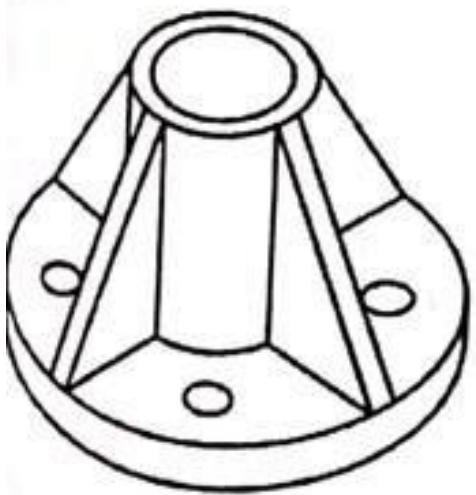


# **ENGINEERING DRAWING**

## **II- SOLUTIONS**

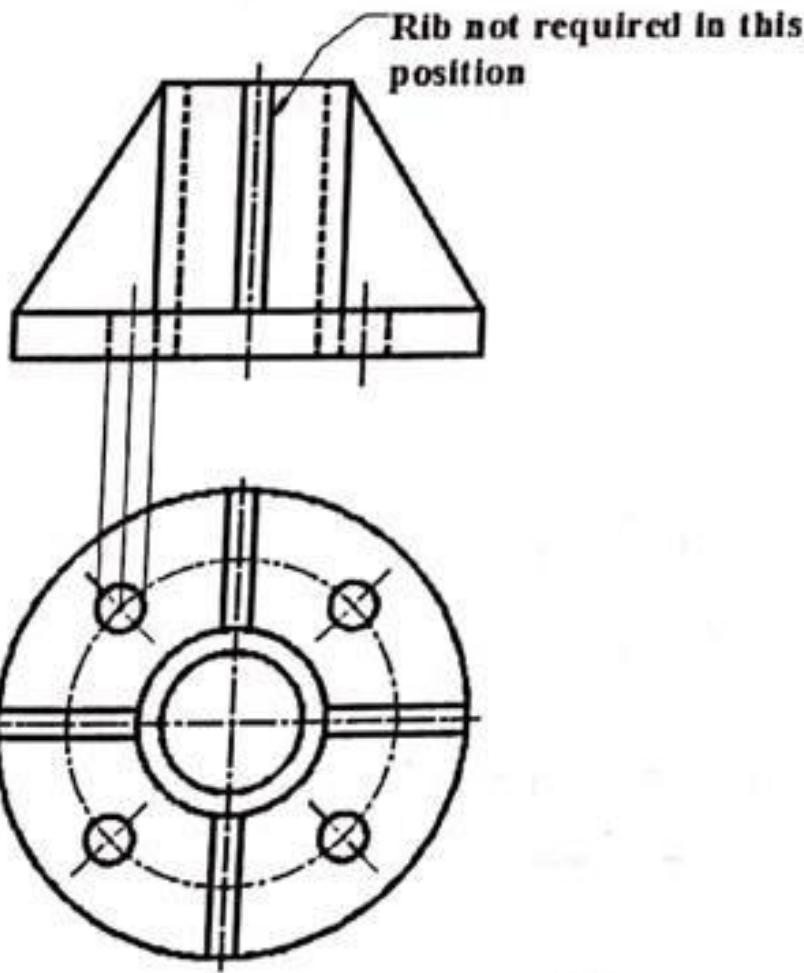
**BY – ER. SABINA BIMALI**

# **SECTIONAL ORTHOGRAPHIC WITH CONVENTION - SOLUTIONS**

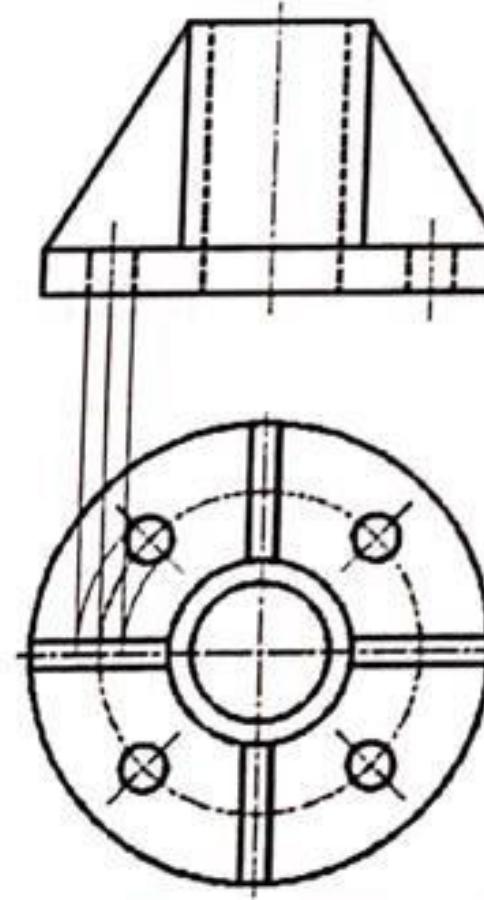


(a): Object with radially arranged features

**True Projection (Not Preferred)**

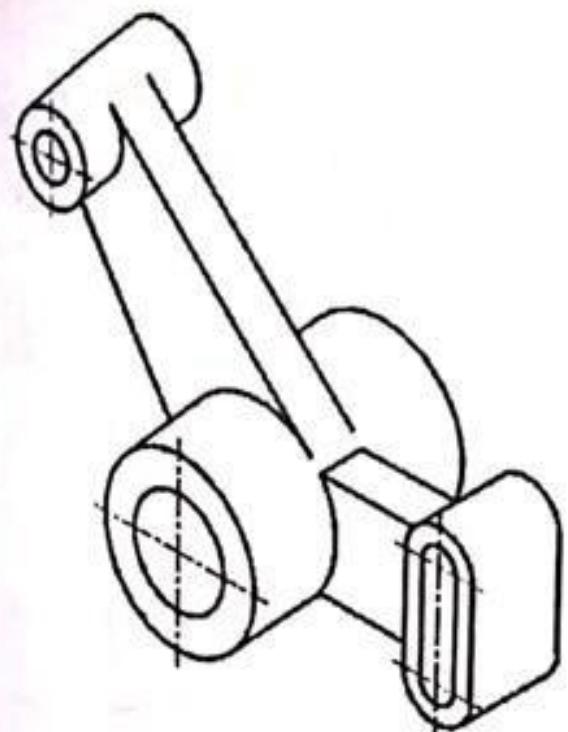


**(b): True Projection**

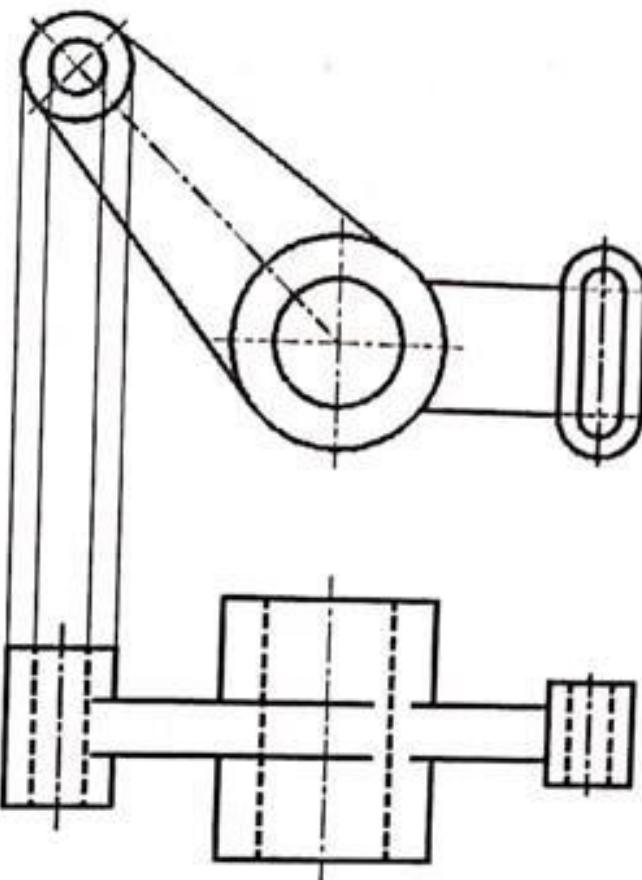


**Aligned Ribs and Holes (Preferred Practice)**

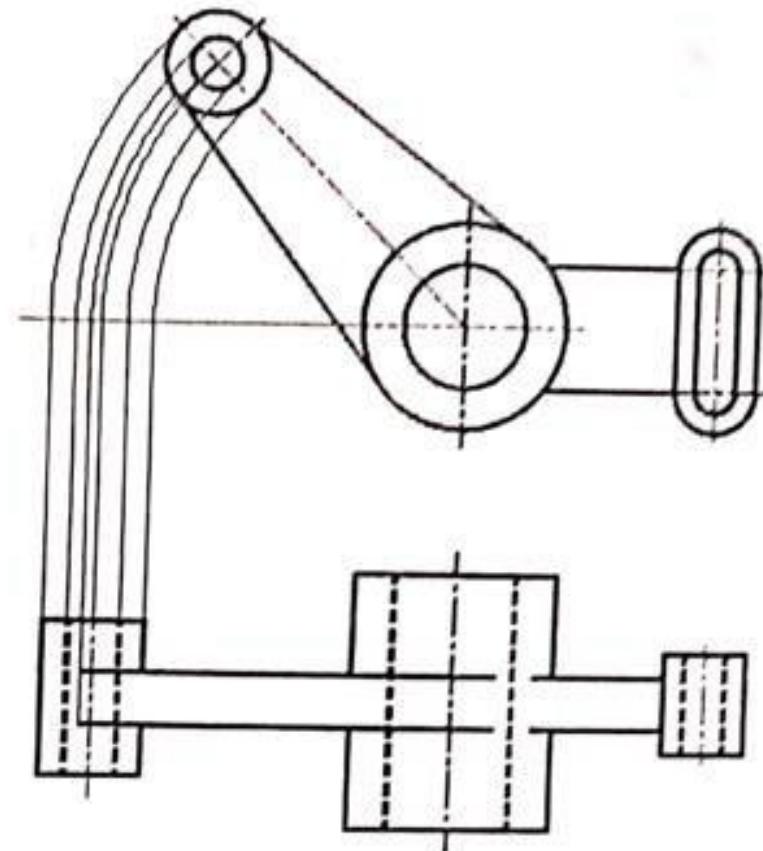
