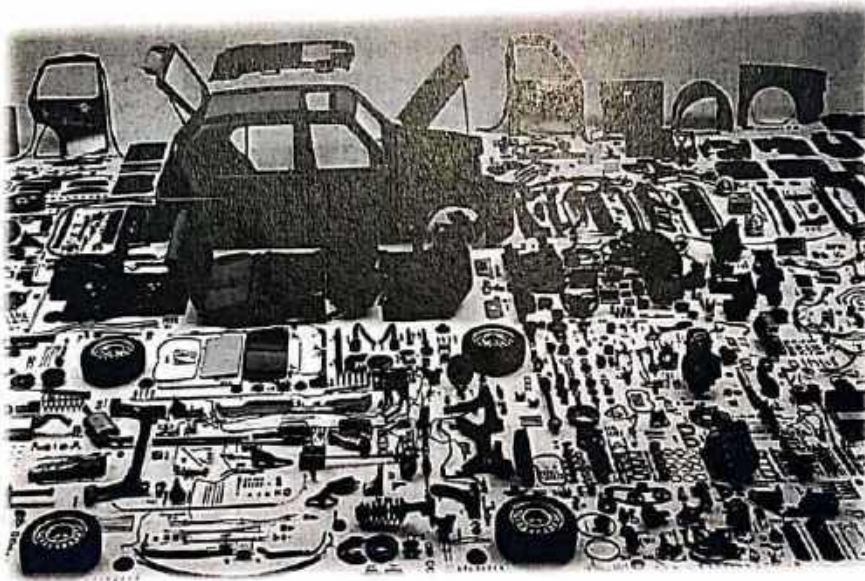


Fig.1. Parts of a Car

In both small-scale workshops and large multinational industries, it forms the backbone of the product development cycle. Without engineering drawings, it would be nearly impossible to replicate designs accurately or maintain consistency in production. A typical engineering drawing includes vital information such as **dimensions**, **tolerances**, and **surface finish** specifications. One of the most important features of an engineering drawing is the use of **orthographic projection**. Orthographic projection is a technique used to represent a three-dimensional object in two dimensions by projecting its features onto orthogonal planes. Typically, three standard views are used: the **front view**, **top view**, and

side view as shown in Fig.2. By interpreting these views, engineers and manufacturers can visualize the full shape of the object and understand how each feature relates spatially to others. In essence, engineering drawing is the bridge between imagination and reality.

Examples of Orthographic Projection

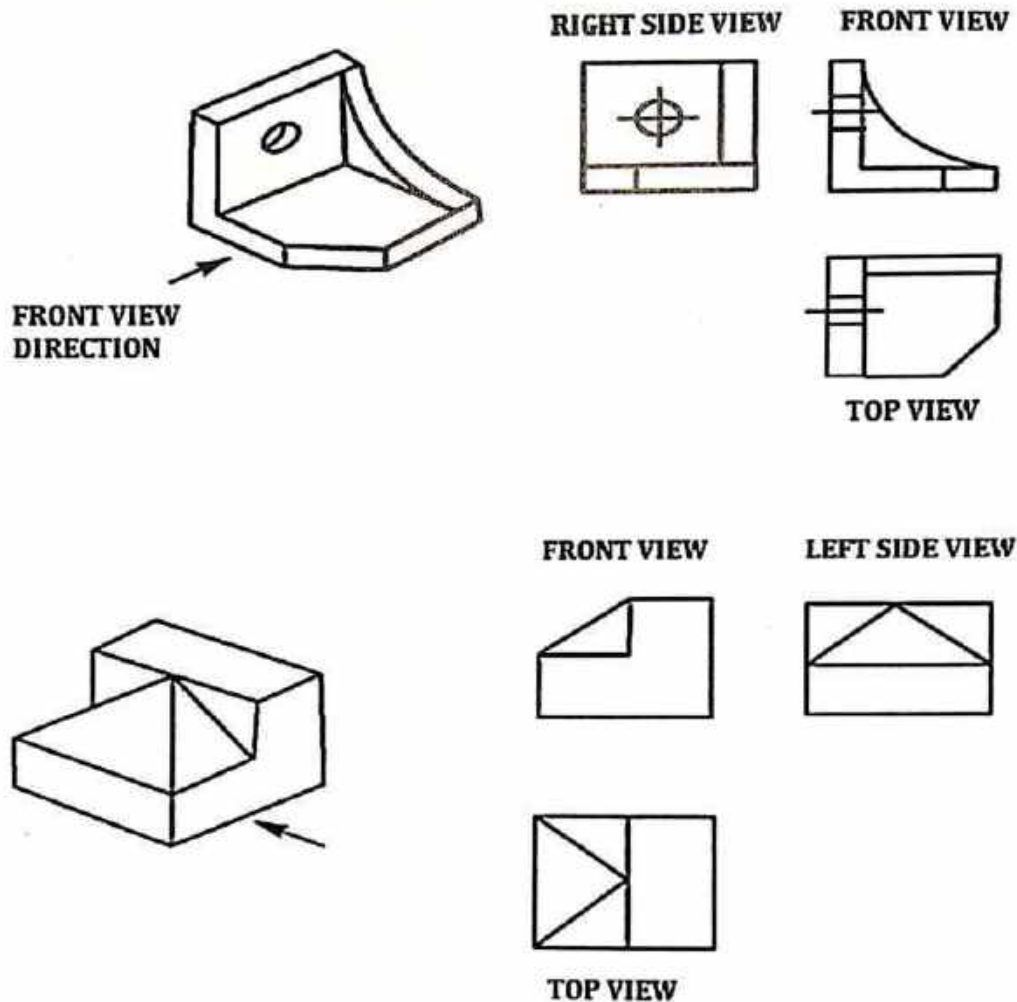
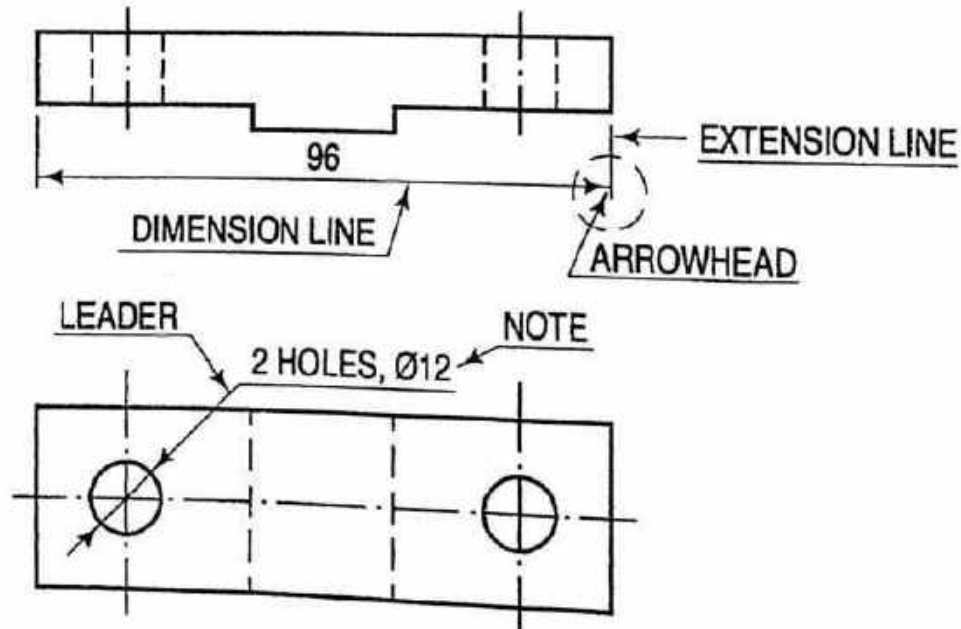


Fig.2. Orthographic Projection

TYPES OF LINES

Types of Lines	Applications	Representation
Continuous Thick Line	Object lines or visible edges	
Continuous Thin Line	Dimension line, Extension line, Projection line, Leader line, Reference line, Hatching line	
Dashed Thin Line	Hidden lines or edges	
Long Dashed Dotted Narrow Line	Centre line, lines of symmetry	
Continuous thin with zigzags	Long-break line	
Chain thin (narrow) with thick (wide) at the ends	Cutting planes	

Example:

Note: Arrowheads must be drawn in 3:1 ratio

Image Source: Engineering Drawing by N.D. Bhatt

1. Identify the types of lines in the below mentioned views and name them appropriately in the given table.

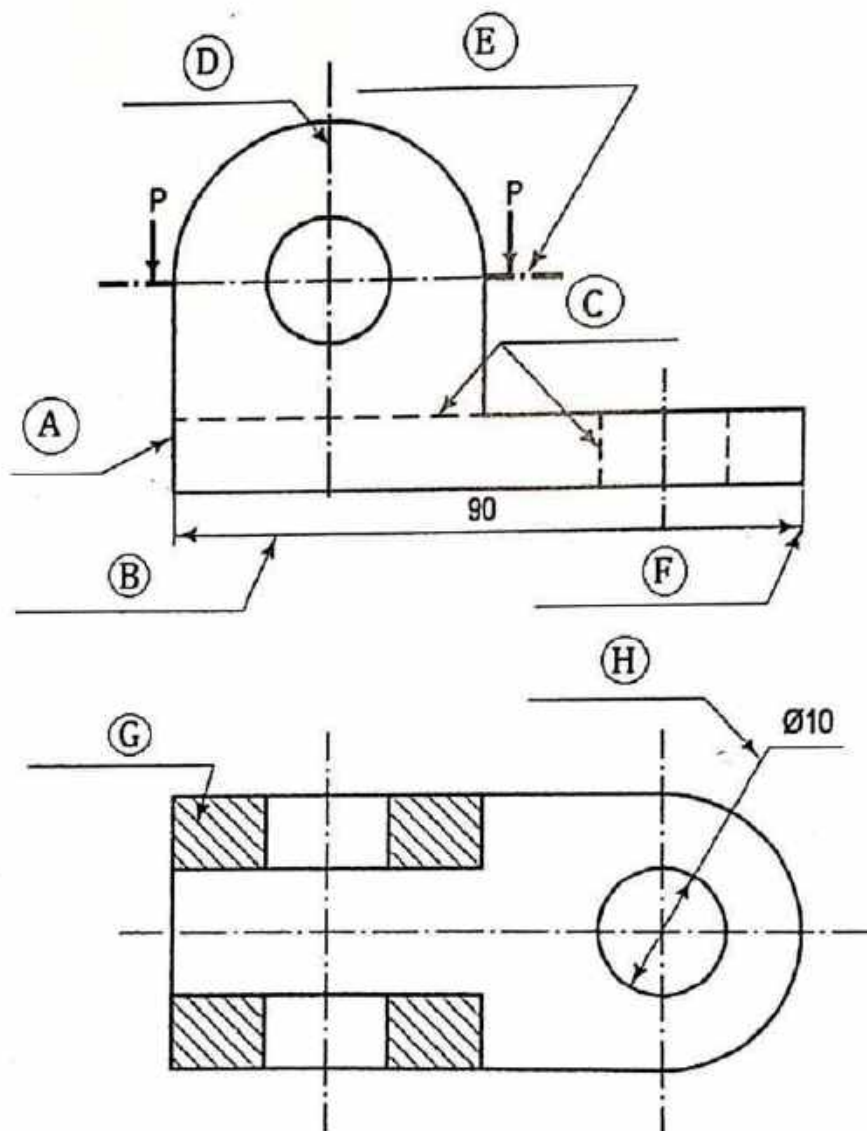








Image Source: Engineering Drawing by N.D.Bhatt

A	Continuous thick	E	Chained thin with thick
B	Continuous thin	F	Thin line
C	Dashed thin line	G	Section line
D	long dashed dotted	H	thin line

1. Draw different types of lines used on engineering drawing using appropriate pencils.

Types of Lines	Representation
Continuous Thick Line (HB)	
Continuous Thin Line (2H)	
Dashed Thin Line (2H)	
Long Dashed Dotted Narrow Line (2H)	
Continuous thin with zigzags (2H)	
Chain thin (narrow) with thick (wide) at the ends (HB and 2H)	

LETTERING PRACTICE

The marking of titles, subtitles, dimensions, and other textual information on a drawing sheet, in accordance with BIS guidelines, is termed as lettering.

Types of lettering	Heights of Letters
Title of Drawing	5 mm or 7 mm
Subtitle and headings like FRONT VIEW and TOP VIEW	3.5 mm or 5 mm
Notes, dimension figures	3.5 mm or 5 mm

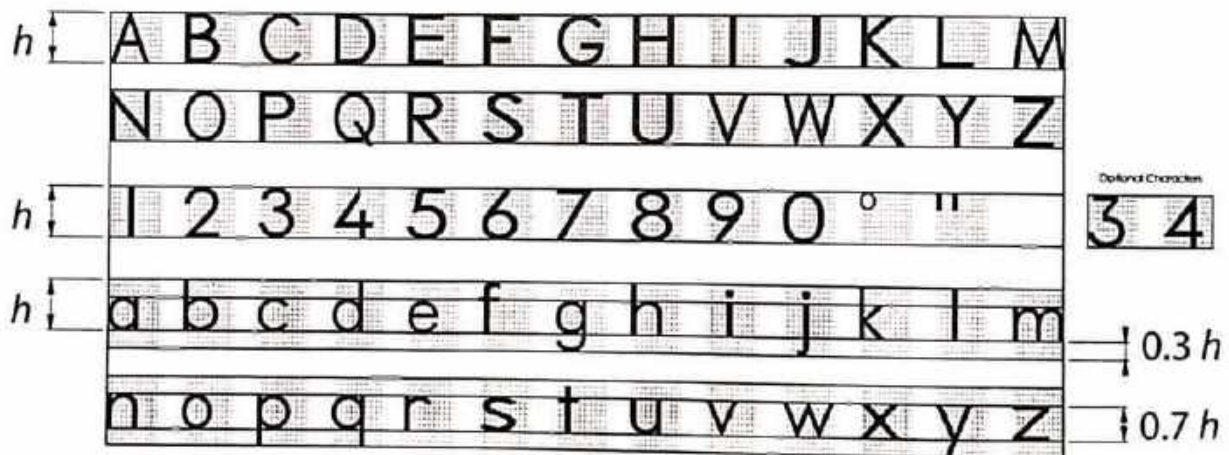


Image Source: Engineering Drawing by N.D.Bhatt

Draw guidelines at a height of 7 mm and 5 mm and write the following sentence in both upper case and lower case letters respectively.

"Engineering Drawing is the language of Engineers".

Upper case Lettering

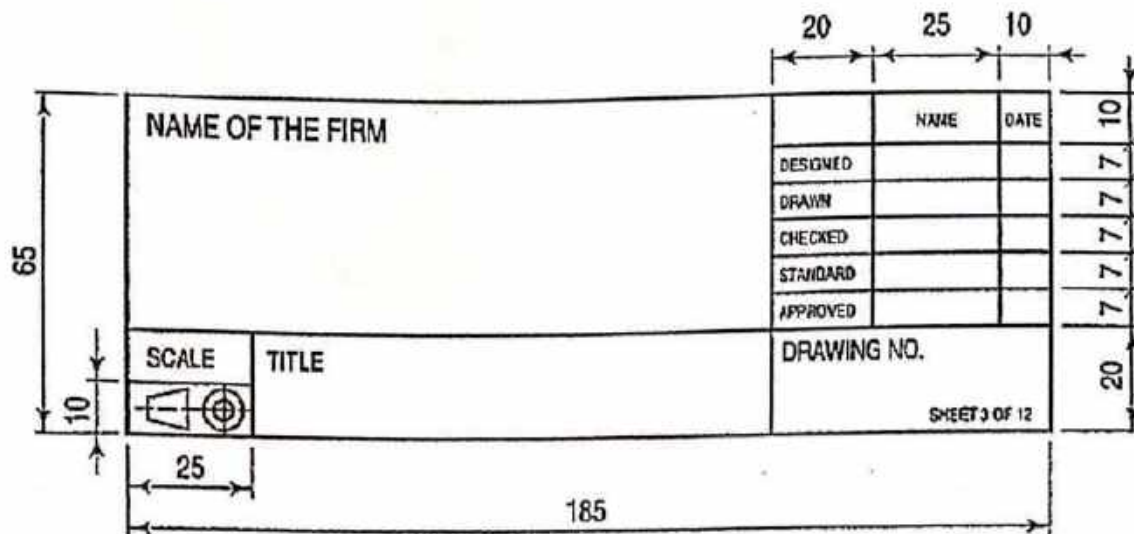
A B C D E F G H I J K L M N O P Q R S T U V
W X Y Z

ENGINEERING DRAWING IS
THE LANGUAGE OF ENGINEERS

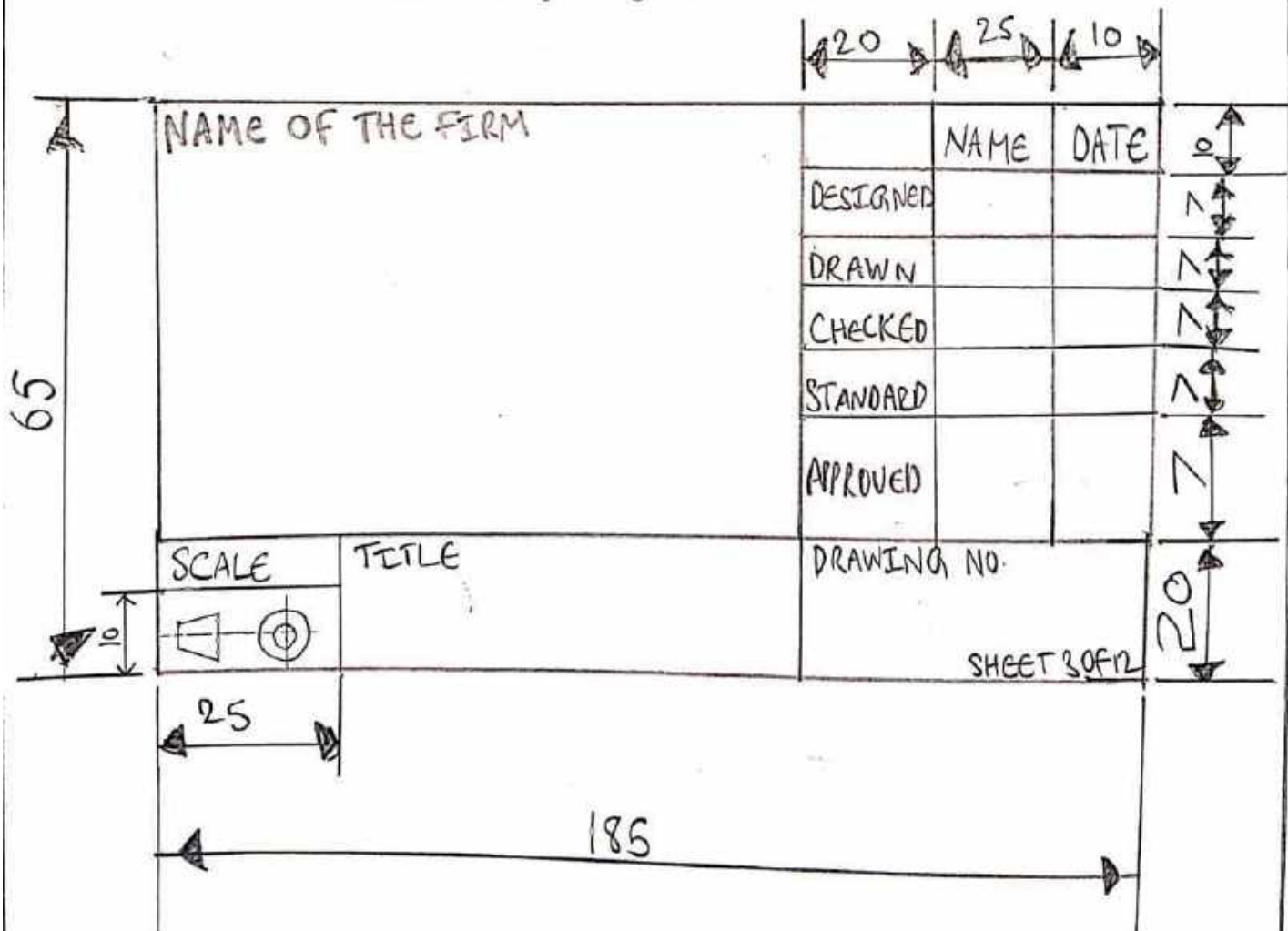
Lower case Lettering

engineering drawing is the
language of engineers.

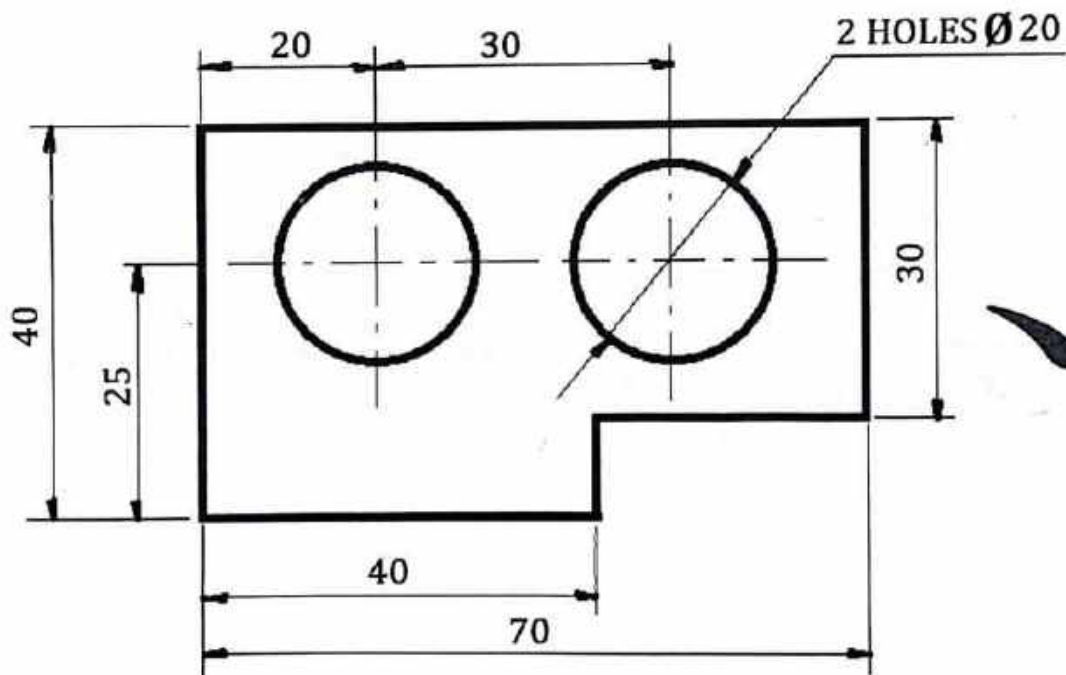
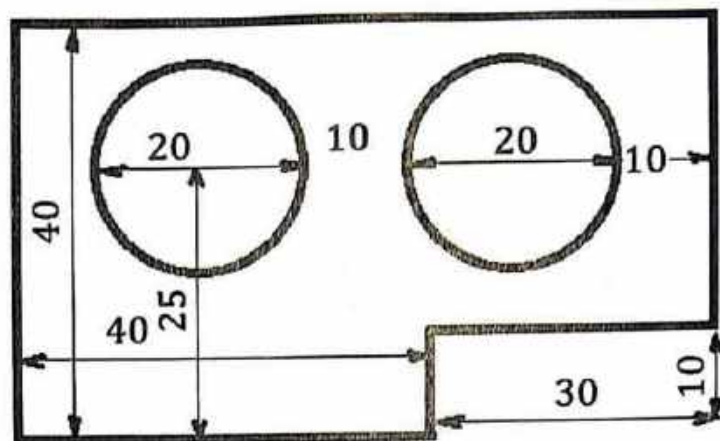
DRAWING A TITLE BLOCK



Redraw the Title Block shown above as per the given dimensions.

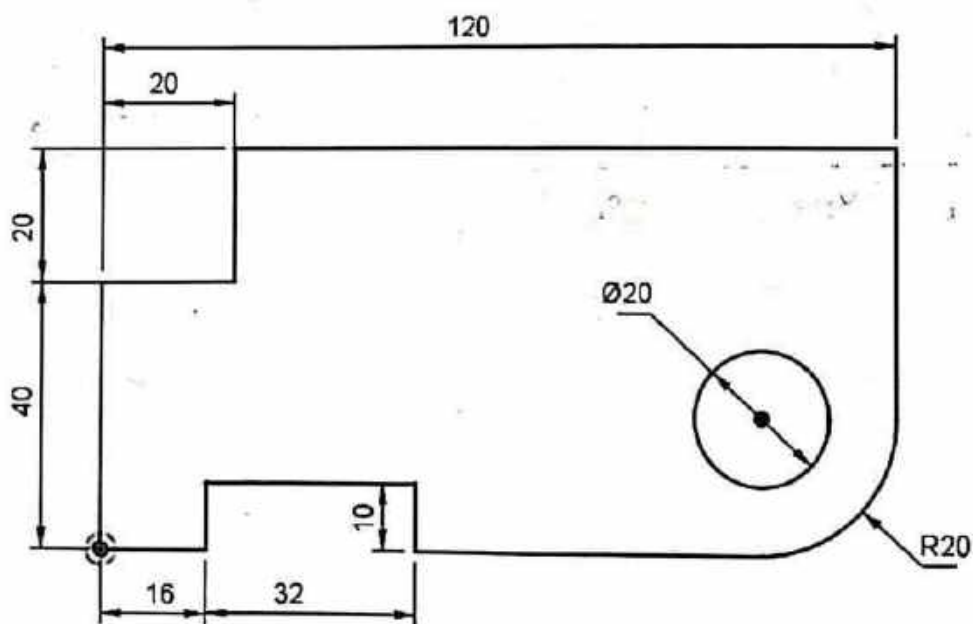
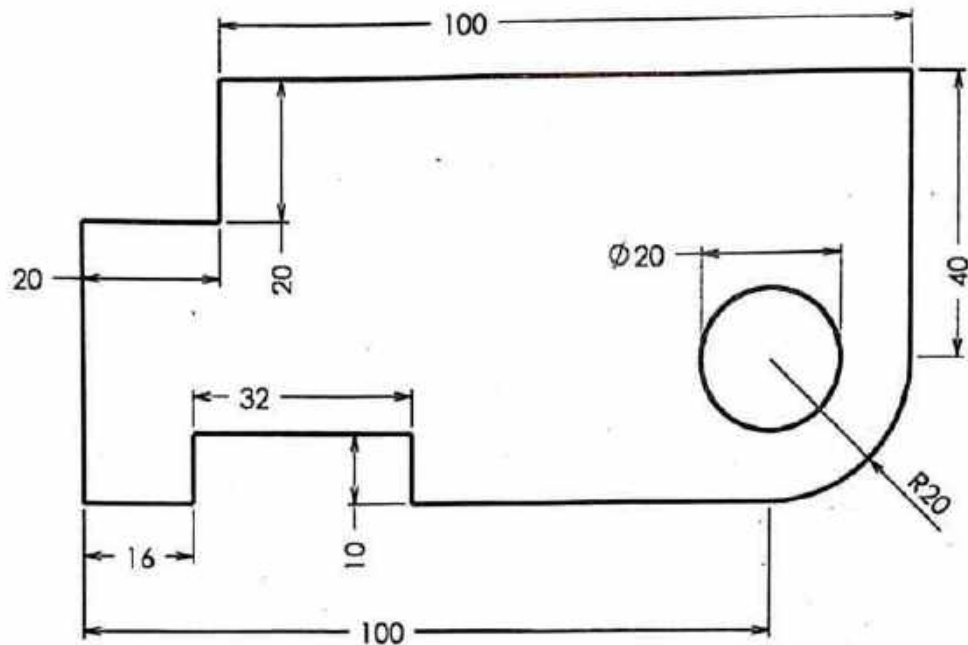


DIMENSIONING PRACTICE



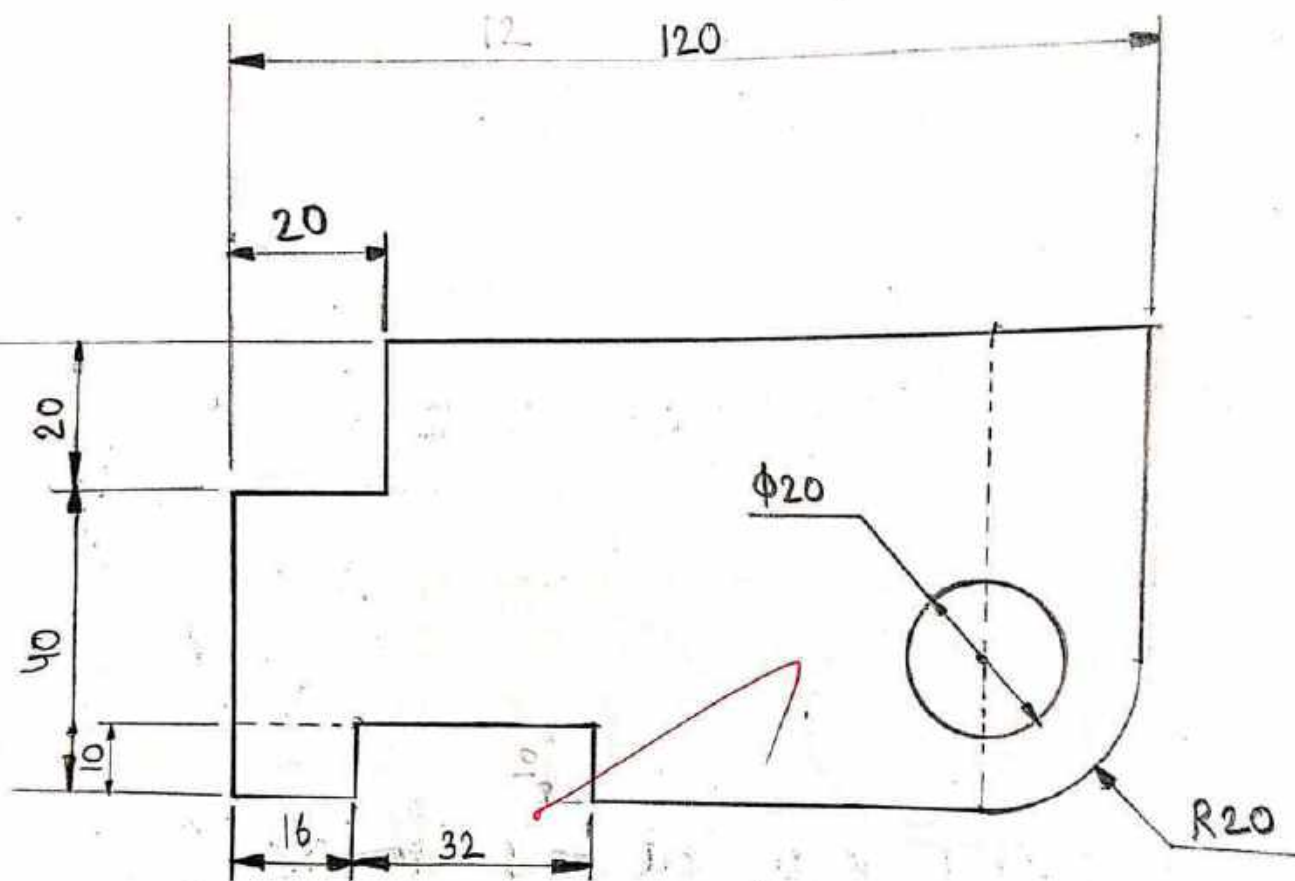
Fully Constrained Sketch

1. Identify the incorrect dimensioning practices in the given drawing. Redraw the 2D figure and apply all dimensions according to standard dimensioning conventions. All dimensions are in millimetres (mm).

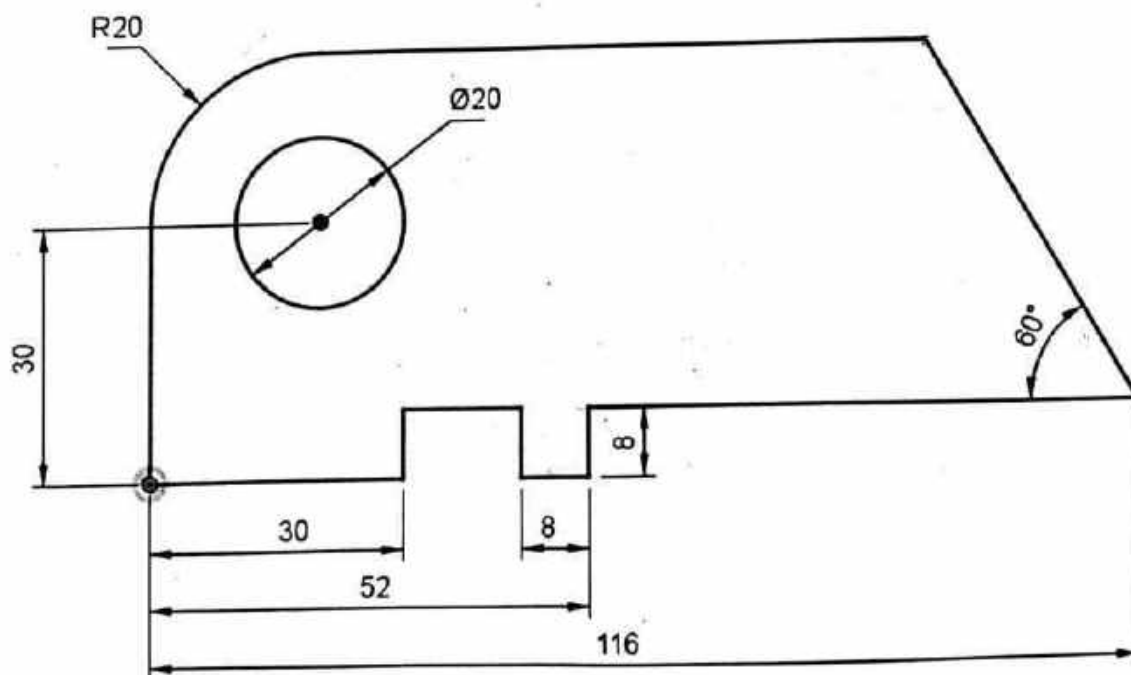
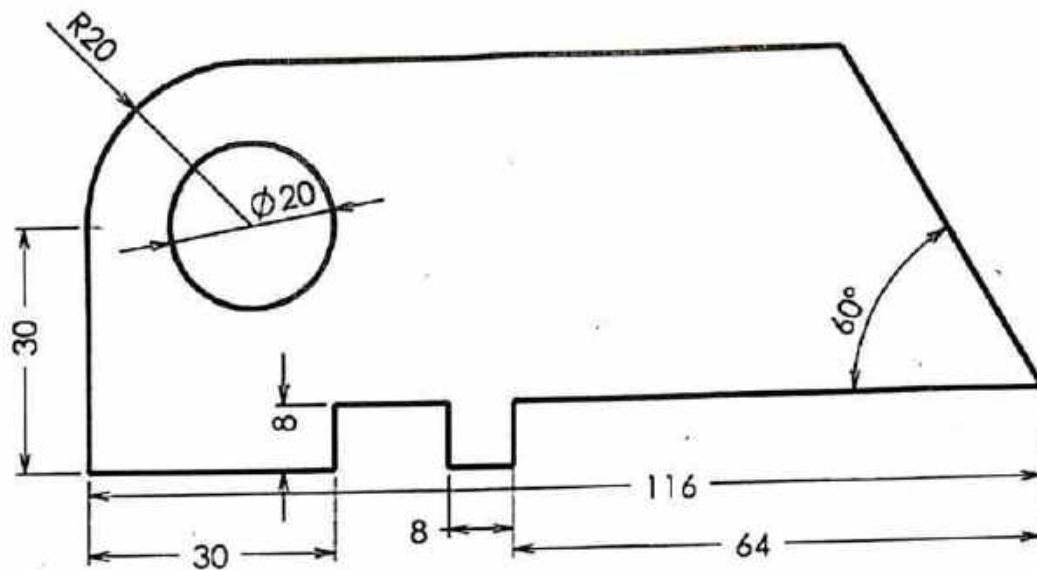