**(c): Conventional Practice**



(a): Arm Aligned at an Angler



**True Projection (Not Preferred)**



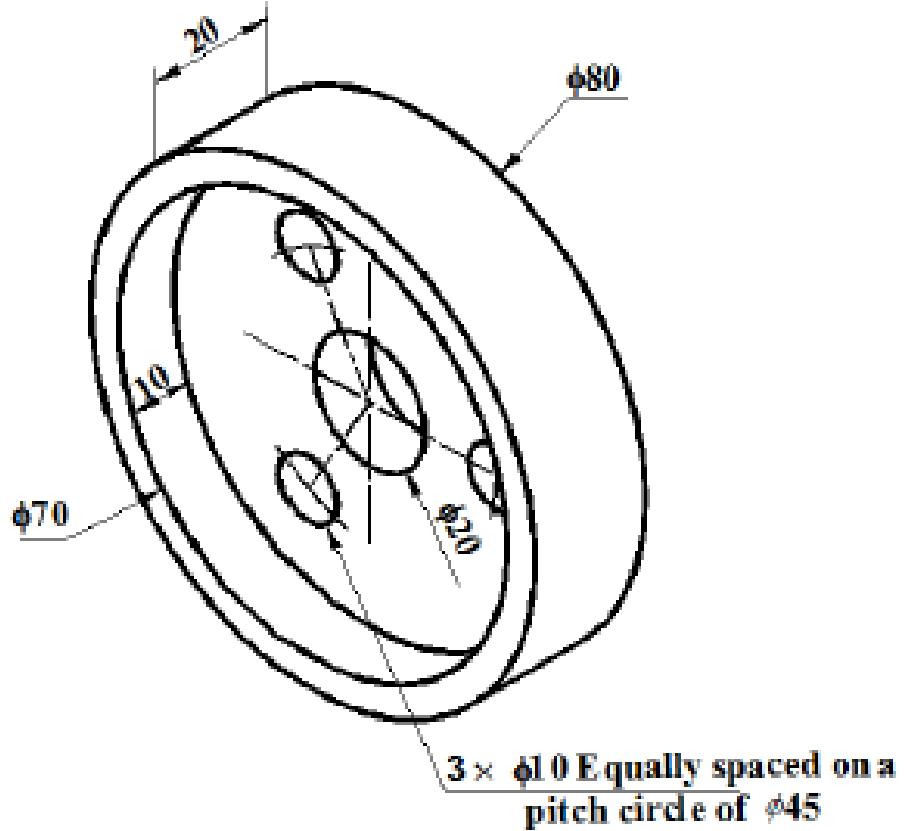
**Aligned View (Preferred Practice)**

(b): True Projection

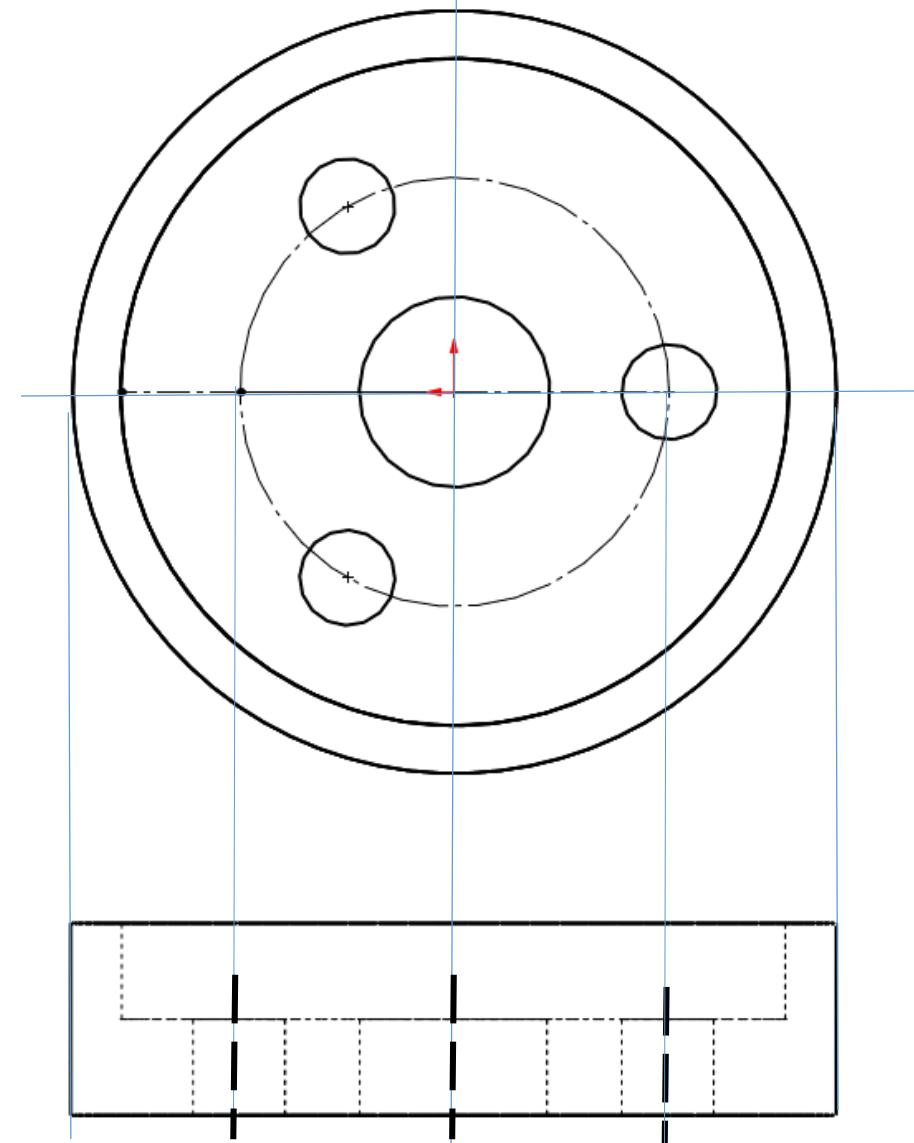
(c): Conventional Practice

## (CONVENTIONAL PRACTICES)

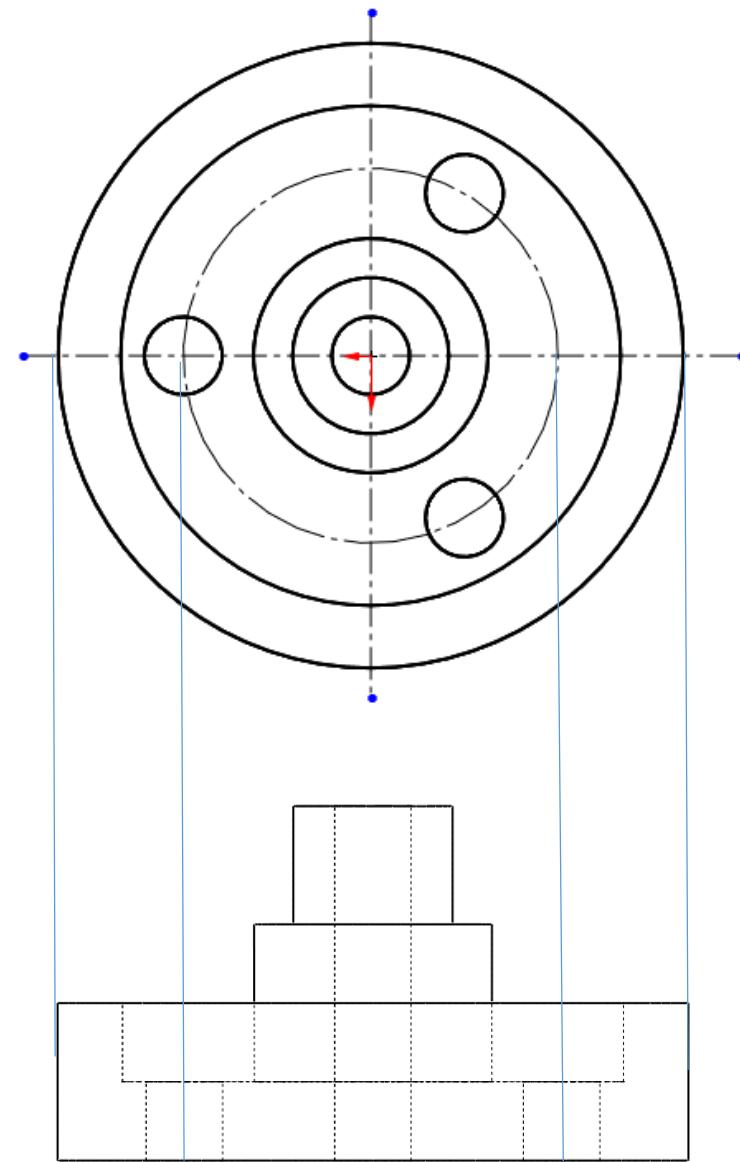
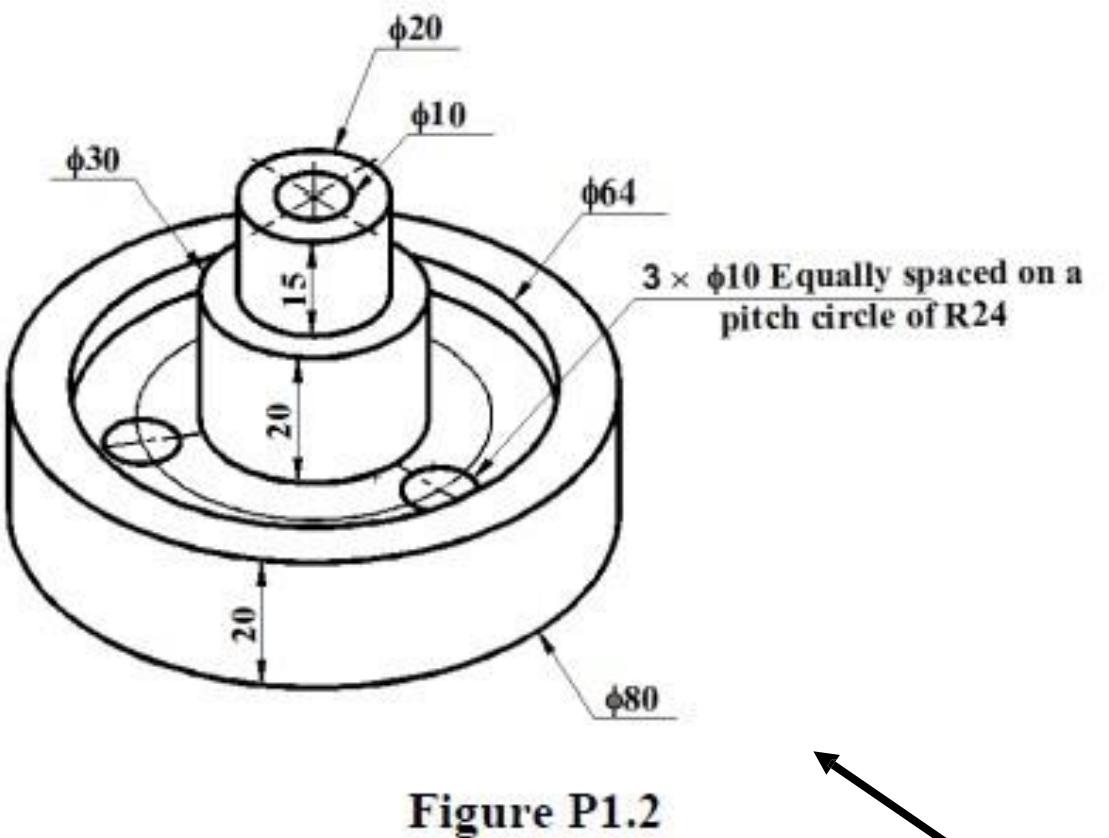
1. Draw front view and side view of the object shown in **Figure P1.1**. Use convention for the radially arranged holes.