Fully Constrained Sketch

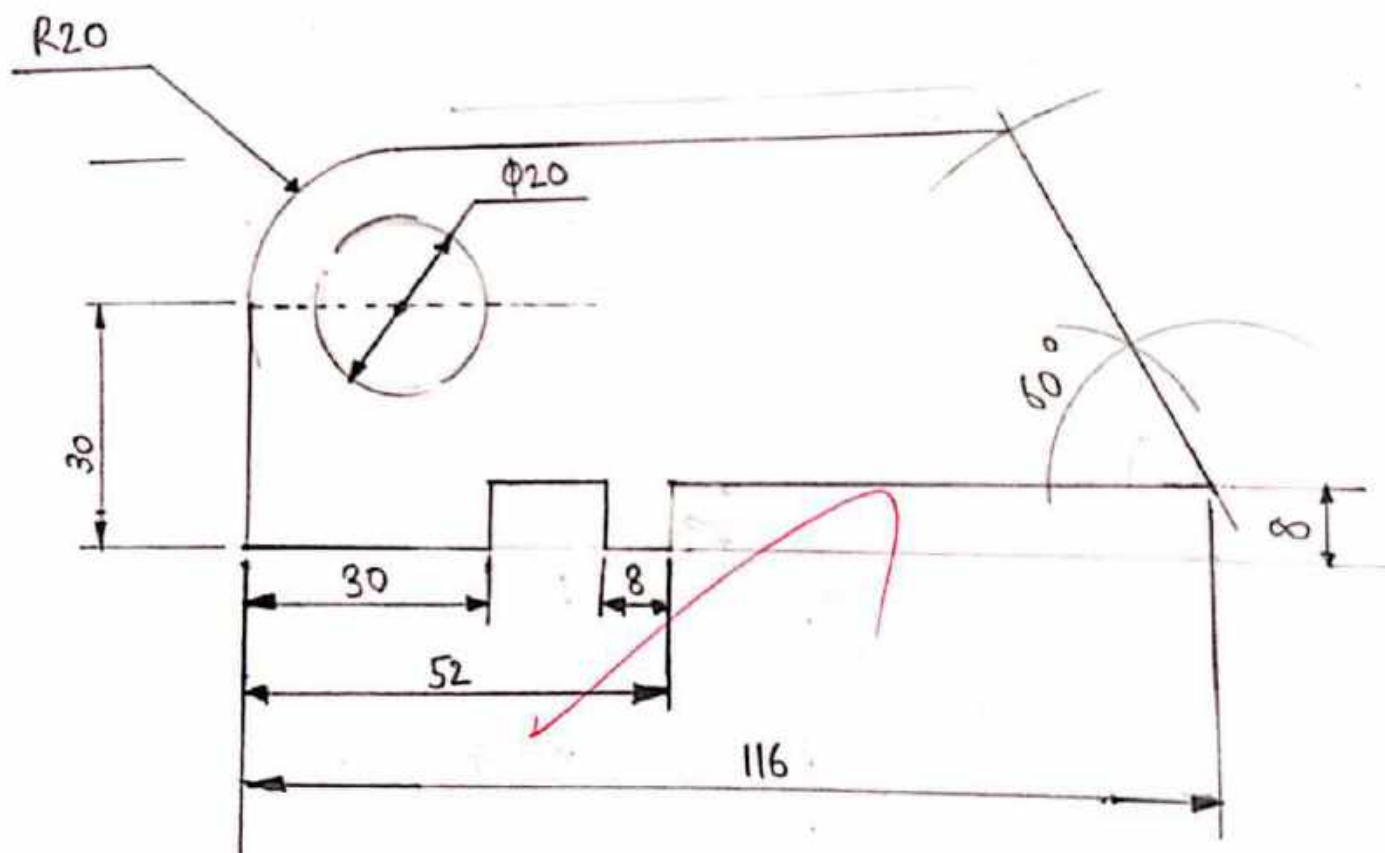
FULLY CONSTRAINT SKETCH



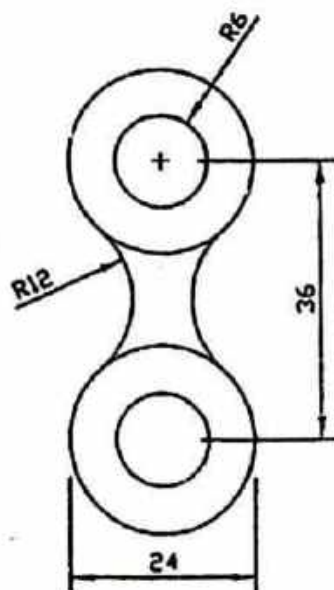
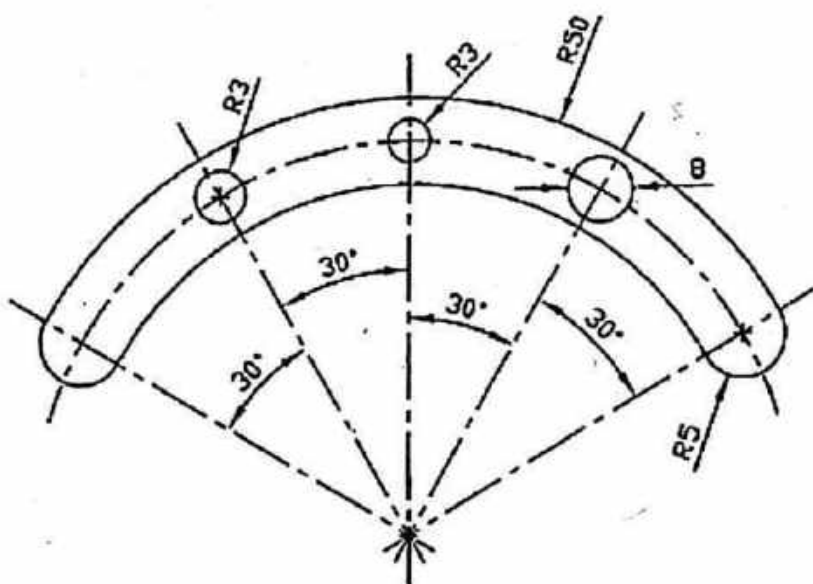
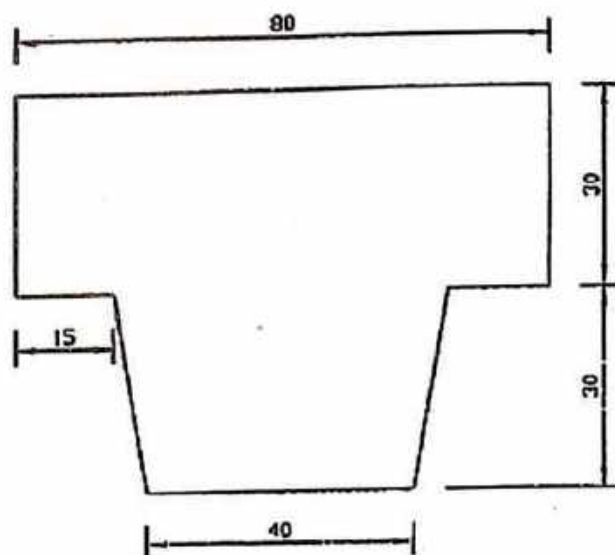
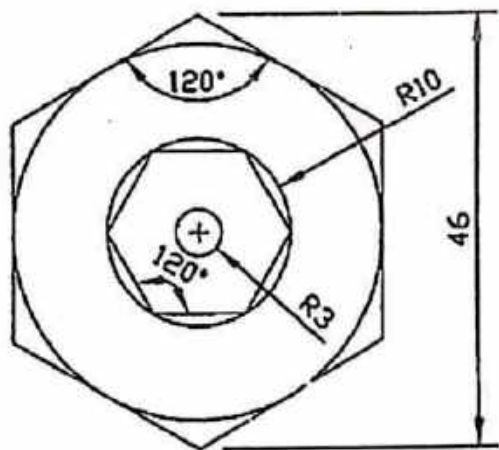
2. Identify the incorrect dimensioning practices in the given drawing. Redraw the 2D figure and apply all dimensions according to standard dimensioning conventions. All dimensions are in millimetres (mm).



Fully Constrained Sketch

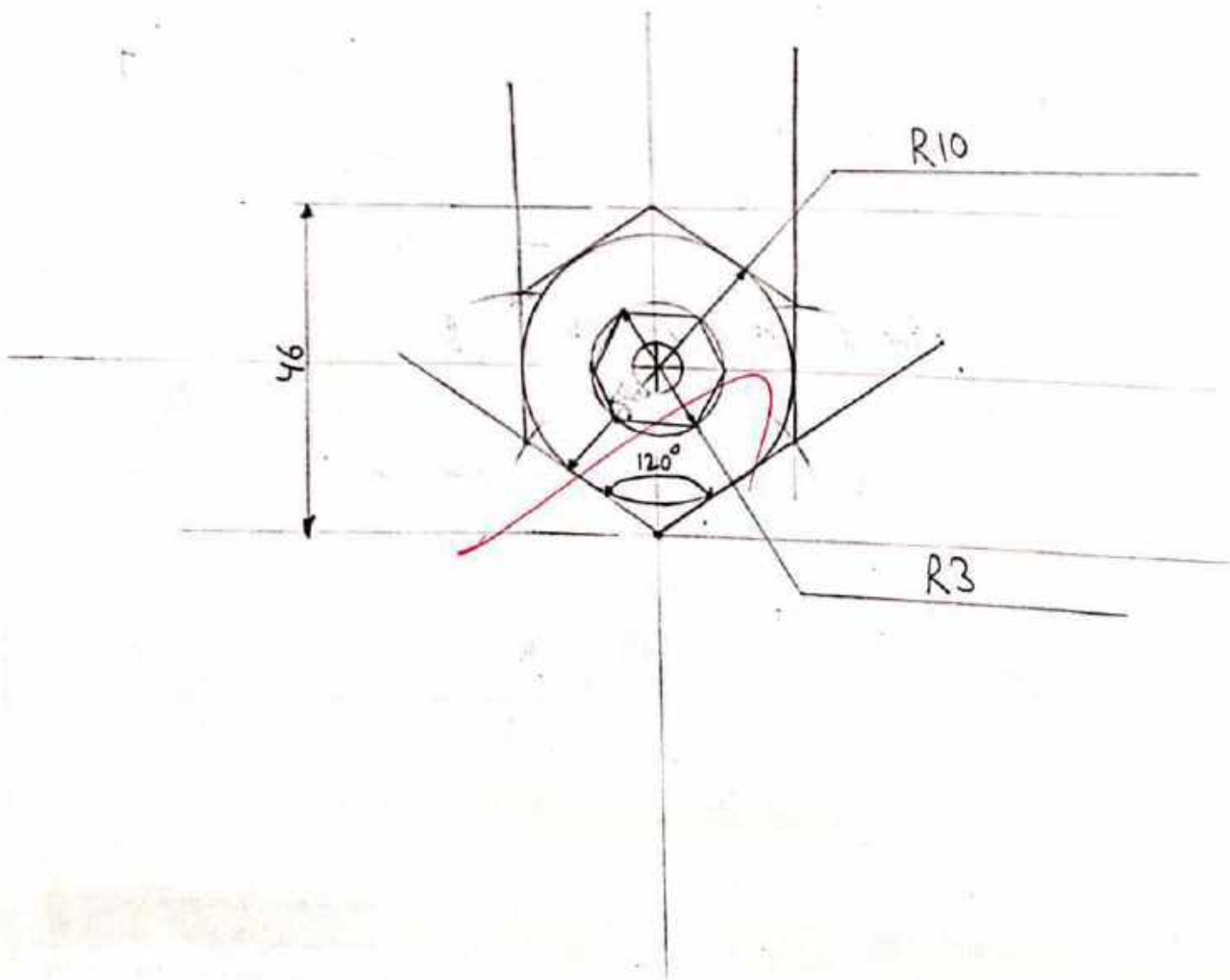


DIMENSIONING PRACTICE



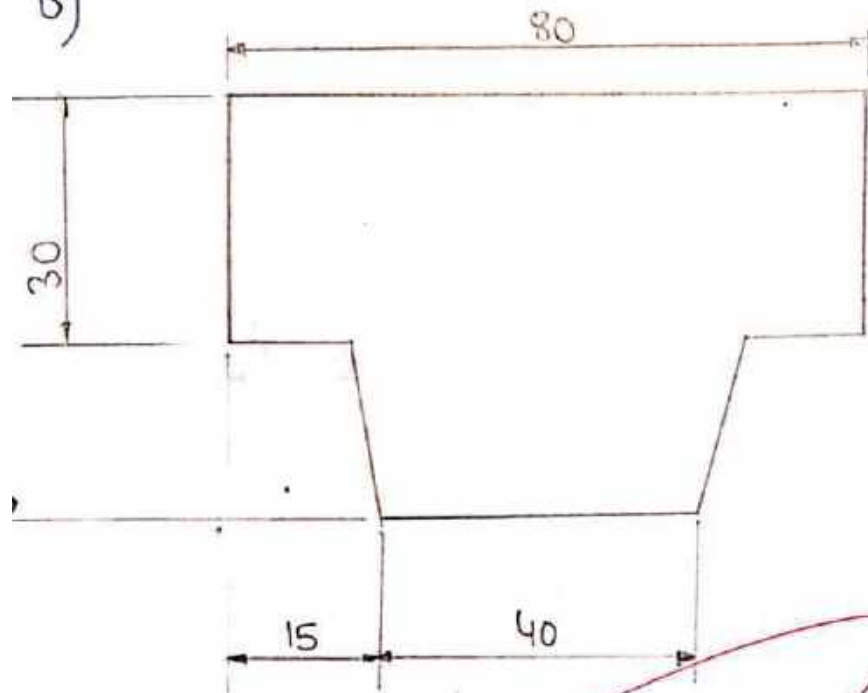
Dimensioning practice

a)

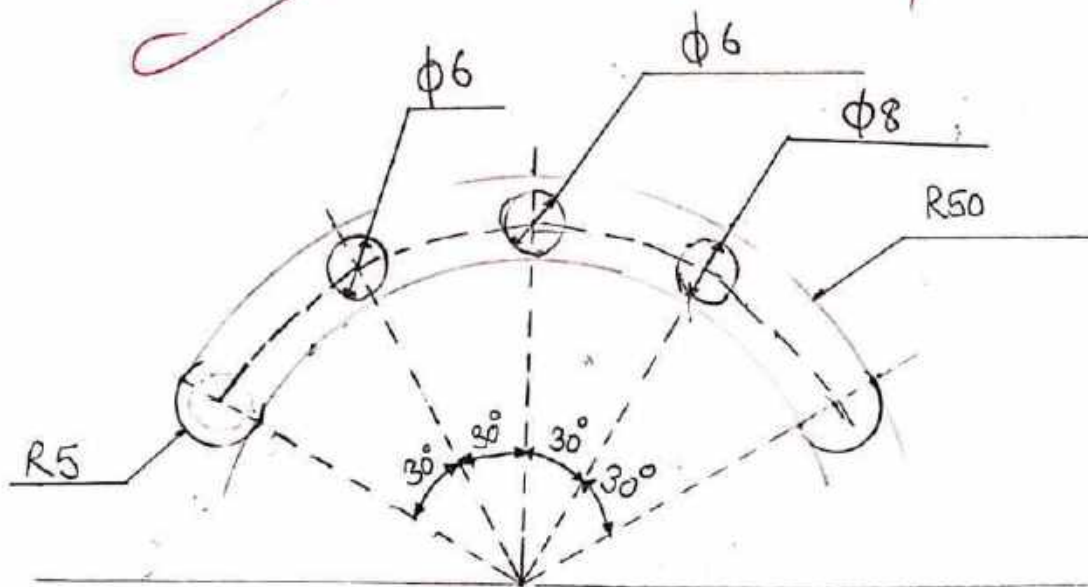


DIMENSIONING PRACTICE

b)

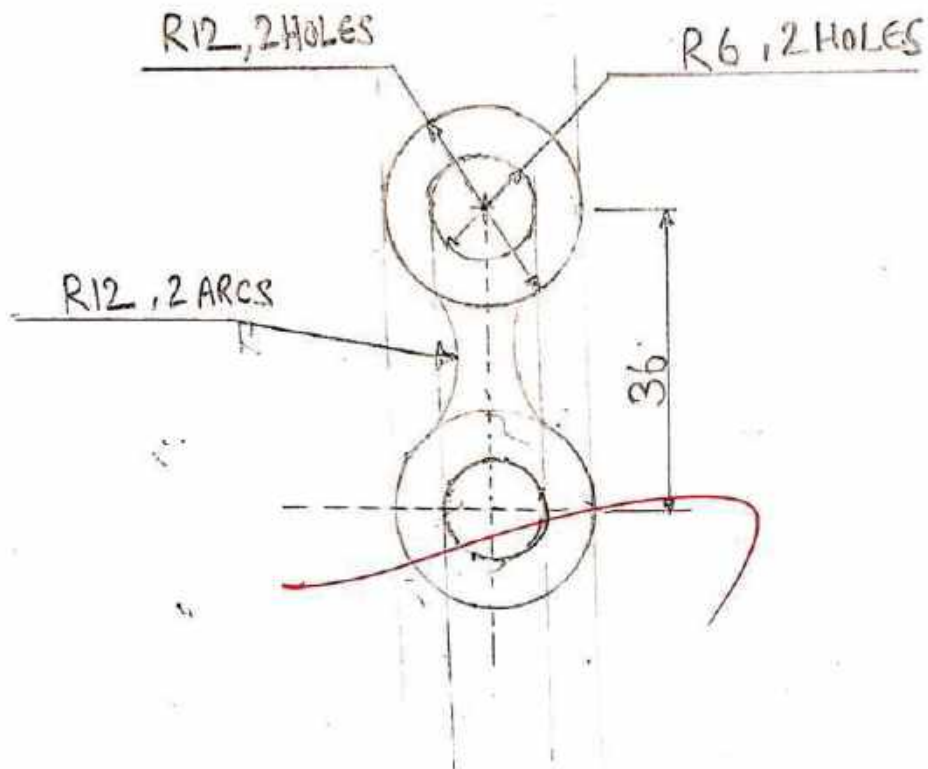


c)

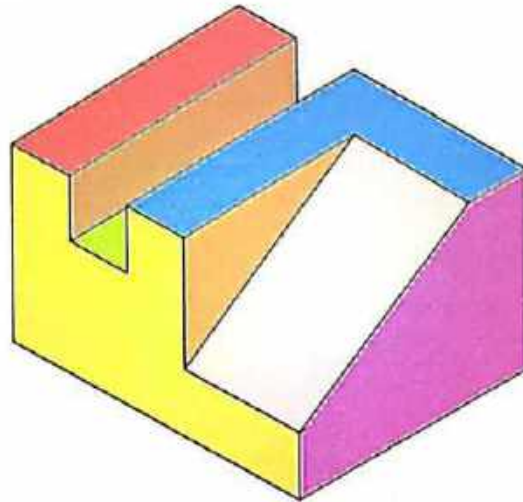
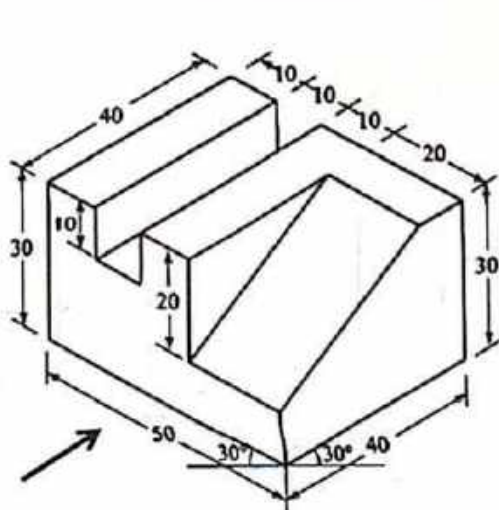


DIMENSIONING PRACTICE

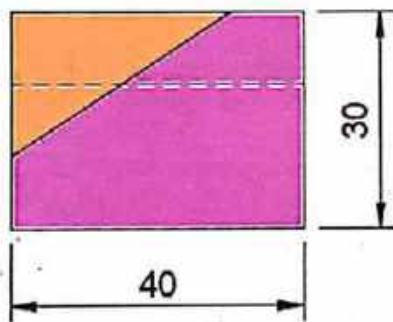
a)



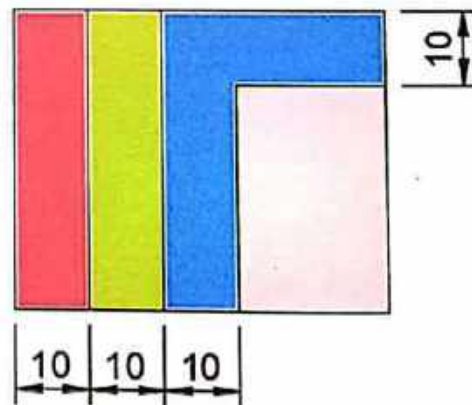
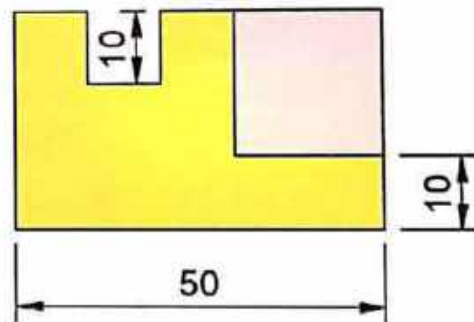
ORTHOGRAPHIC PROJECTION OF SIMPLE COMPONENTS