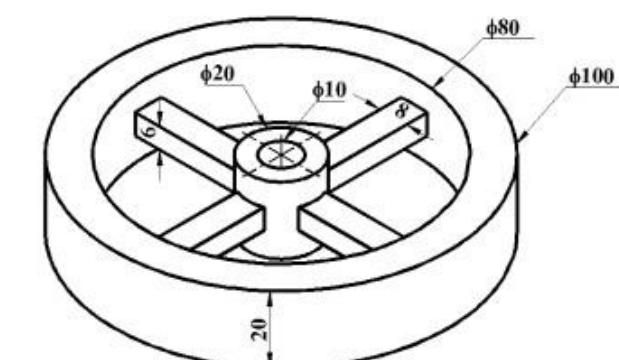
**Figure P1.1**



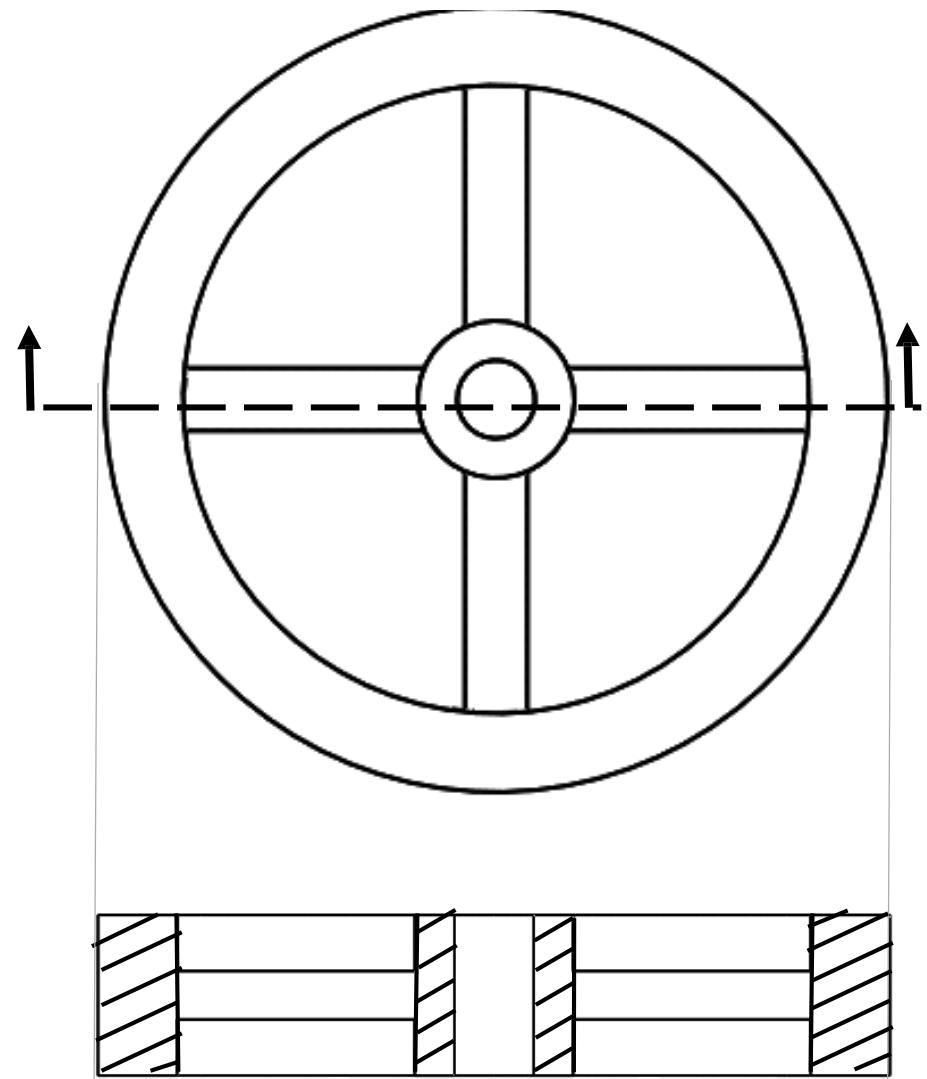
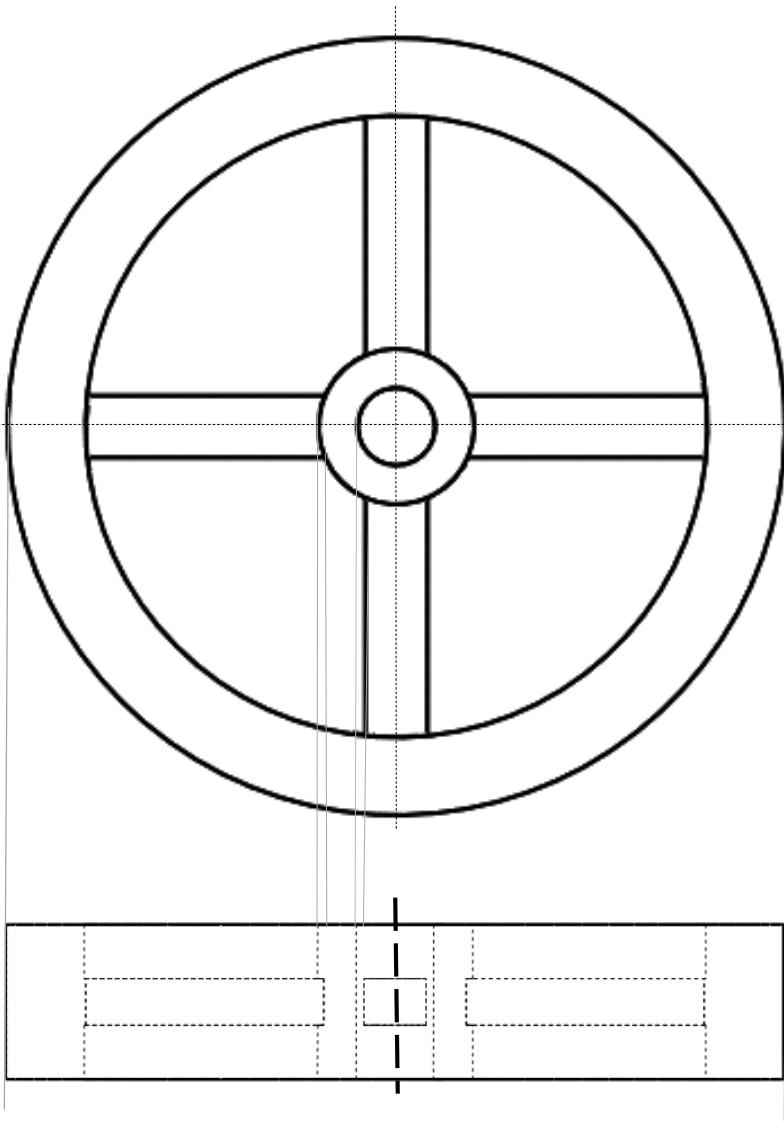
2. Draw front view and top view of the object shown in **Figure P1.2**. Use convention for the radially arranged holes.