RIGHT SIDE VIEW

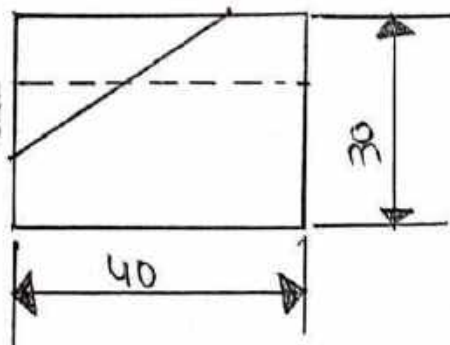


FRONT VIEW

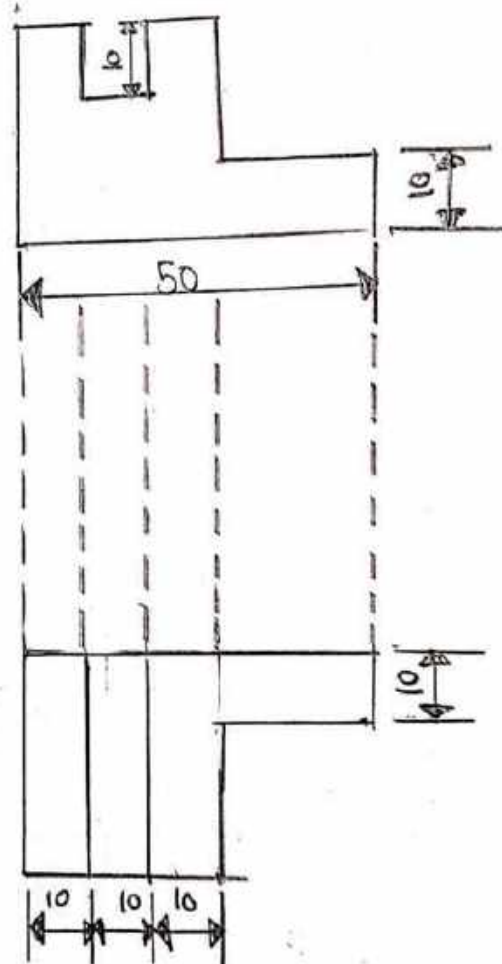


TOP VIEW

RIGHT SIDE
VIEW

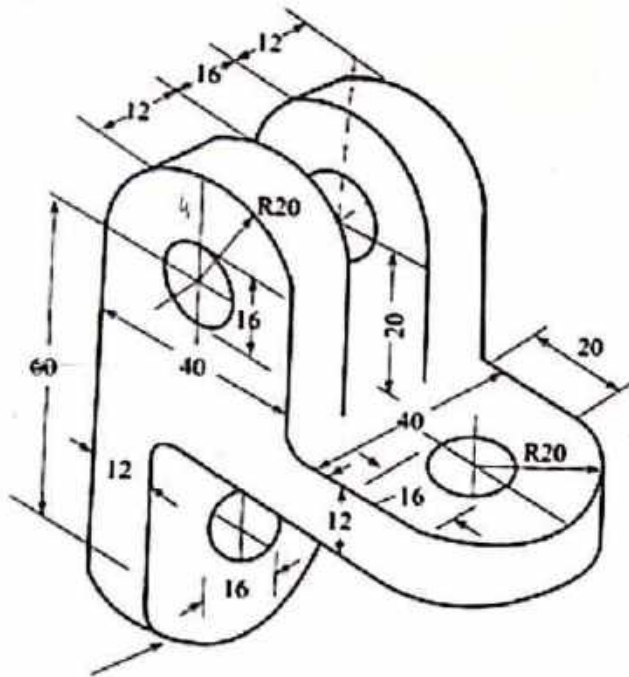


FRONT VIEW

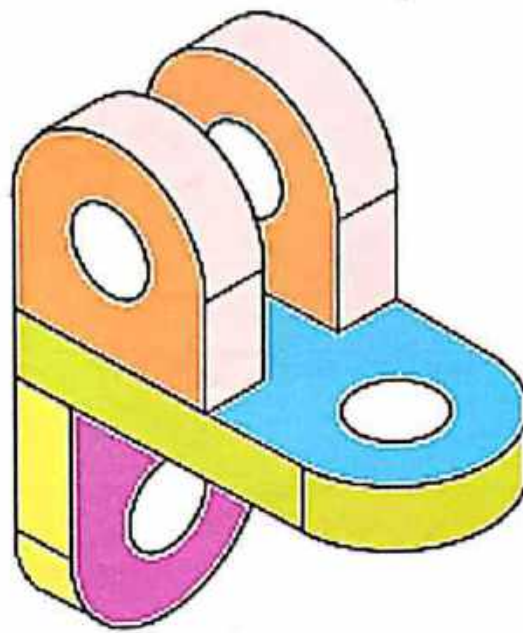


TOP VIEW

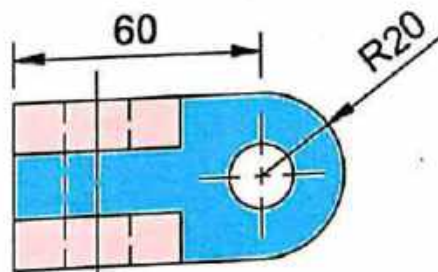
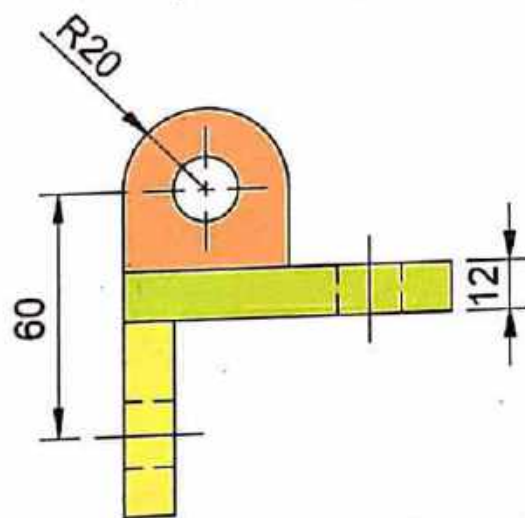
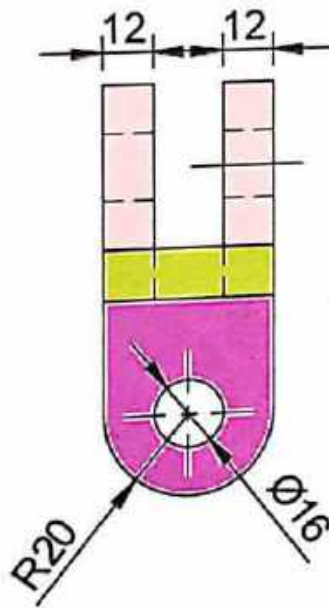
ORTHOGRAPHIC PROJECTION OF SIMPLE COMPONENTS



RIGHT SIDE VIEW

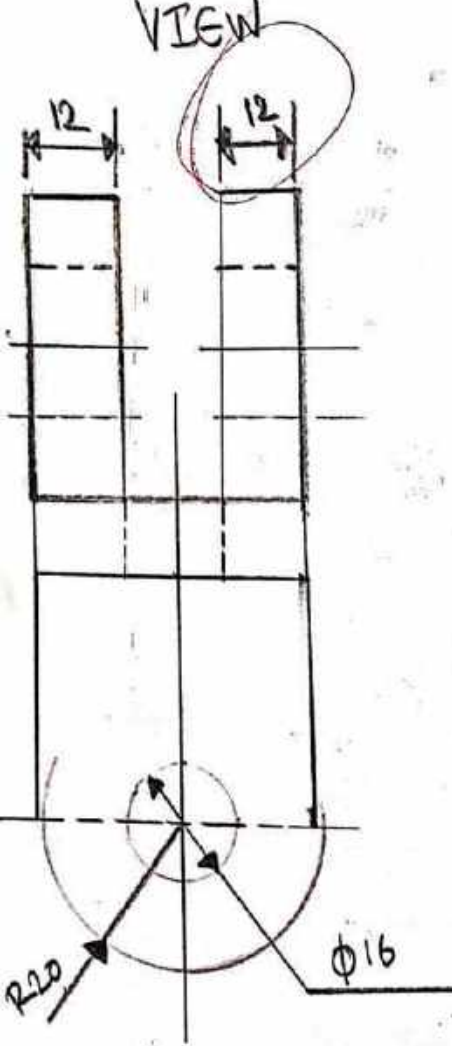


FRONT VIEW

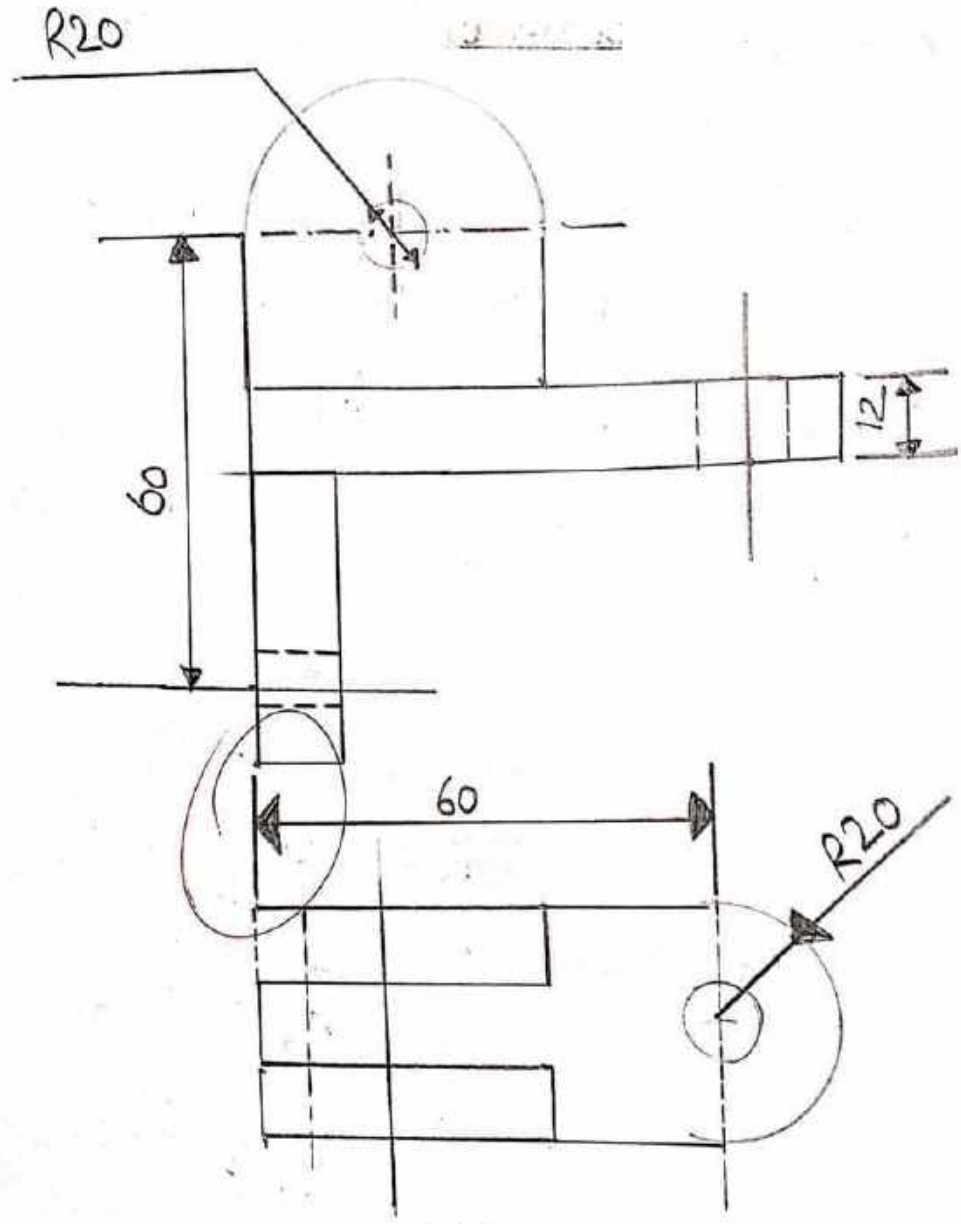


TOP VIEW

RIGHT SIDE
VIEW



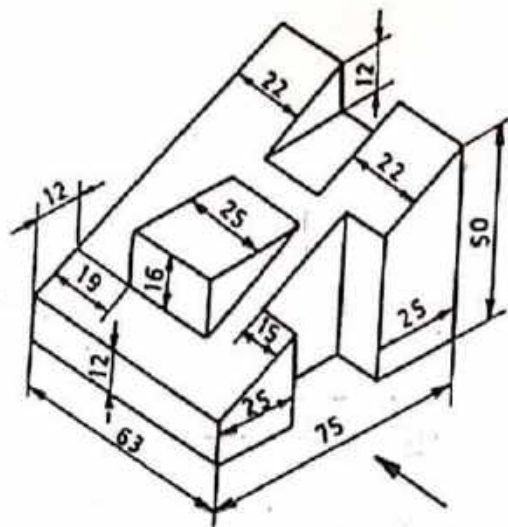
FRONT VIEW



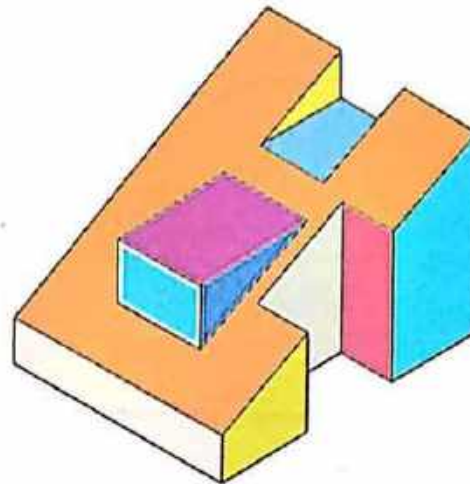
TOP VIEW



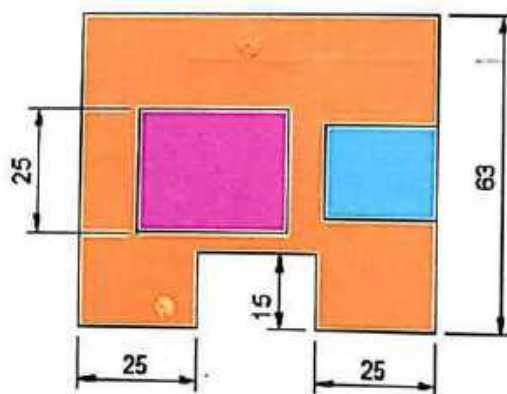
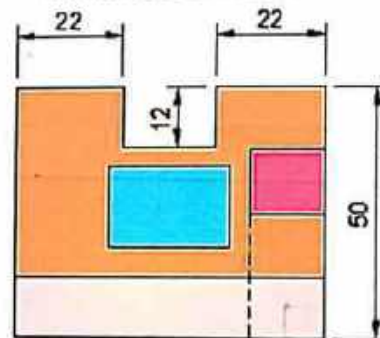
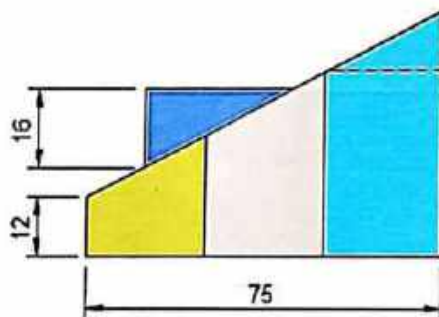
ORTHOGRAPHIC PROJECTION OF SIMPLE COMPONENTS



FRONT VIEW

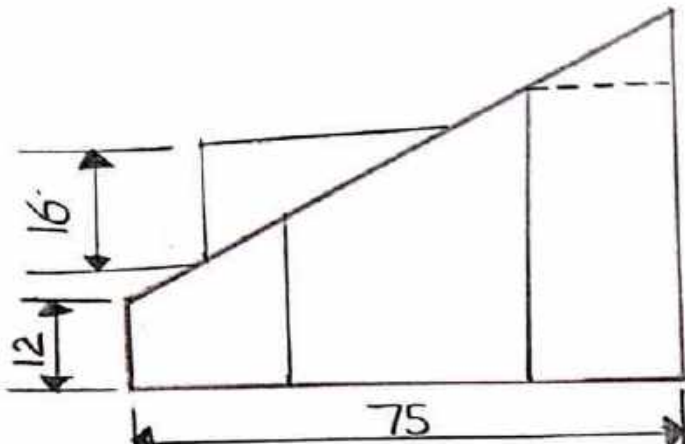


LEFT SIDE VIEW

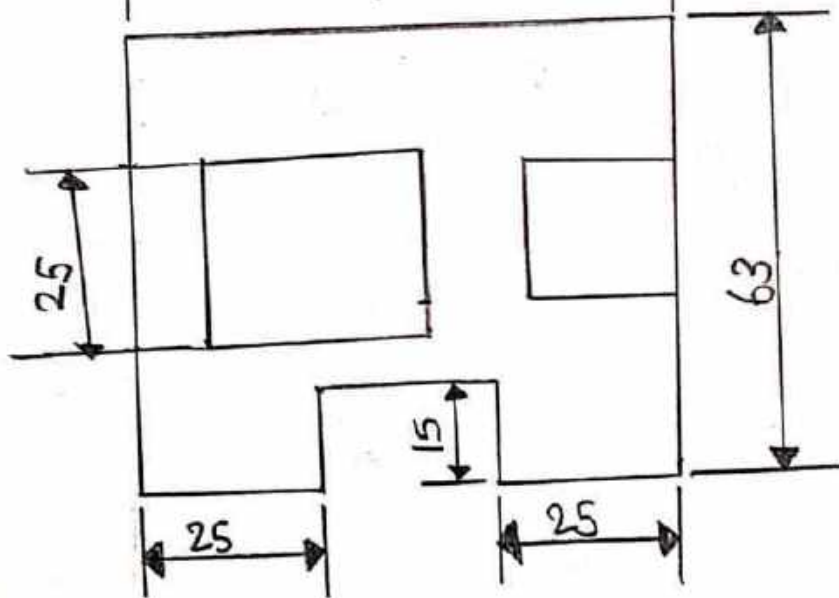
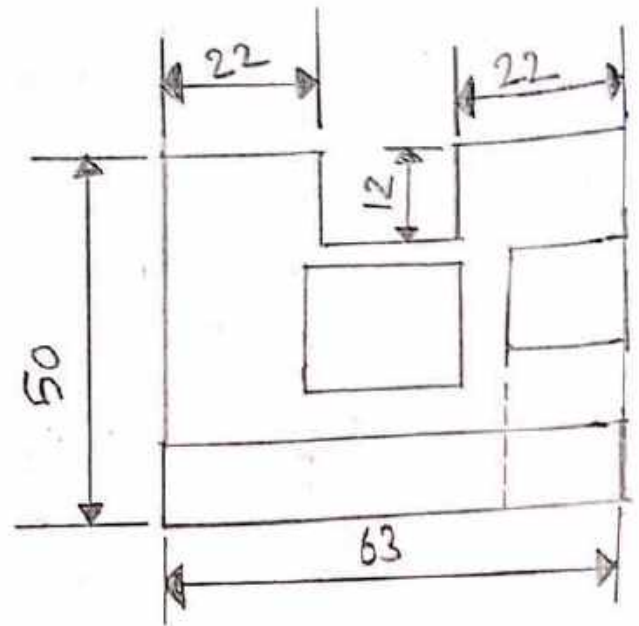