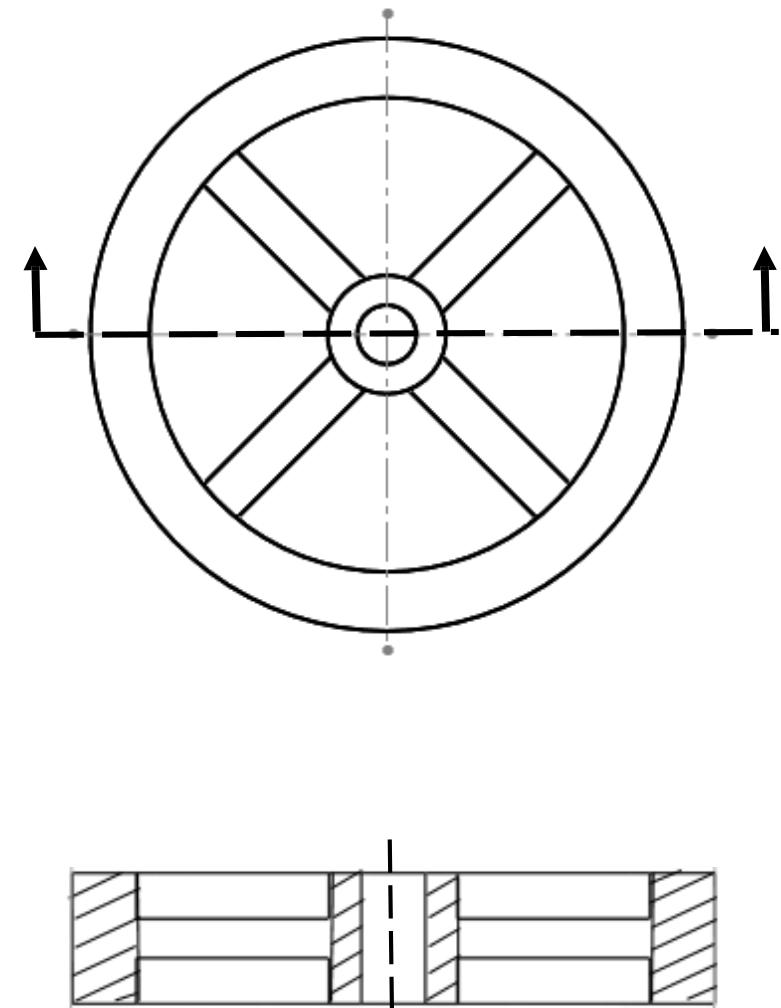
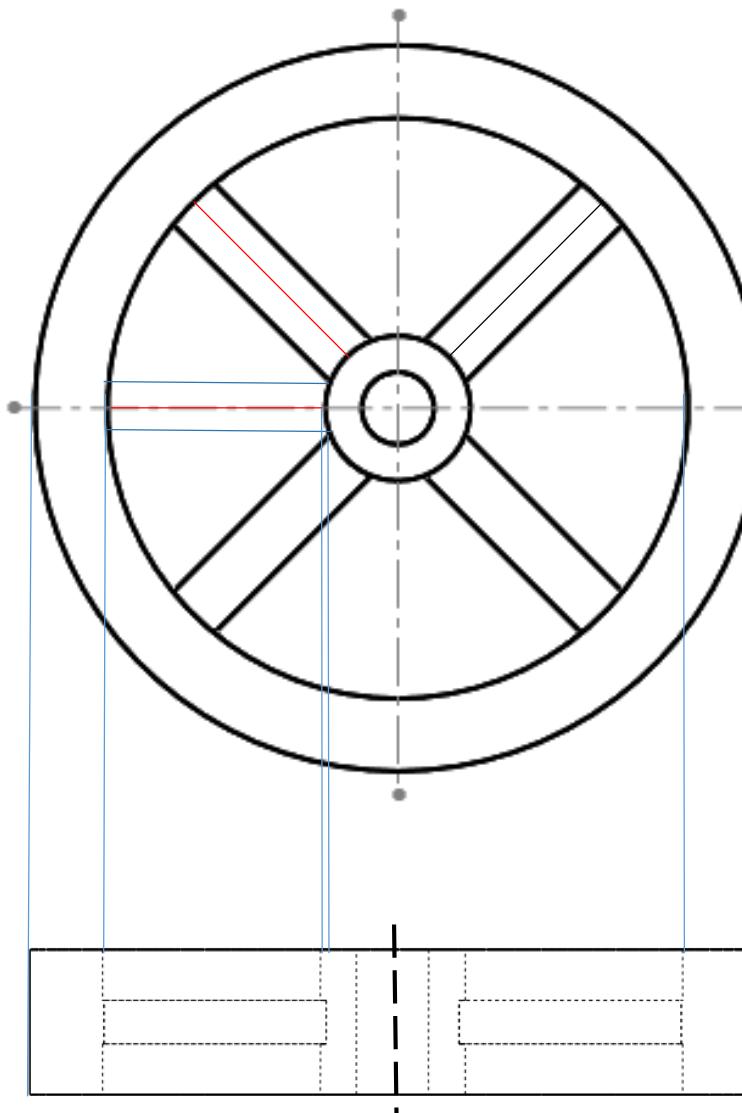
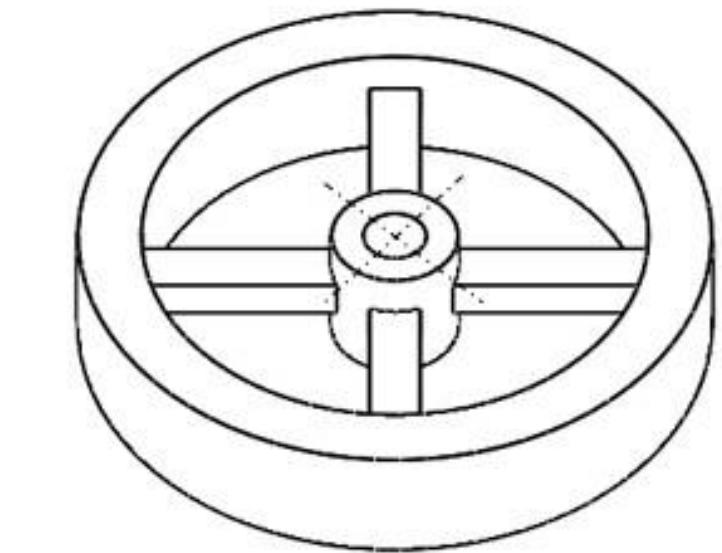
3. Draw sectional front view and top view of the objects shown in **Figure P1.3**. Use convention for the radially arranged



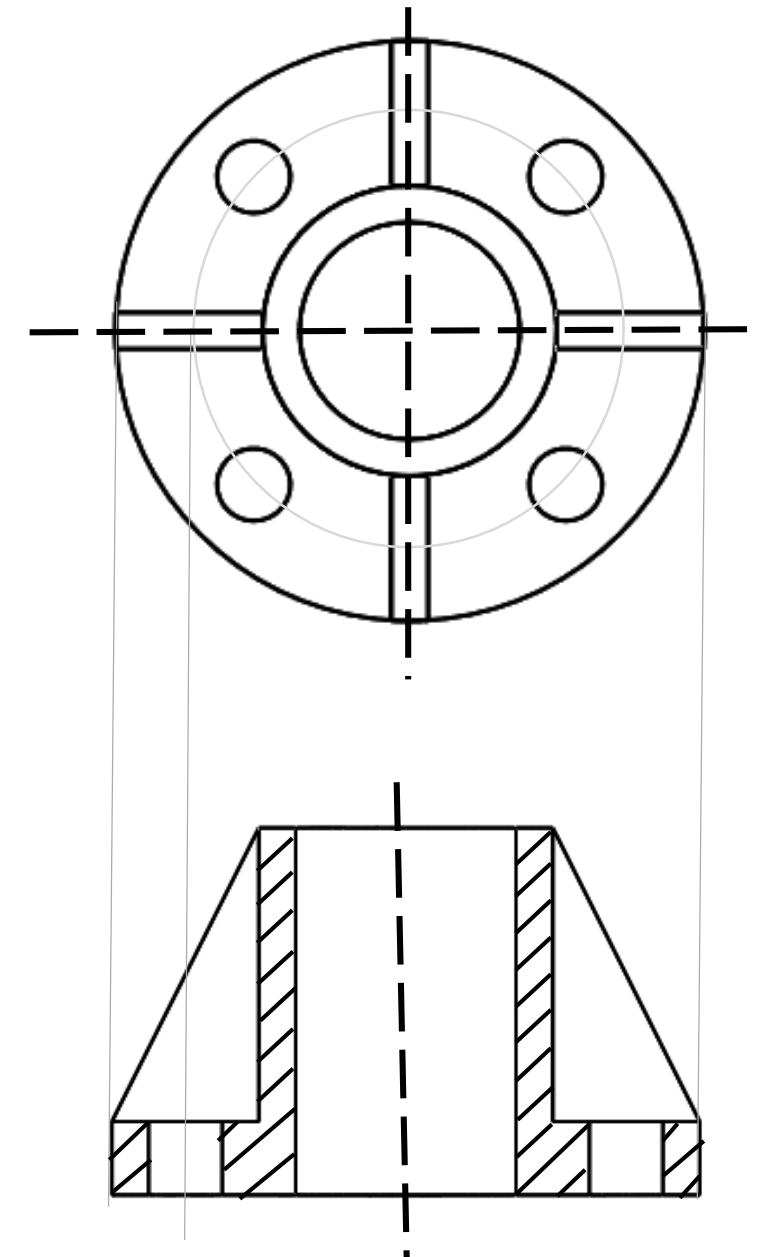
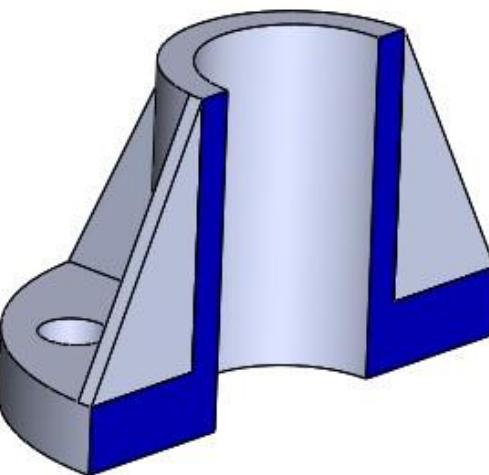
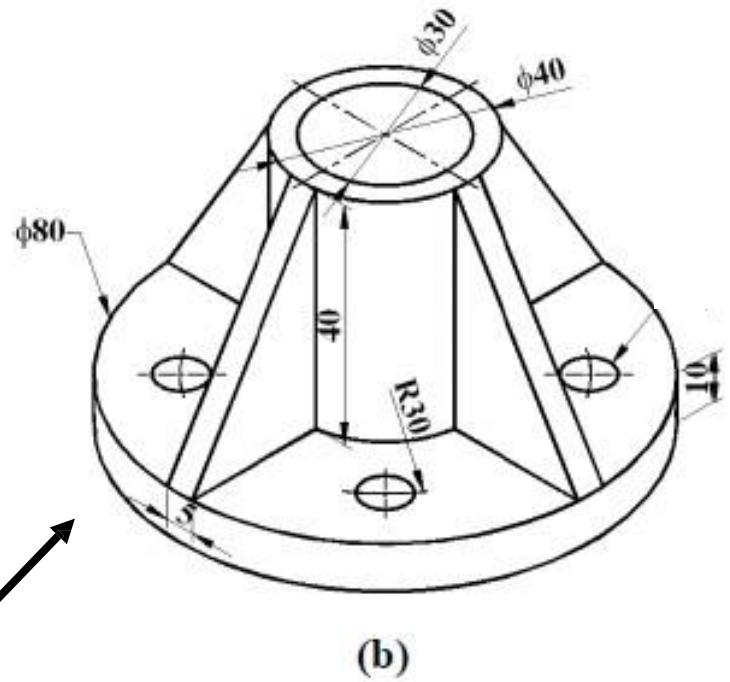
(a)



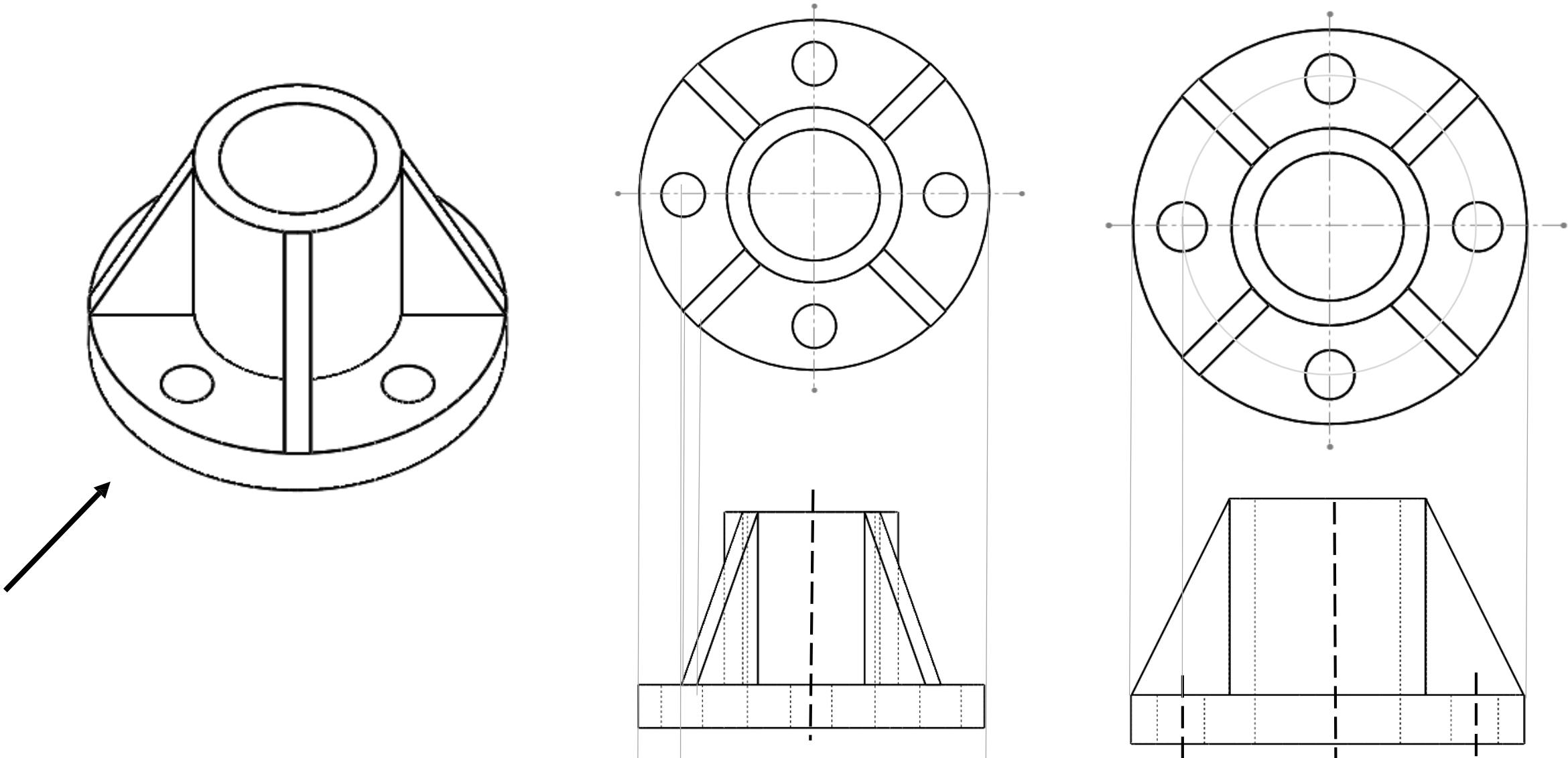
If spokes are not aligned with the axis line of isometric figure: Use ALIGNED method



3. Draw sectional front view and top view of the objects shown in **Figure P1.3**. Use convention for the radially arranged holes, ribs and spokes.

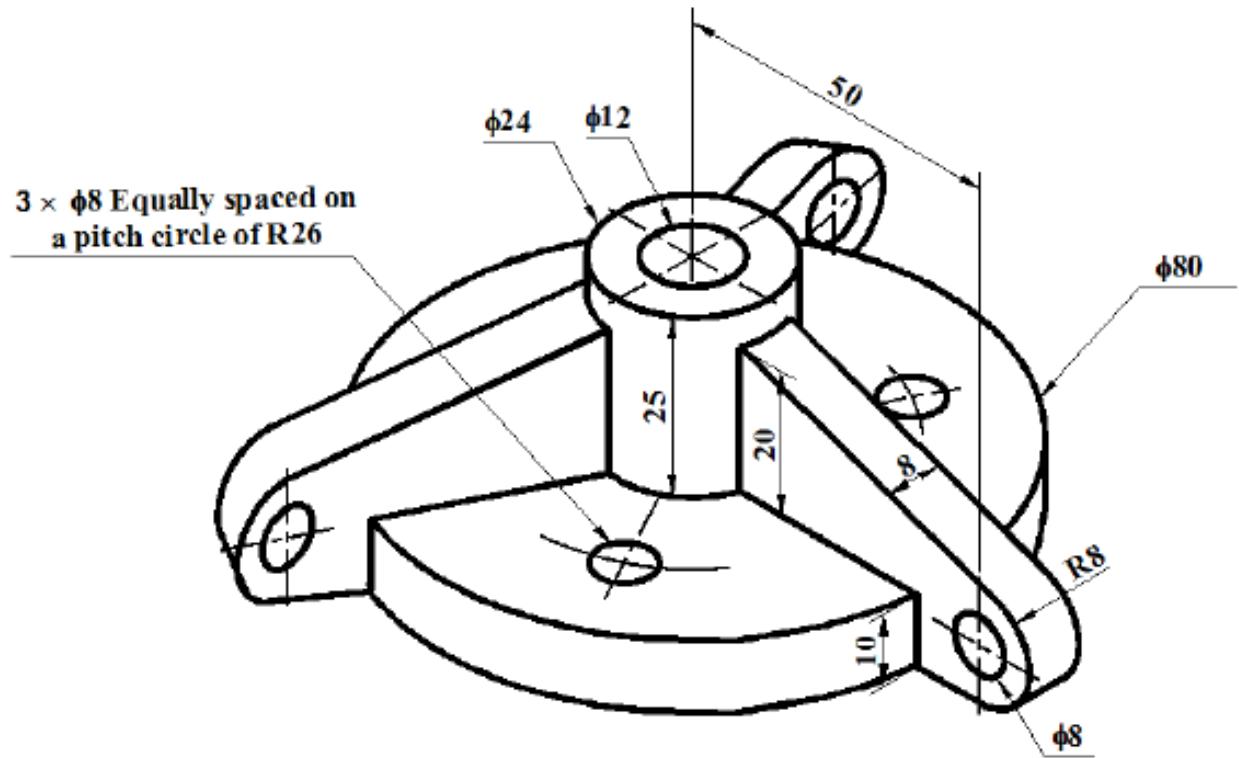


If ribs, webs, hole or spokes are not aligned with the axis line of isometric figure: Use ALIGNED method