TOP VIEW

FRONT VIEW

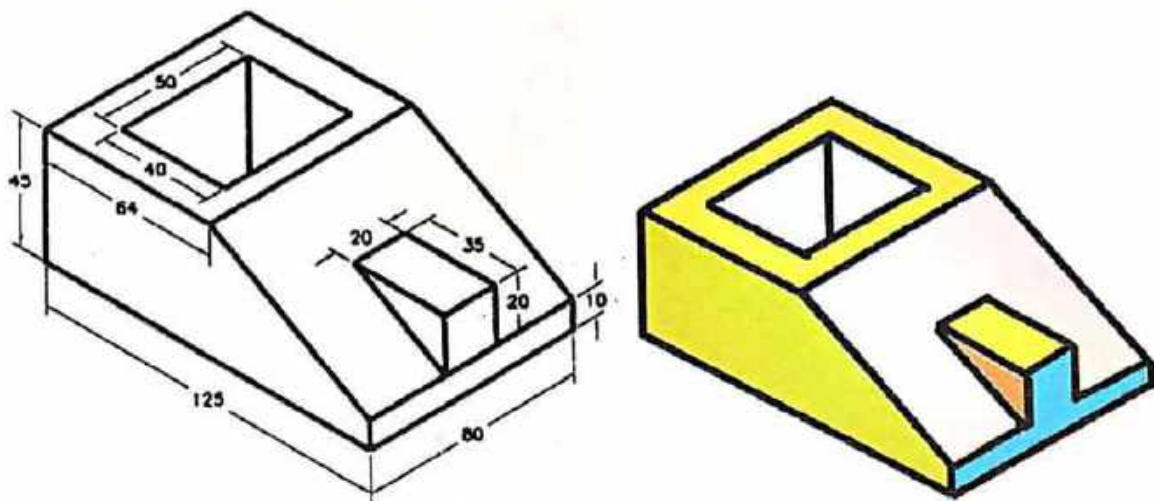


LEFT SIDE VIEW

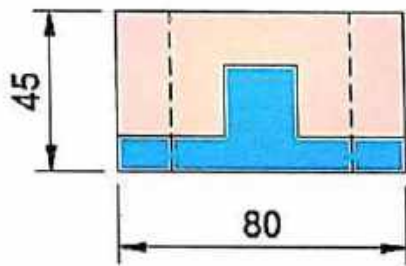


TOP VIEW

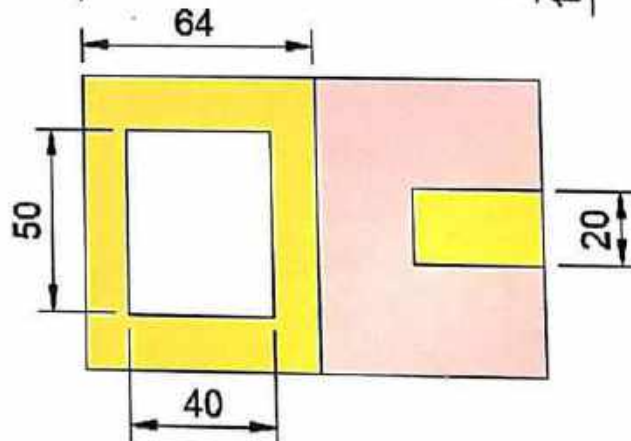
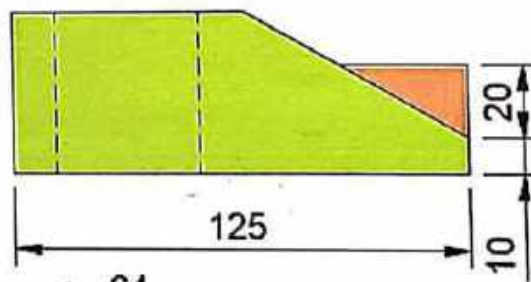
ORTHOGRAPHIC PROJECTION OF SIMPLE COMPONENTS



LEFT SIDE VIEW

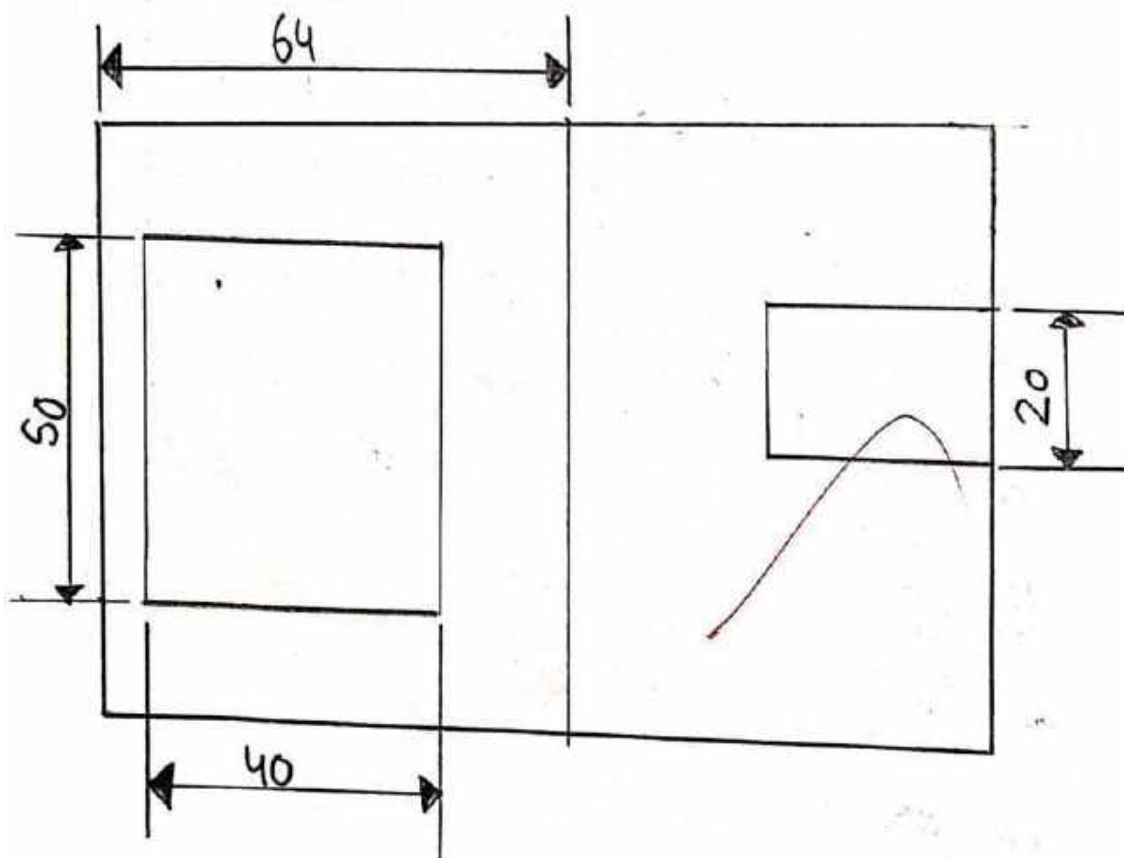
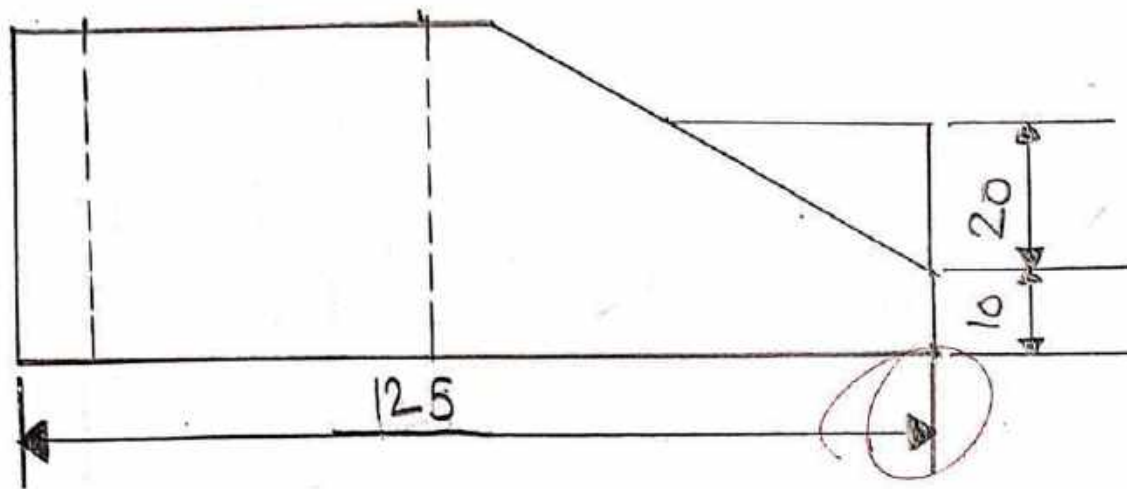


FRONT VIEW



TOP VIEW

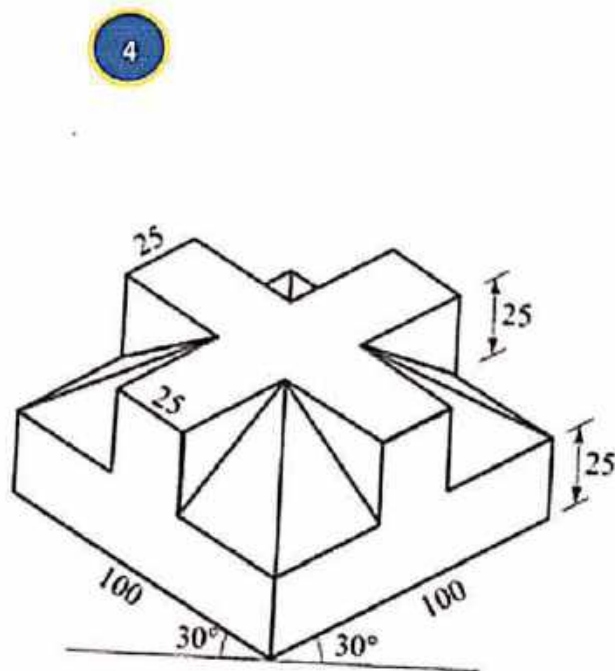
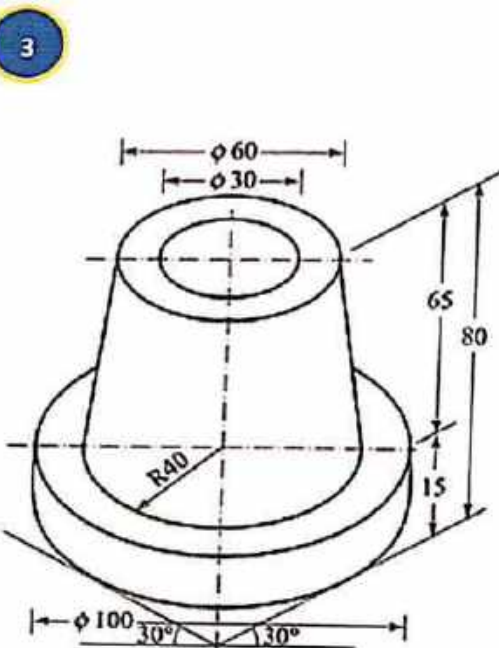
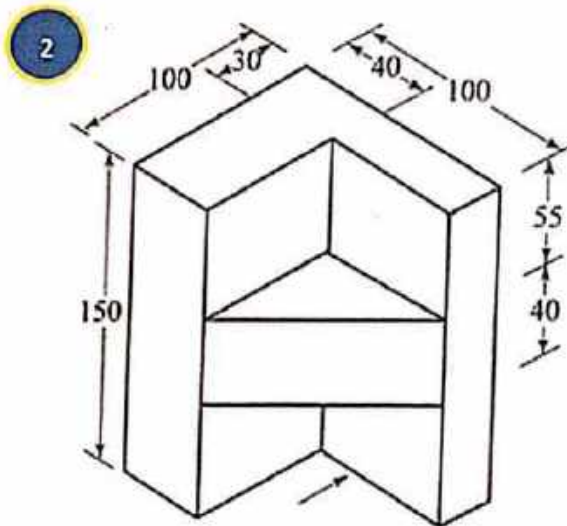
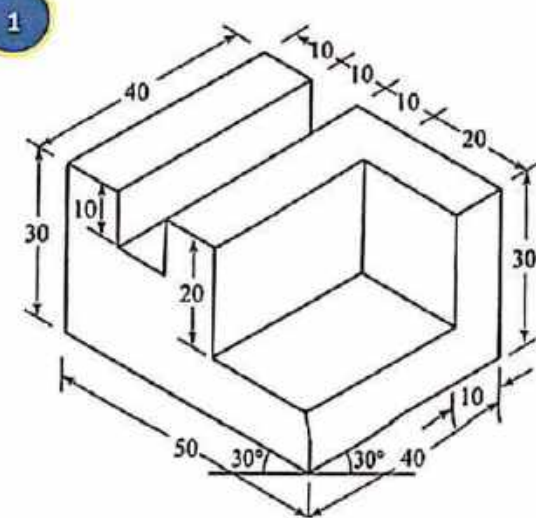
FRONT VIEW



TOP VIEW

ORTHOGRAPHIC PROJECTION PRACTICE

1. Draw the orthographic projections (Front, Top, and side views) of the machine components shown below. Indicate all the dimensions as per the BIS standard. Use appropriate pencils in the drawing.