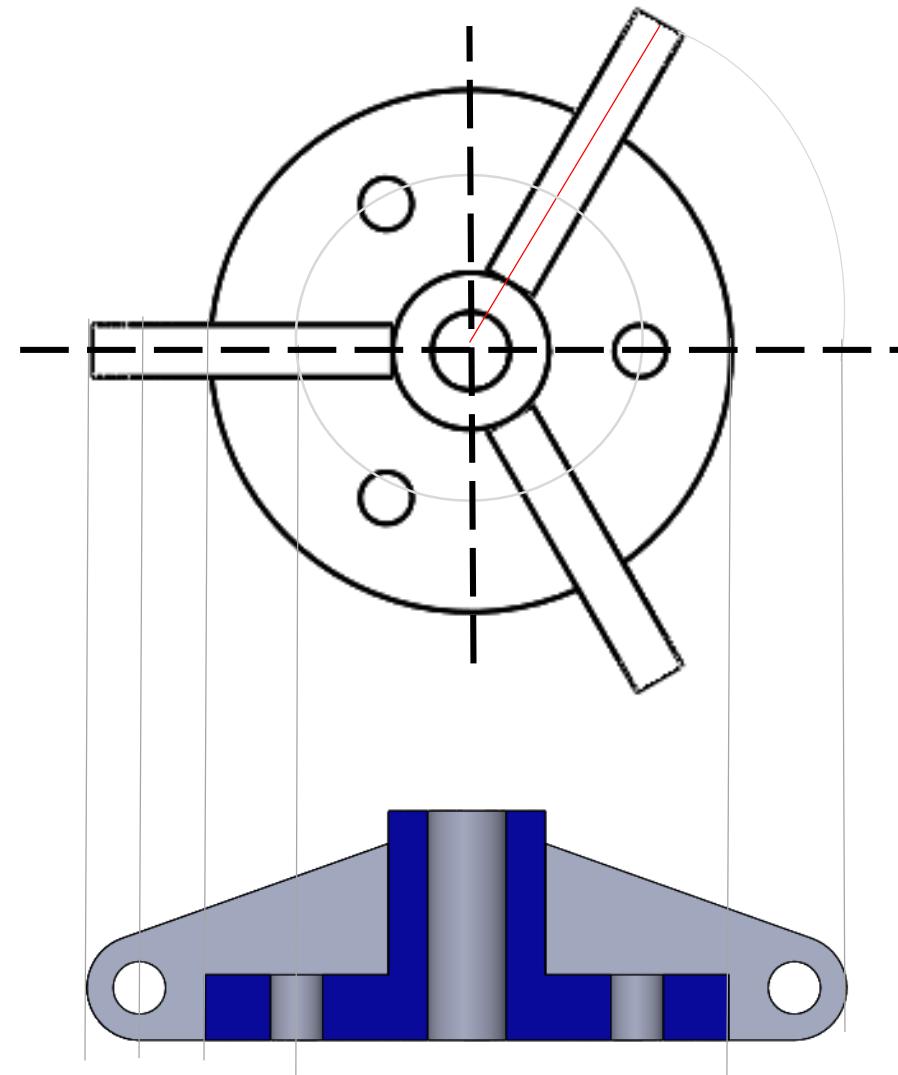
True Projection  
(Not Preferred)

Conventional Practice <sub>10</sub>  
( Preferred)

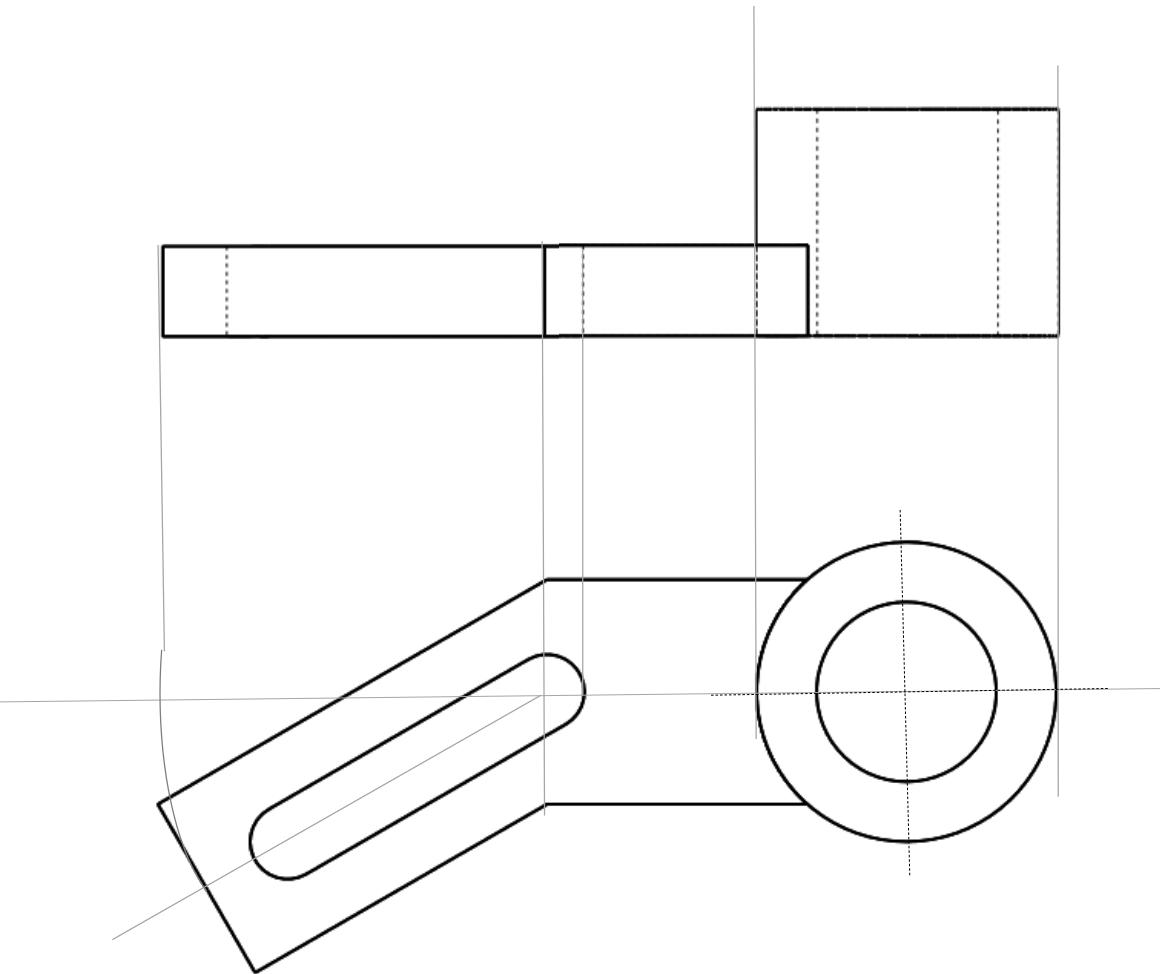
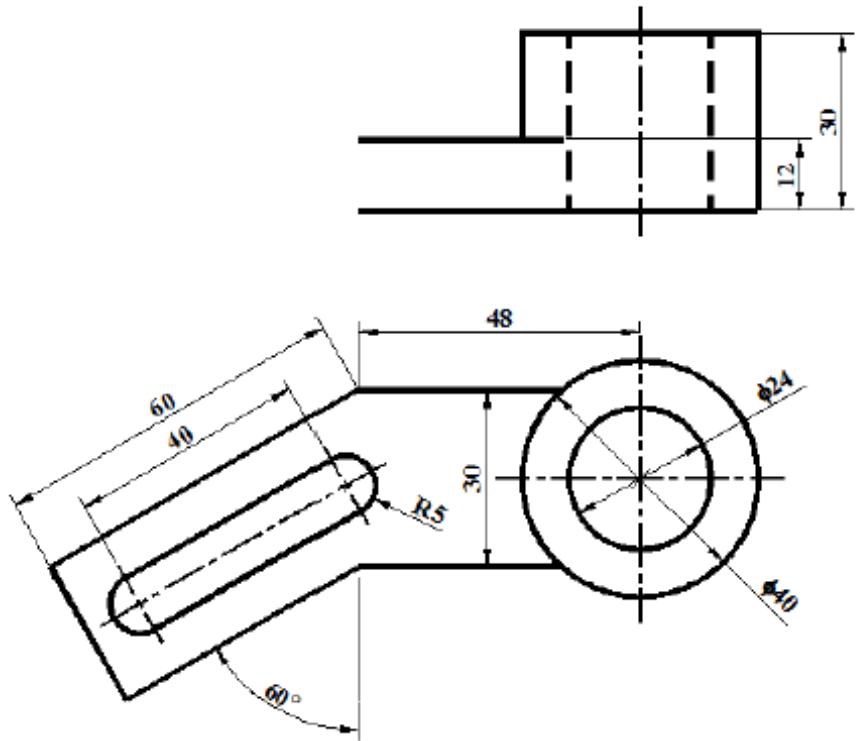