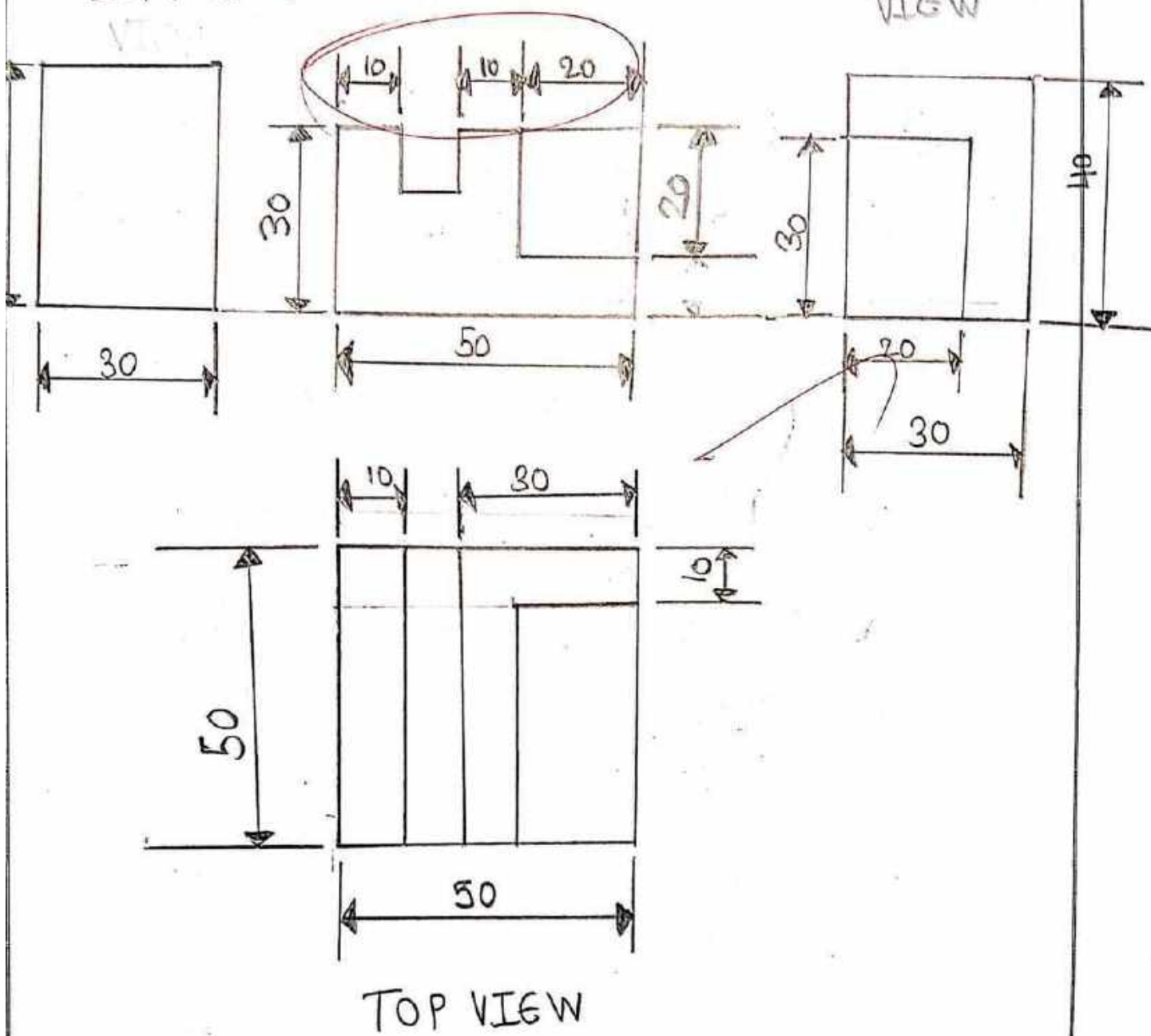
ORTHOGRAPHIC PROJECTION PRACTICE

1

LEFT VIEW

FRONT VIEW

RIGHT
VIEW

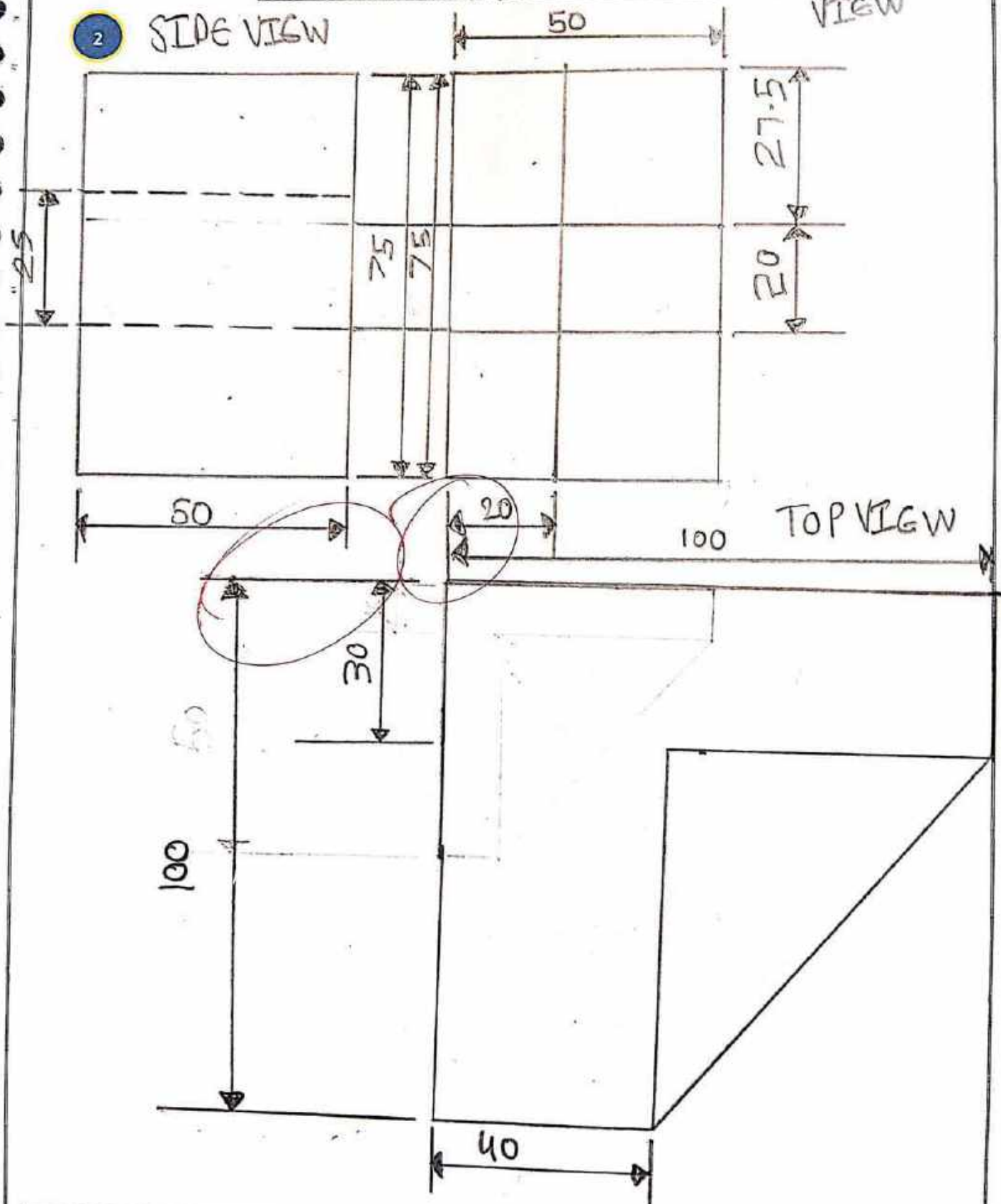


ORTHOGRAPHIC PROJECTION PRACTICE

2

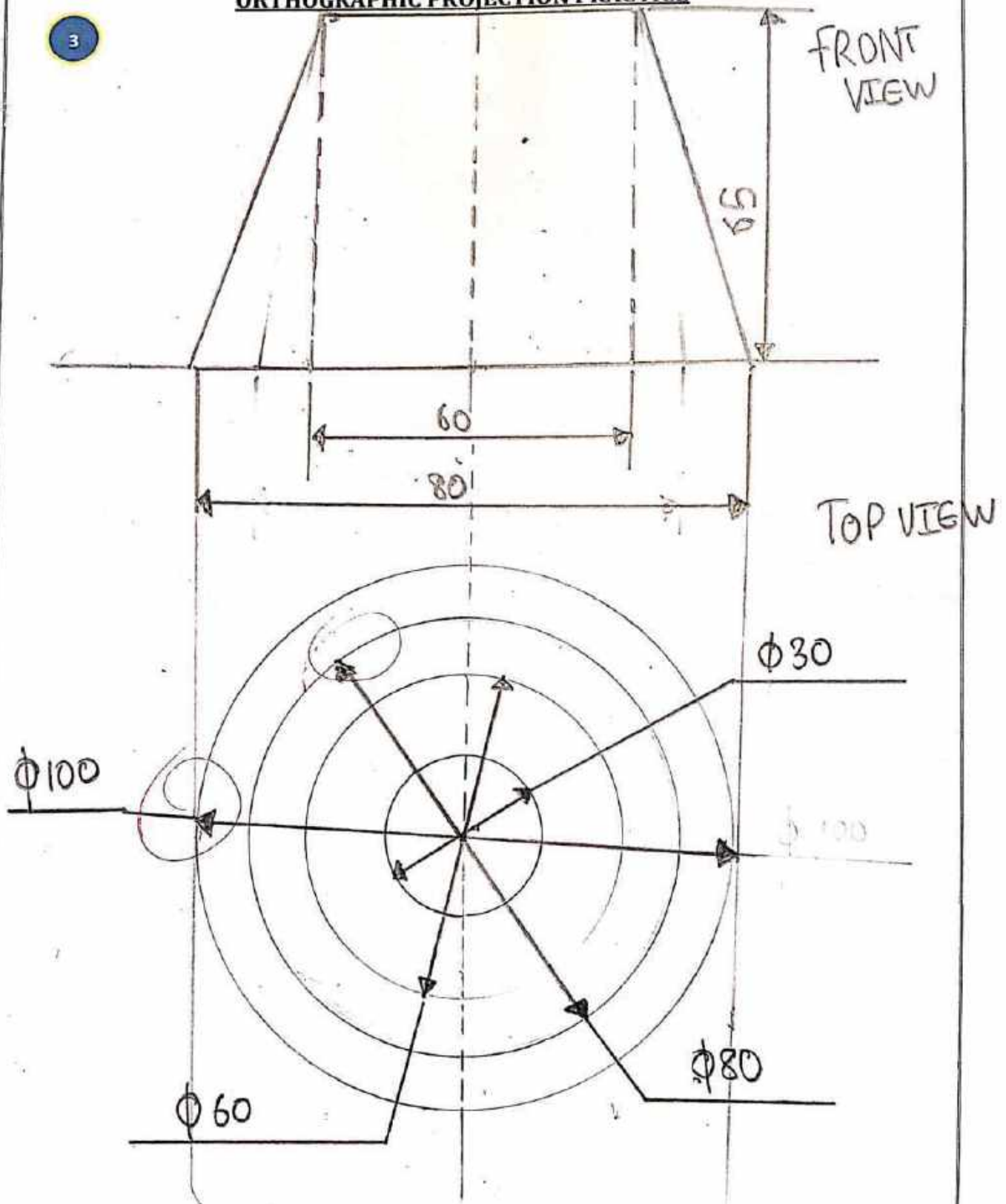
SIDE VIEW

FRONT
VIEW



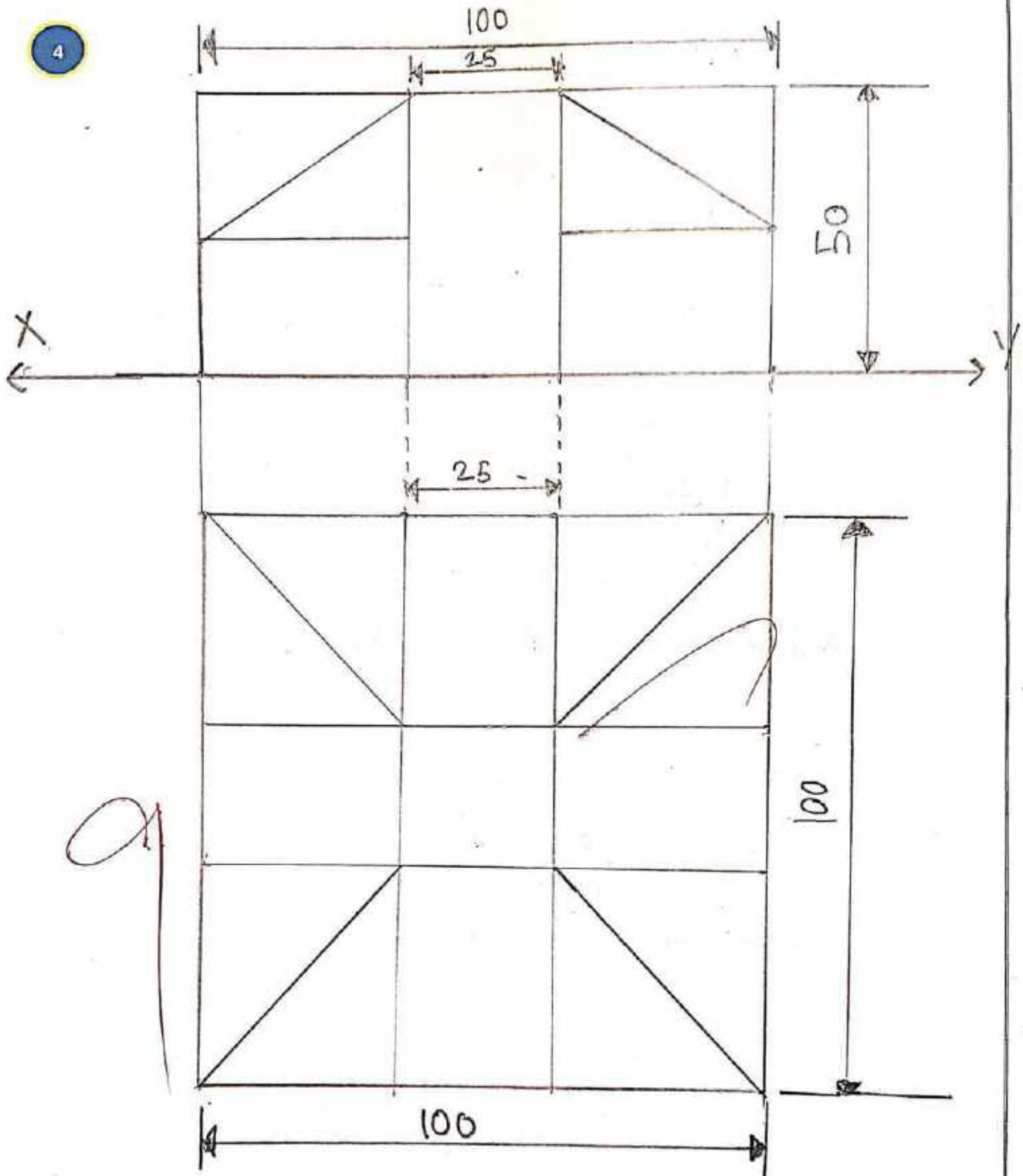
ORTHOGRAPHIC PROJECTION PRACTICE

3



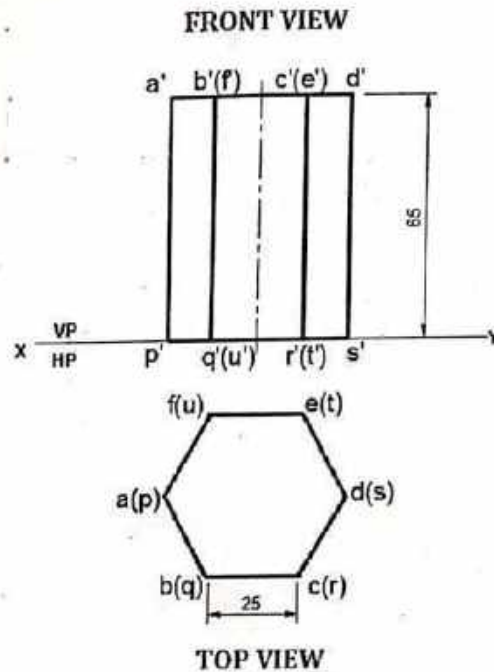
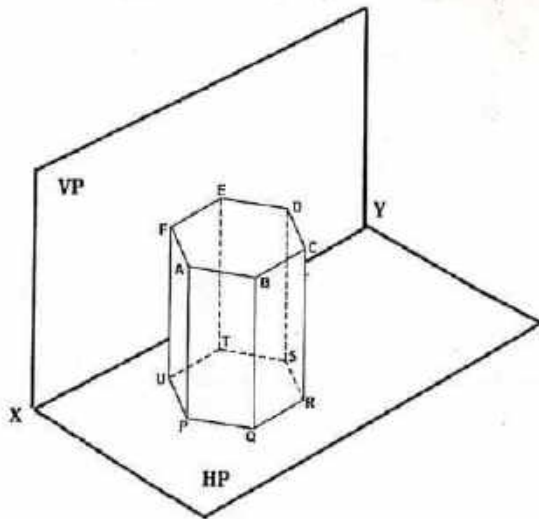
ORTHOGRAPHIC PROJECTION PRACTICE

4

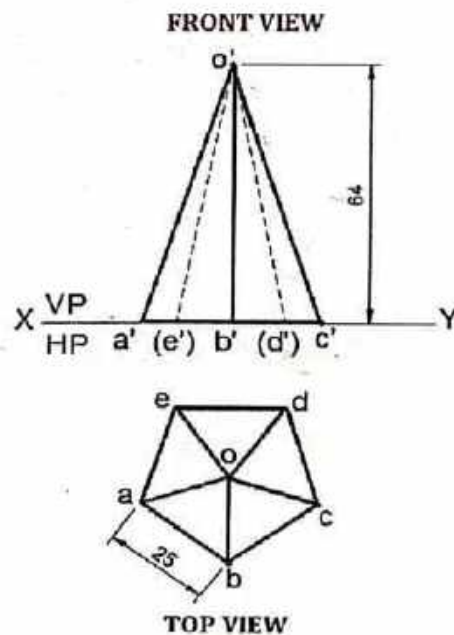
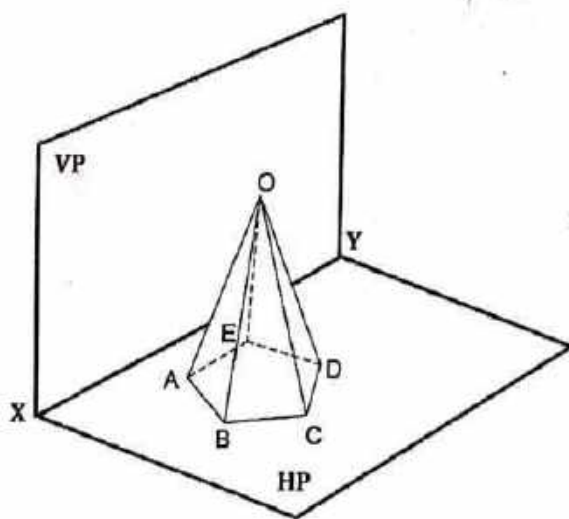


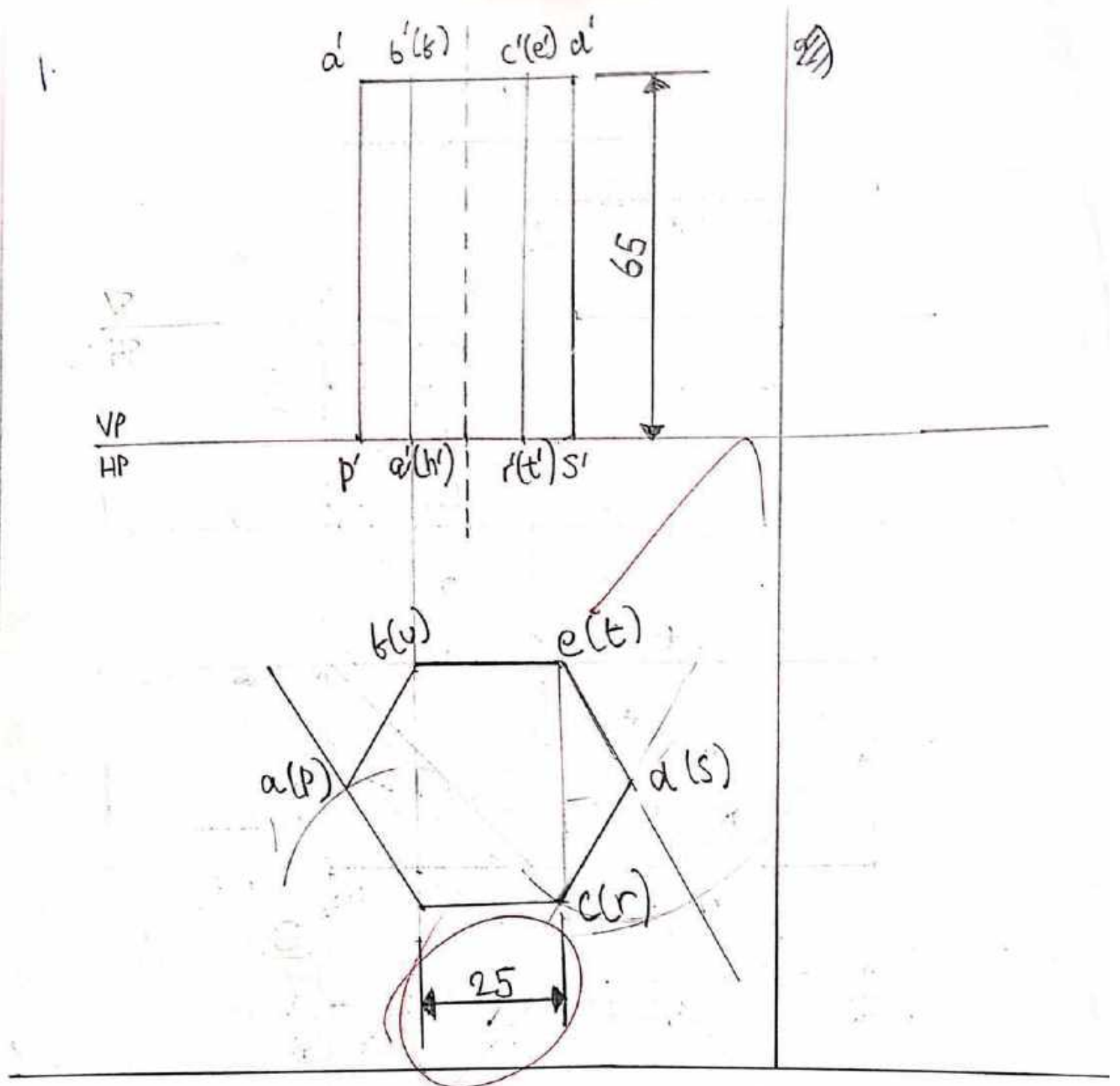
PROJECTION OF SOLIDS IN SIMPLE POSITION

1. A hexagonal prism of base side 25 mm and height 65 mm is resting on HP on its base with one of its base edges parallel to VP. Draw its projections.

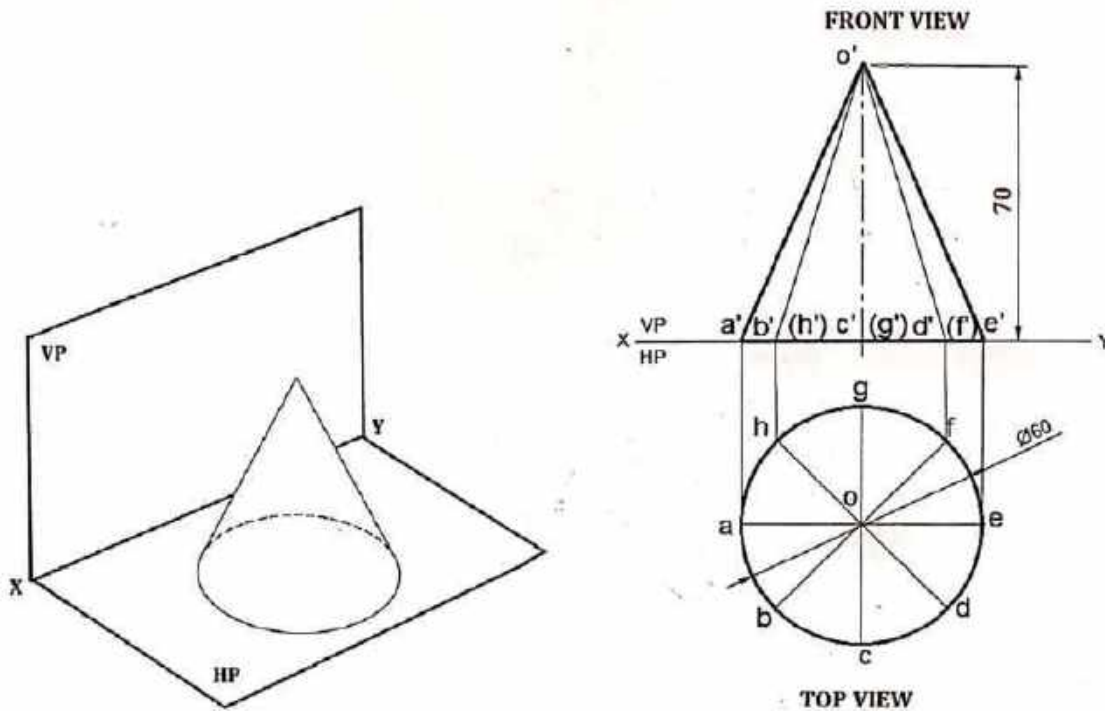


2. A pentagonal pyramid of base side 25 mm and height 64 mm is resting on HP on its base with one of its base edges parallel to VP and nearer to it. Draw its projections.

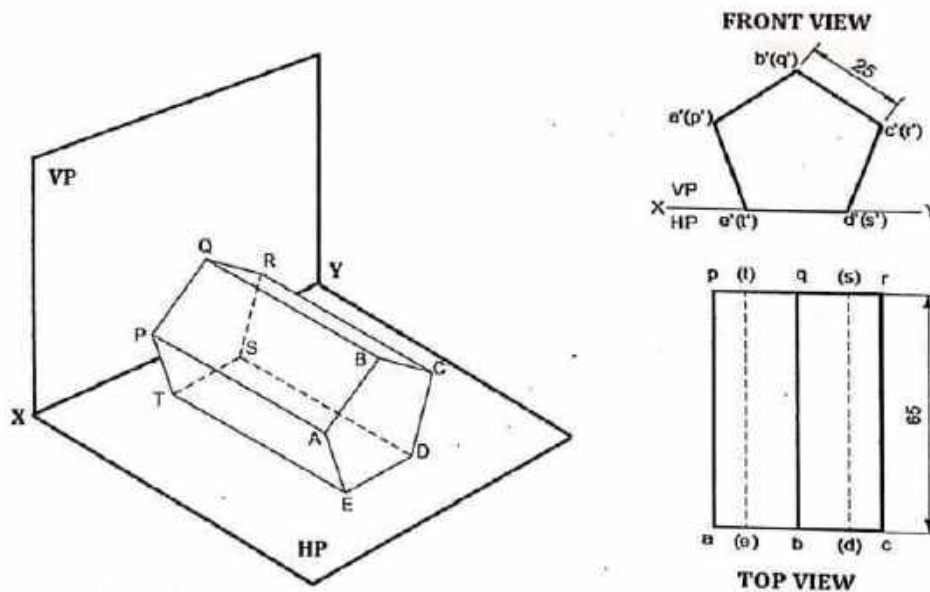




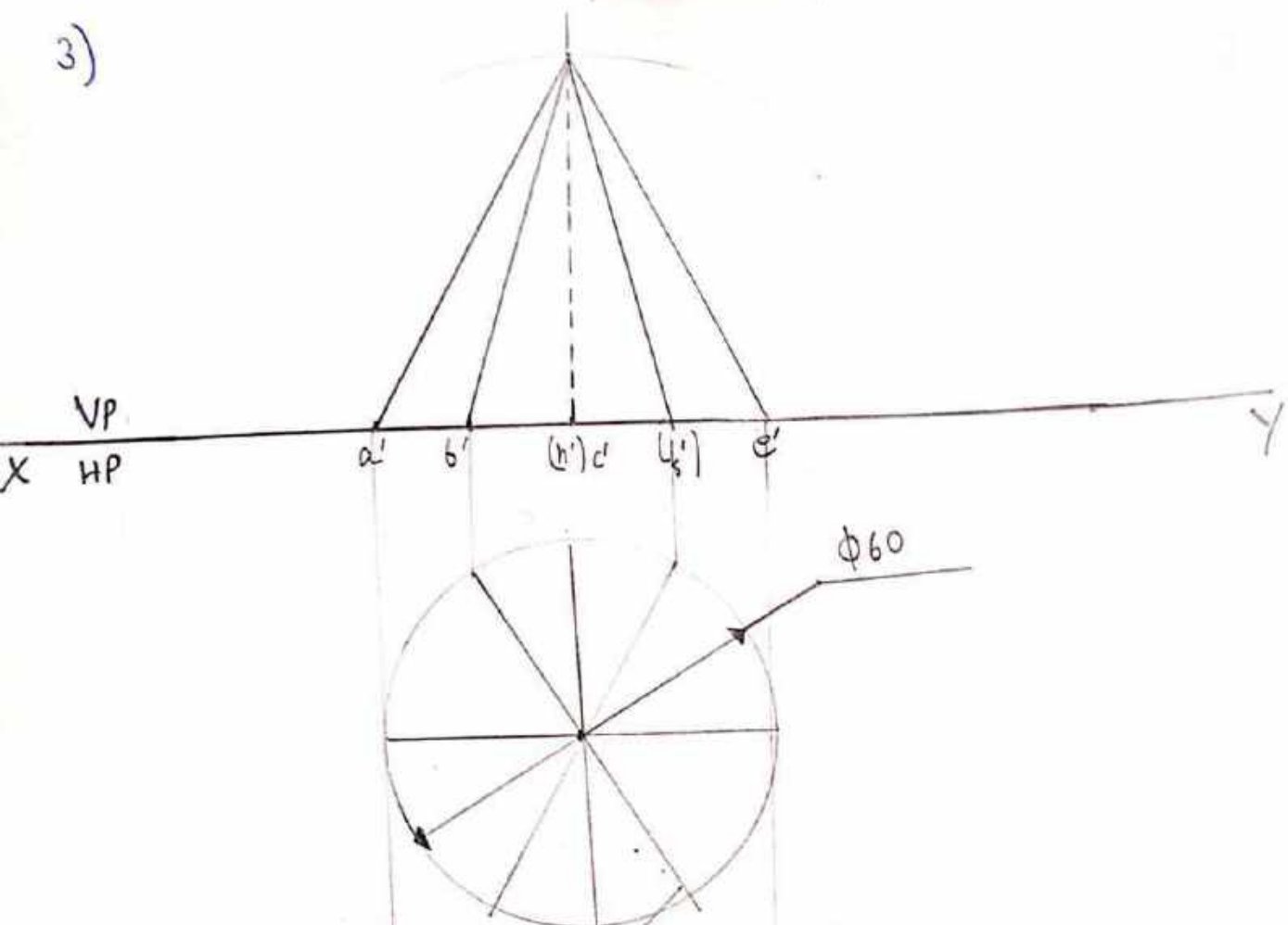
3. A Cone of base diameter 60 mm and height 70 mm is resting on HP on its base with its axis parallel to VP and perpendicular to HP. Draw its projections.



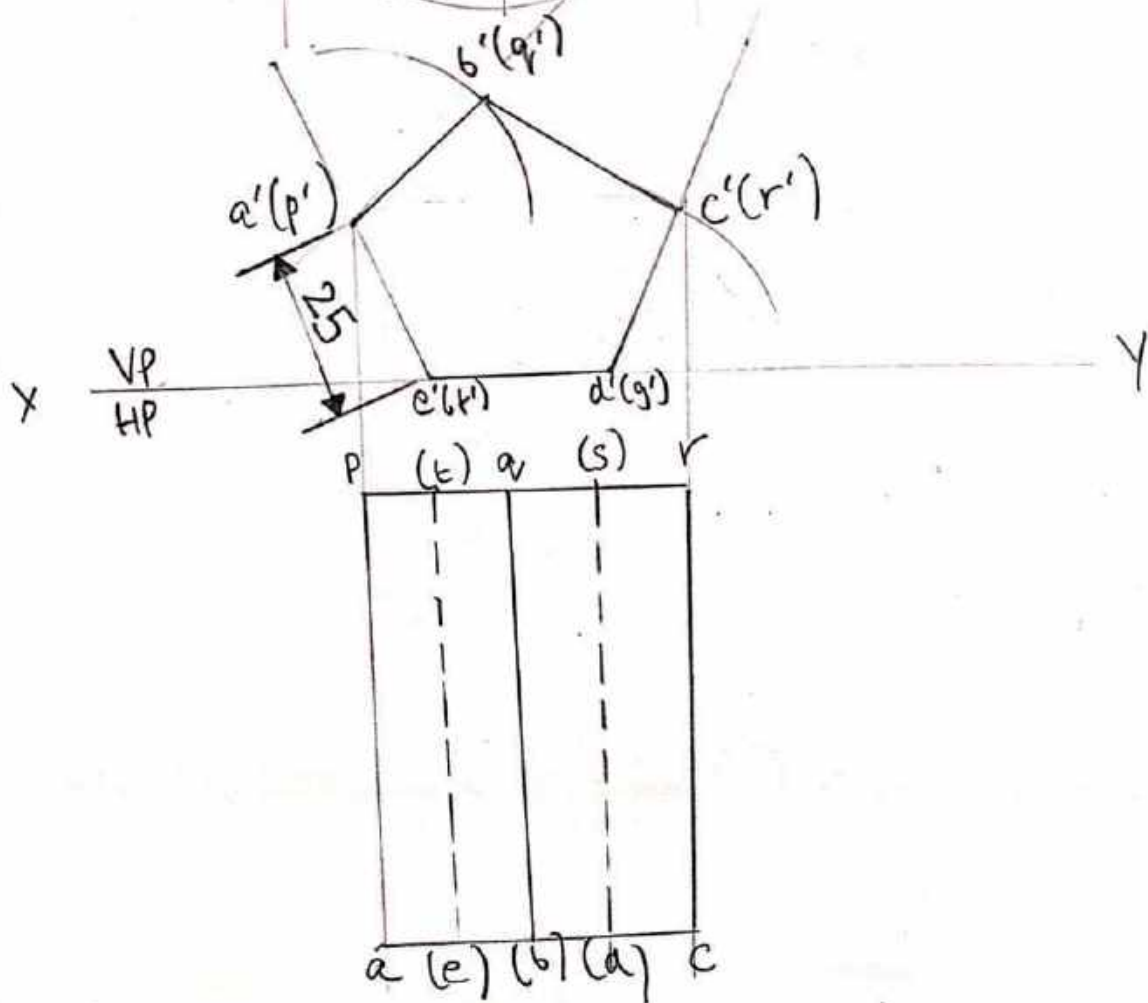
4. A pentagonal prism of base side 25mm and height 65 mm is resting on HP on one of its rectangular faces with its axis parallel to HP and perpendicular to VP. Draw its projections.



3)

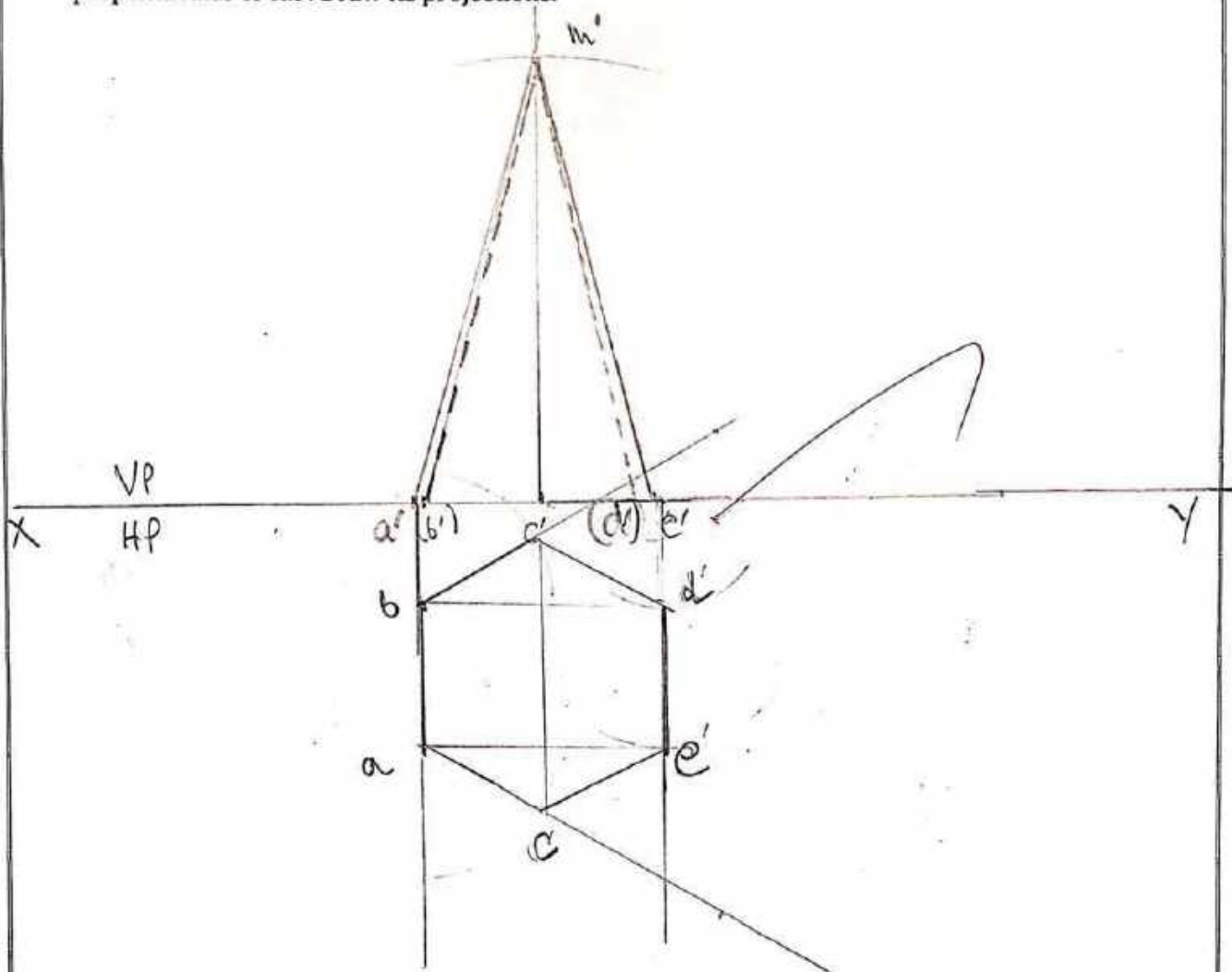


4)

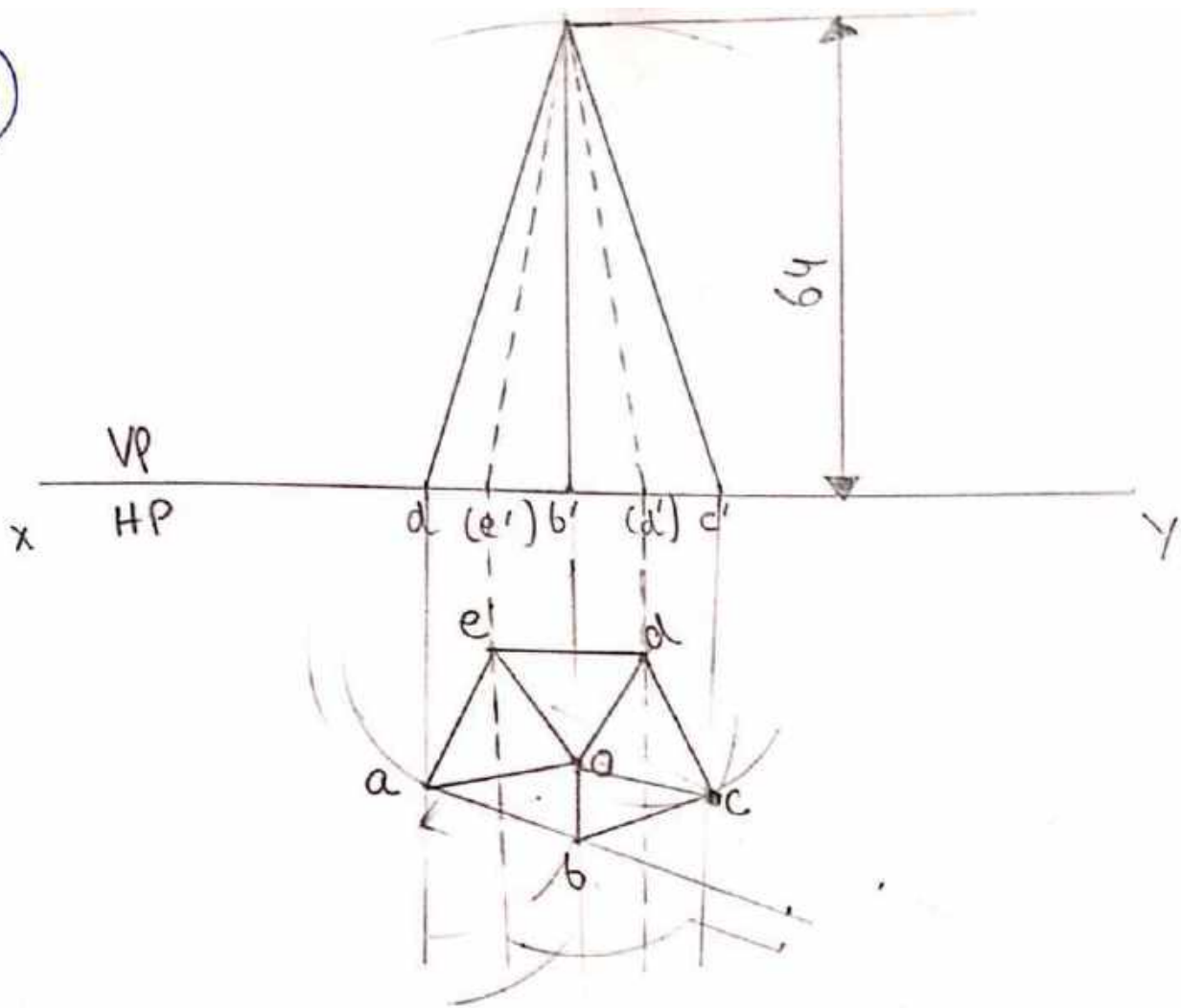


PROJECTION OF SOLIDS IN SIMPLE POSITIONPRACTICE PROBLEMS

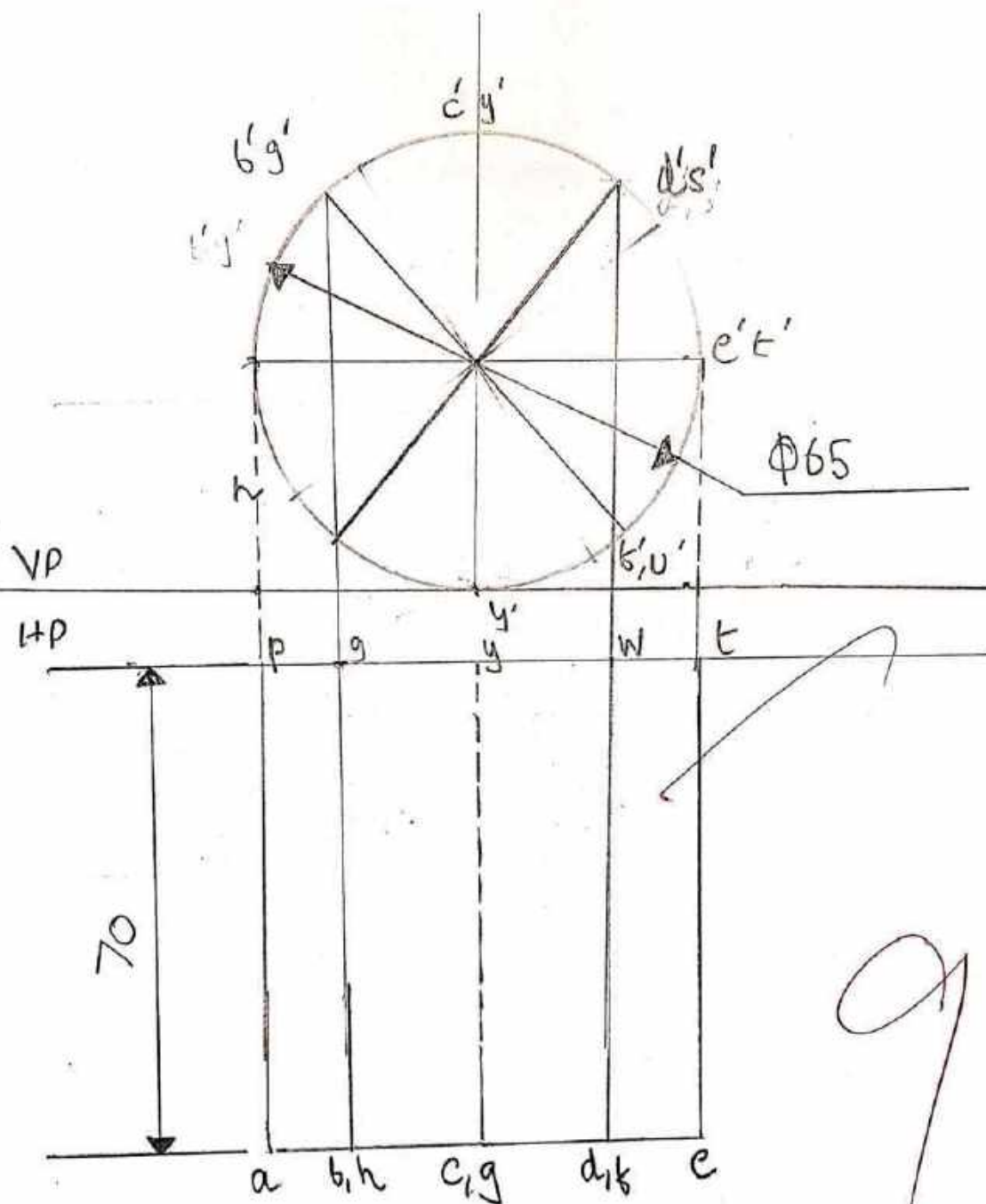
1. A hexagonal pyramid of base side 20mm and height 65 mm is resting on H.P on its base with one of its base edges 30° inclined to V.P. The axis of the pyramid is parallel to V.P and perpendicular to H.P. Draw its projections.