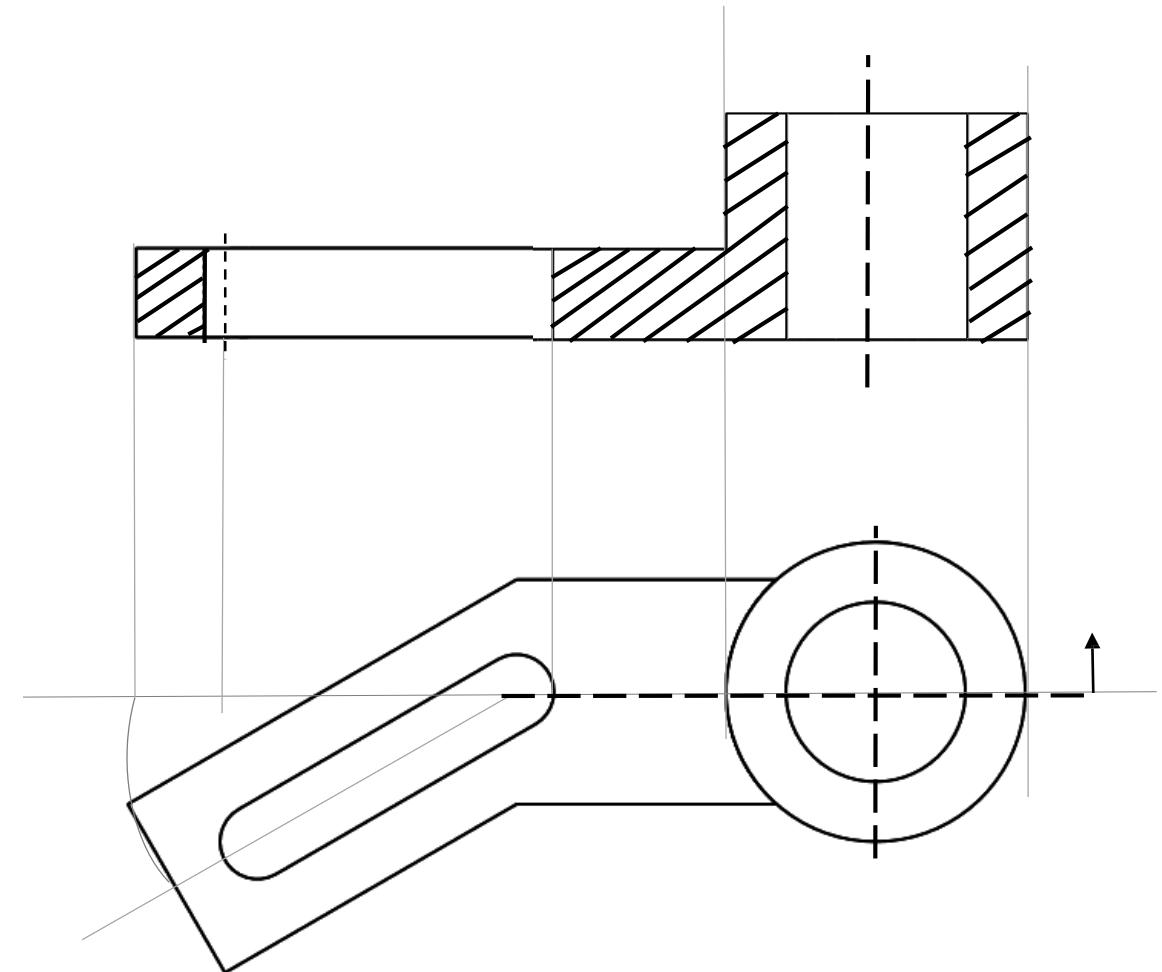
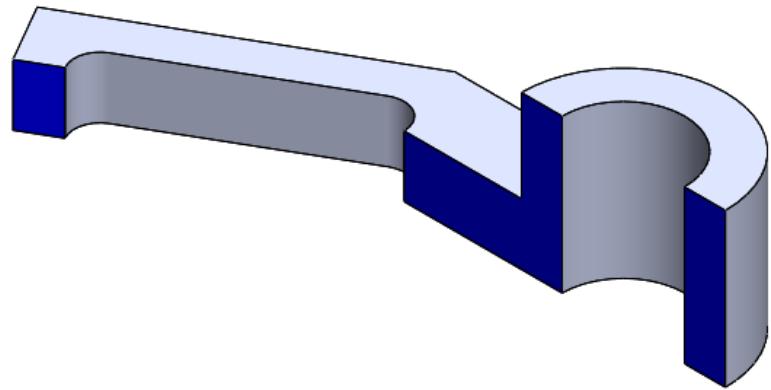
(c)

Figure P1.3

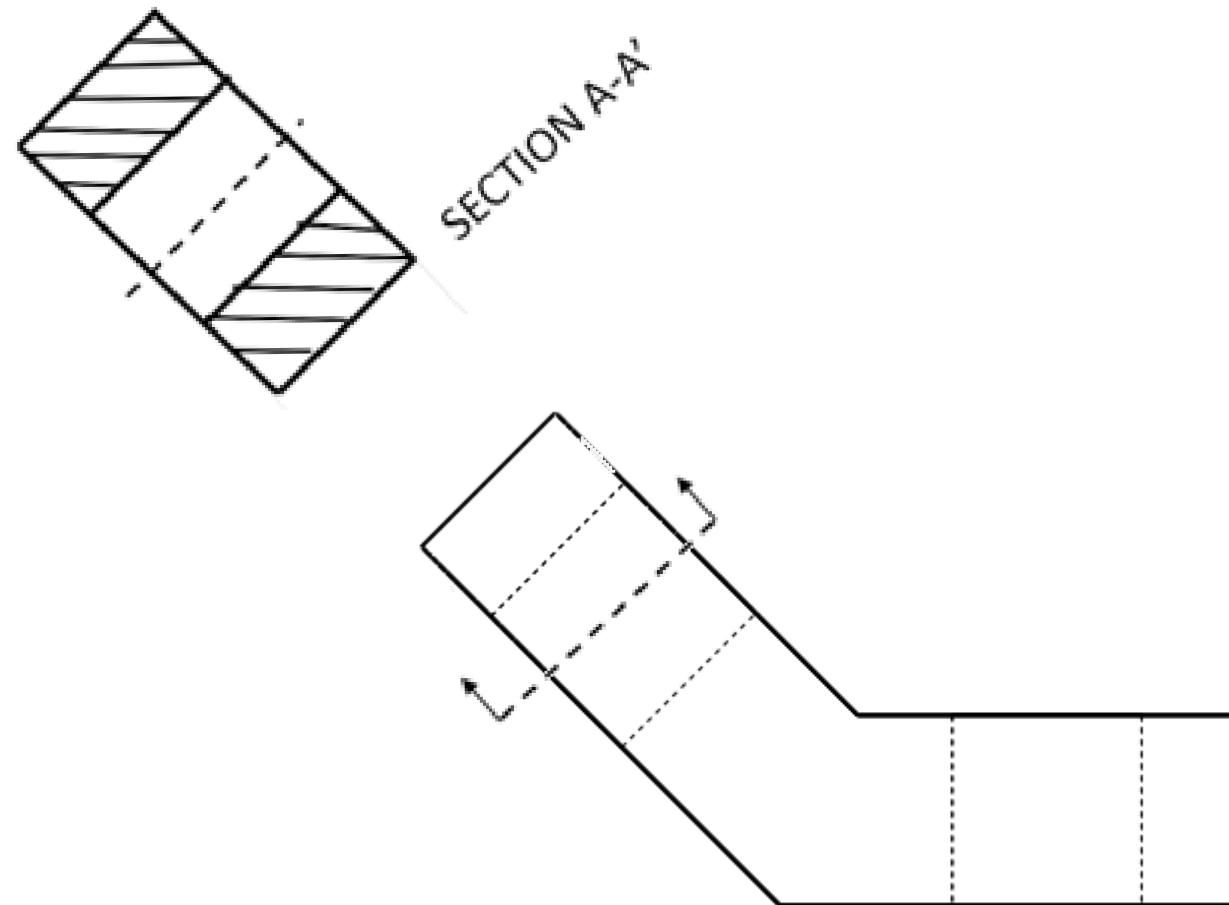
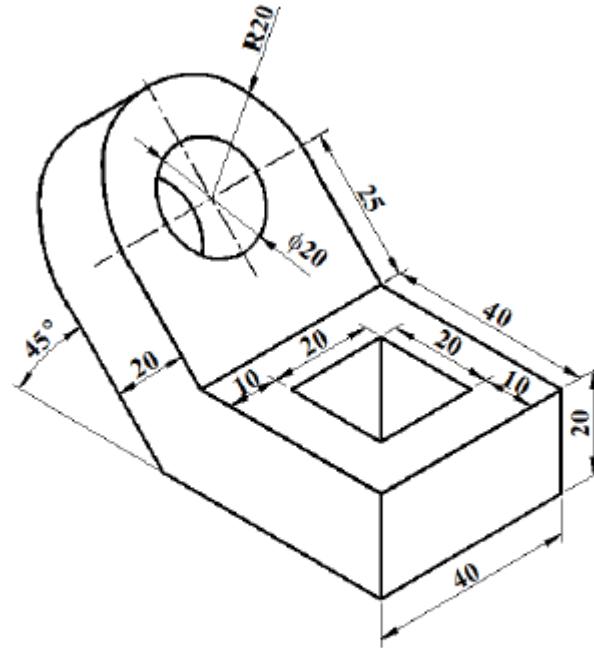


4. Top view and partial front view of an object shown in **Figure P1.4**. Draw its sectional front view.





5. Draw auxiliary sectional view of the object shown in **Figure P1.5**. Use auxiliary cutting plane passing through middle of the cylindrical hole.