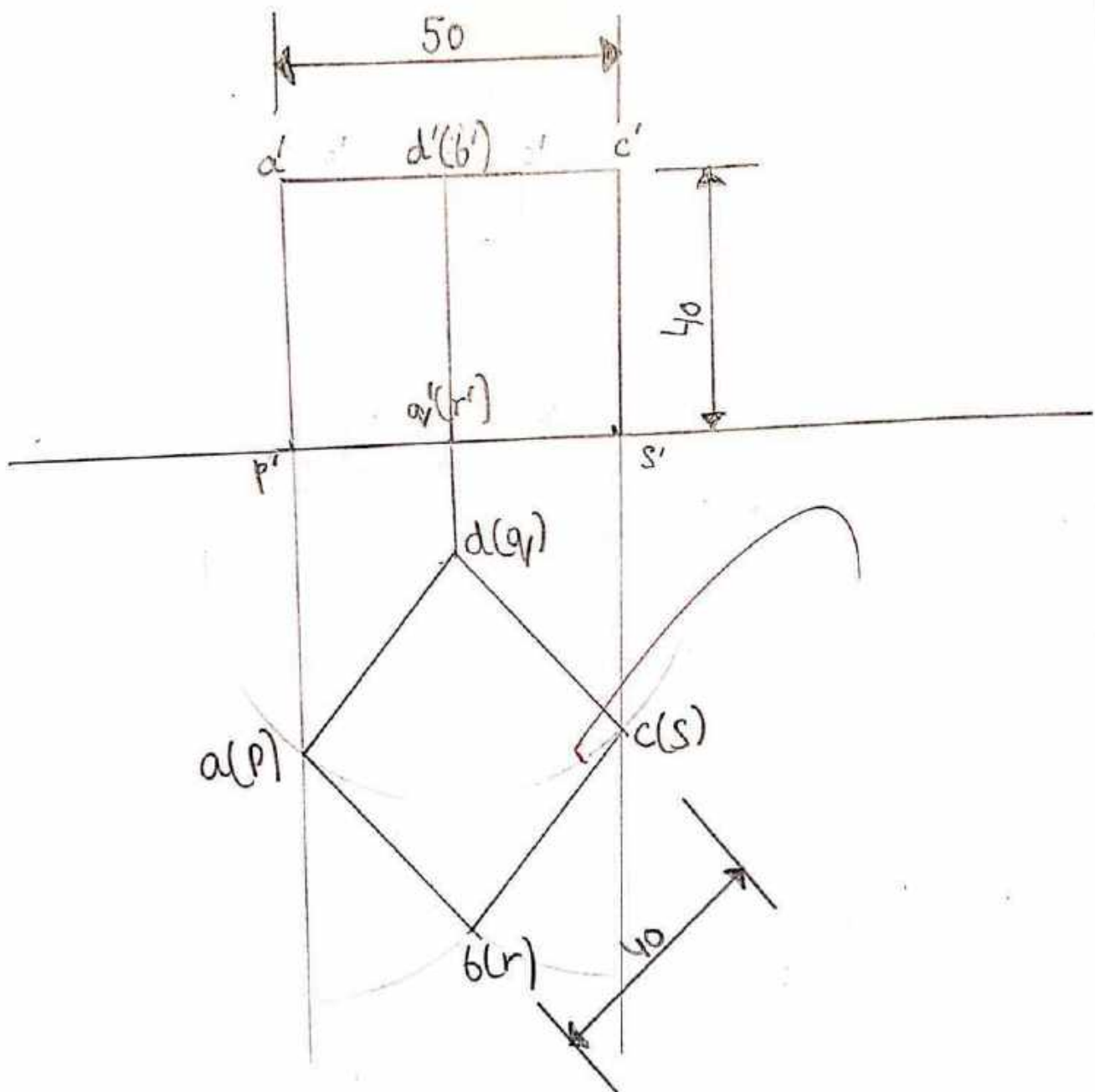
2)



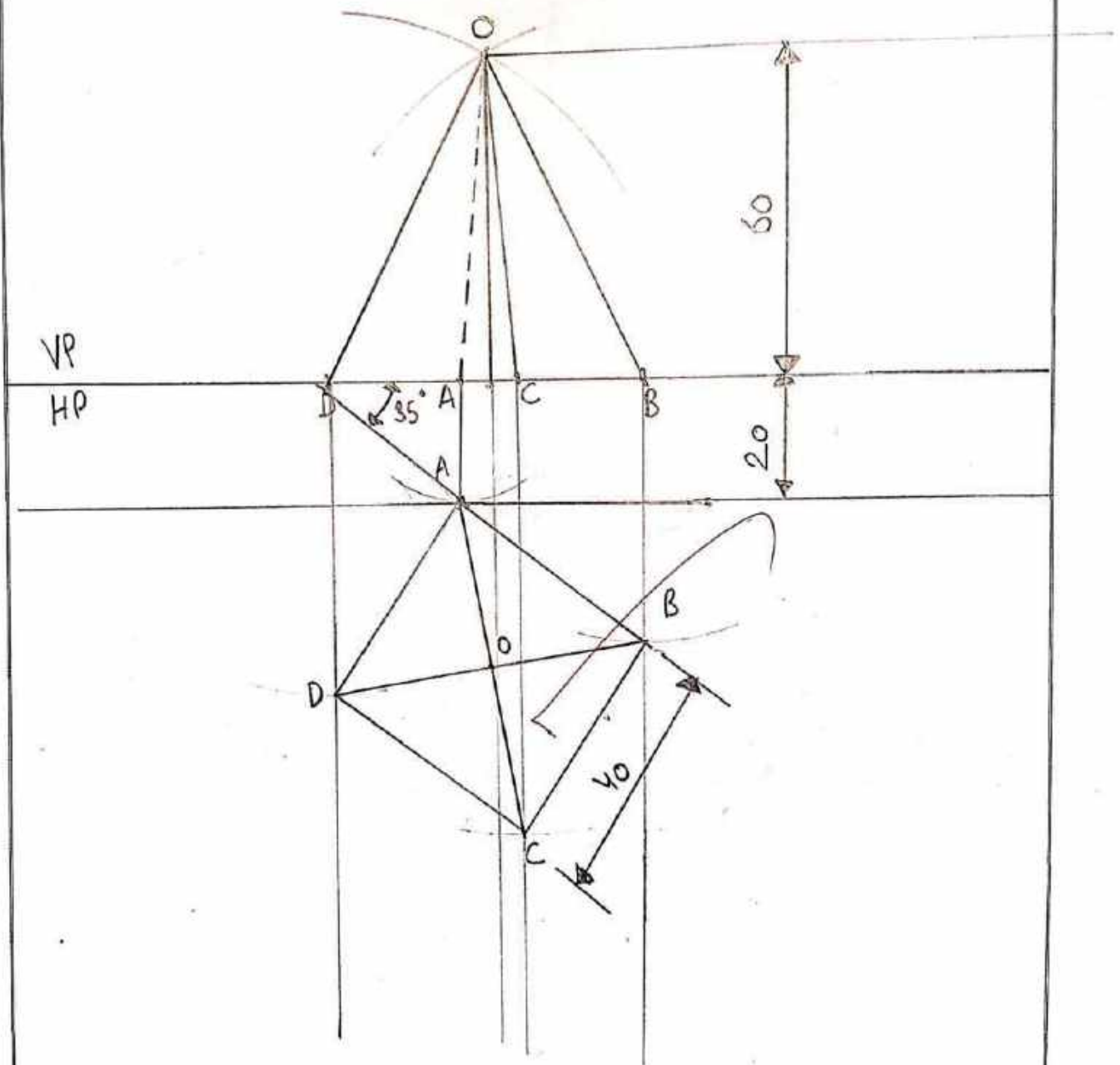
2. A cylinder of diameter 65 mm and height 70 mm is resting on H.P on one of its generators with its axis parallel to H.P and perpendicular to V.P. Draw its projections.



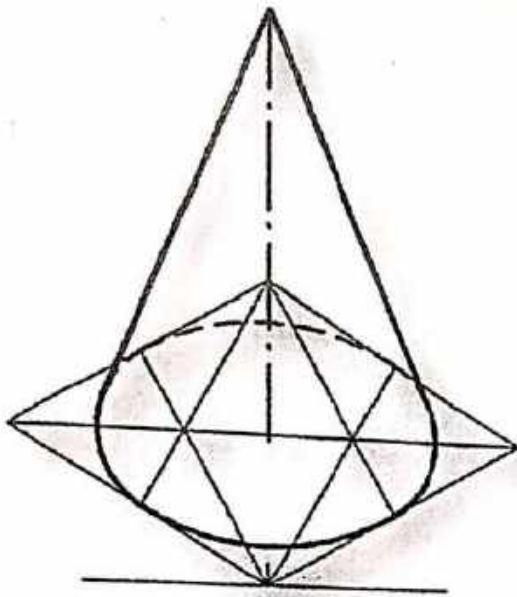
3. A cube of side 40 mm is resting on HP on one of its square faces in such a way that two of its vertical faces are equally inclined to VP. The vertical edge nearer to VP is at a distance of 25 mm from it. Draw its projections.



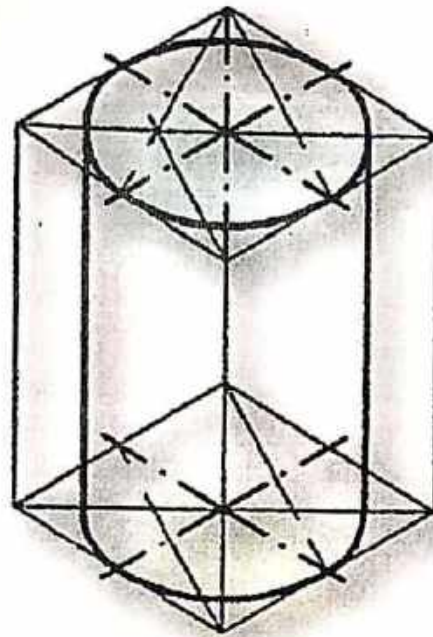
4. A square pyramid of base side 40 mm and height 60 mm is resting on HP one its base with one of its base edges 35° inclined to VP. The base corner nearer to VP is at a distance of 20 mm from it. Draw its projections.



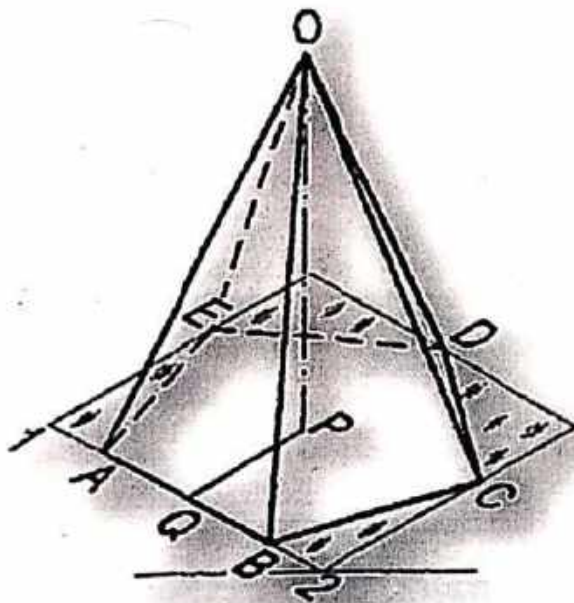
ISOMETRIC PROJECTION



Isometric view of a Cone



Isometric view of a Cylinder

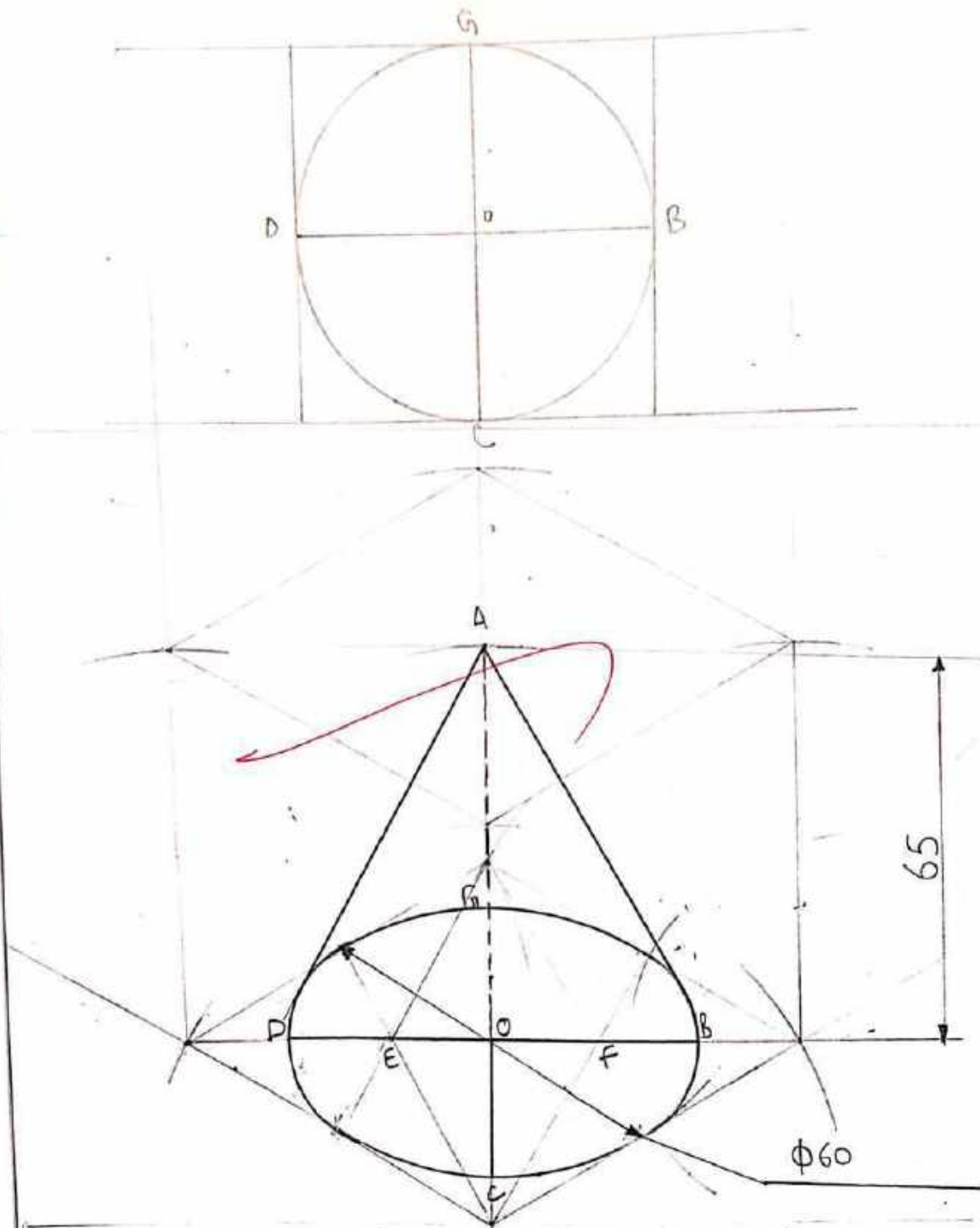


Isometric view of a Pentagonal Pyramid

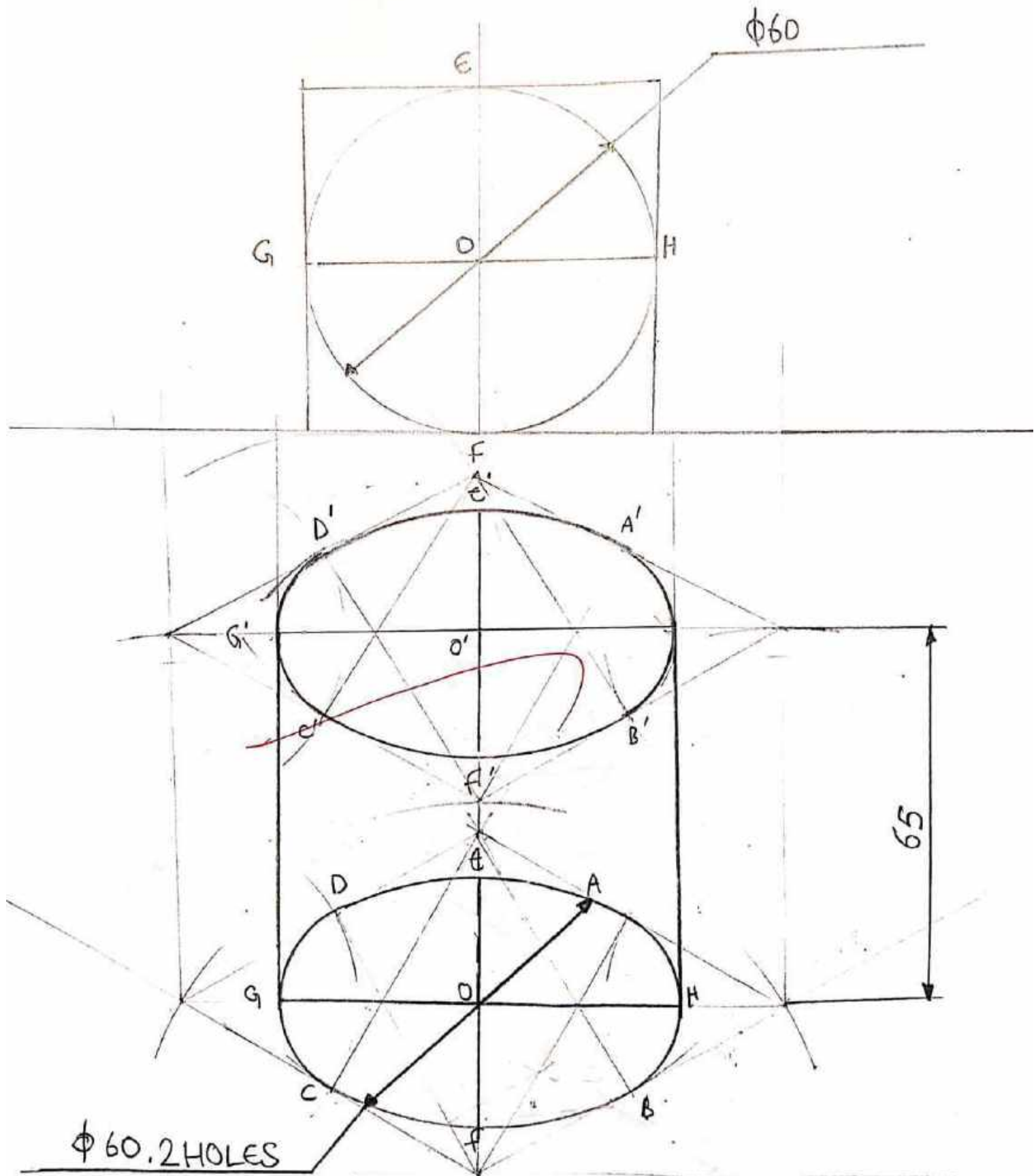
Image Source: Engineering Drawing by N.D.Bhatt

1. Draw the isometric view of a cone having base diameter 60 mm and height 65 mm.

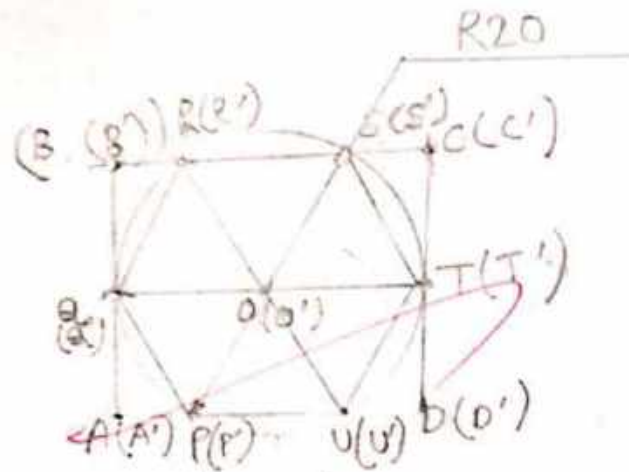
ISOMETRIC VIEW OF A CONE



2. Draw the isometric view of a cylinder having diameter 60 mm and height 65 mm.



3. Draw the isometric view of a hexagonal prism of side 20 mm and height 60 mm.



9