**Figure P1.5**

6. Draw auxiliary sectional view of the object shown in Figure P1.6.

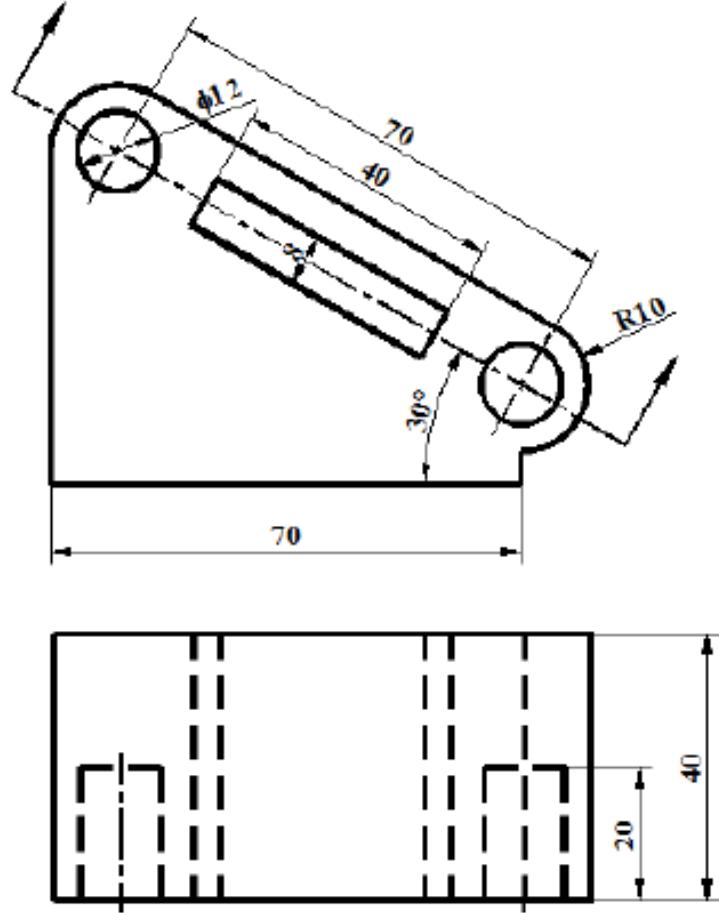
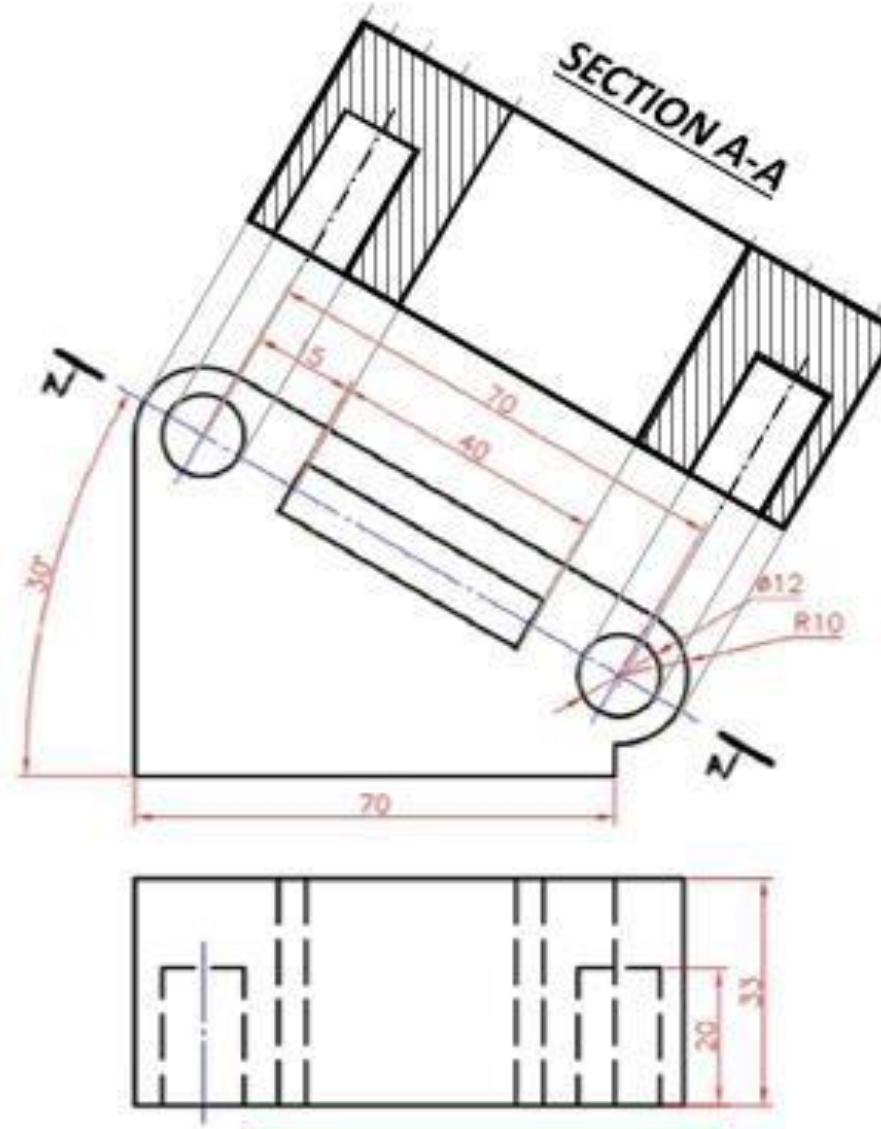
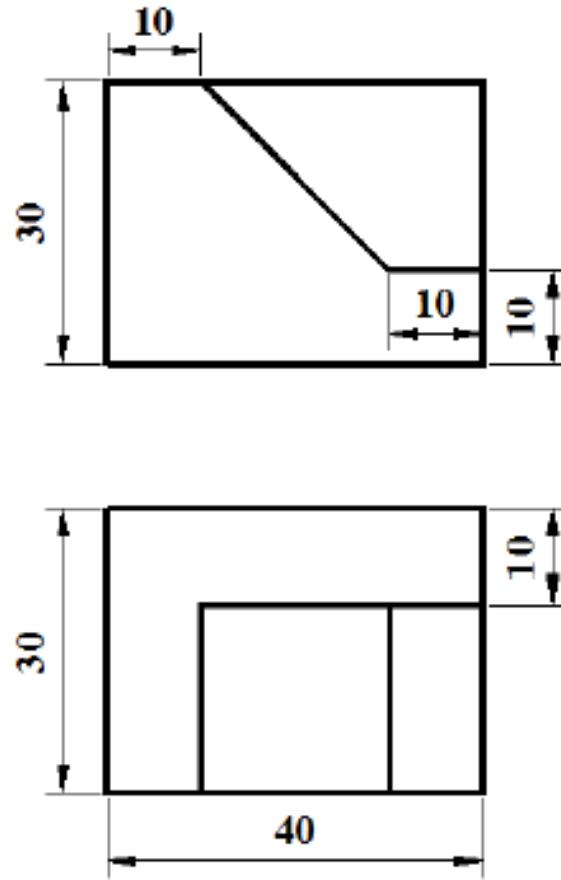


Figure P1.6

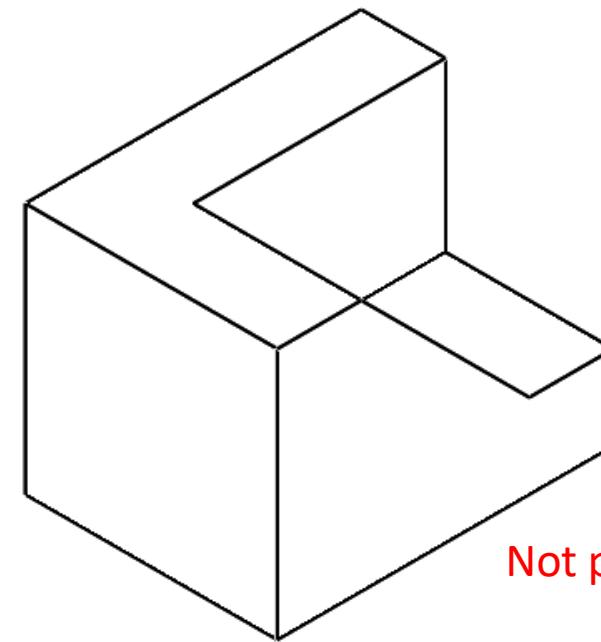
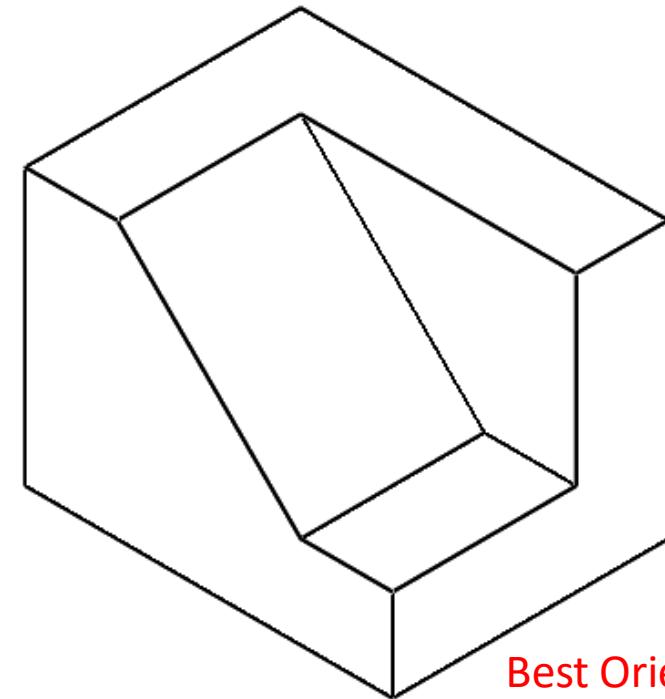
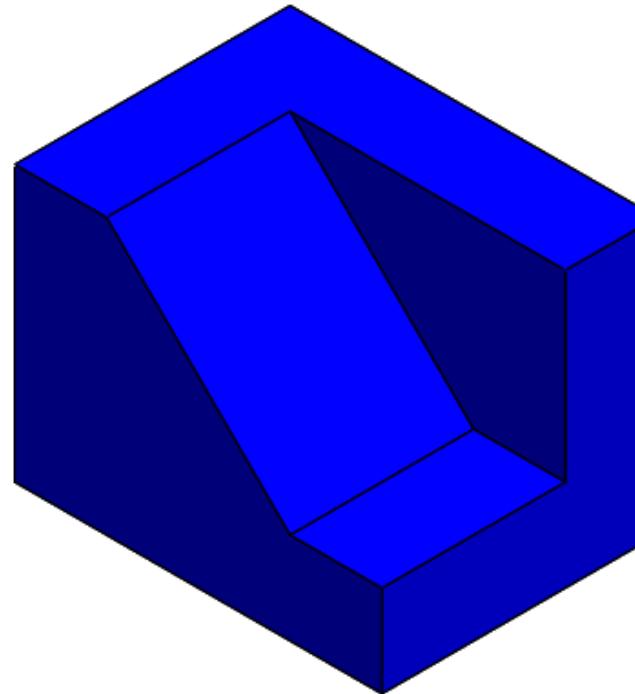


AUXILIARY SECTION

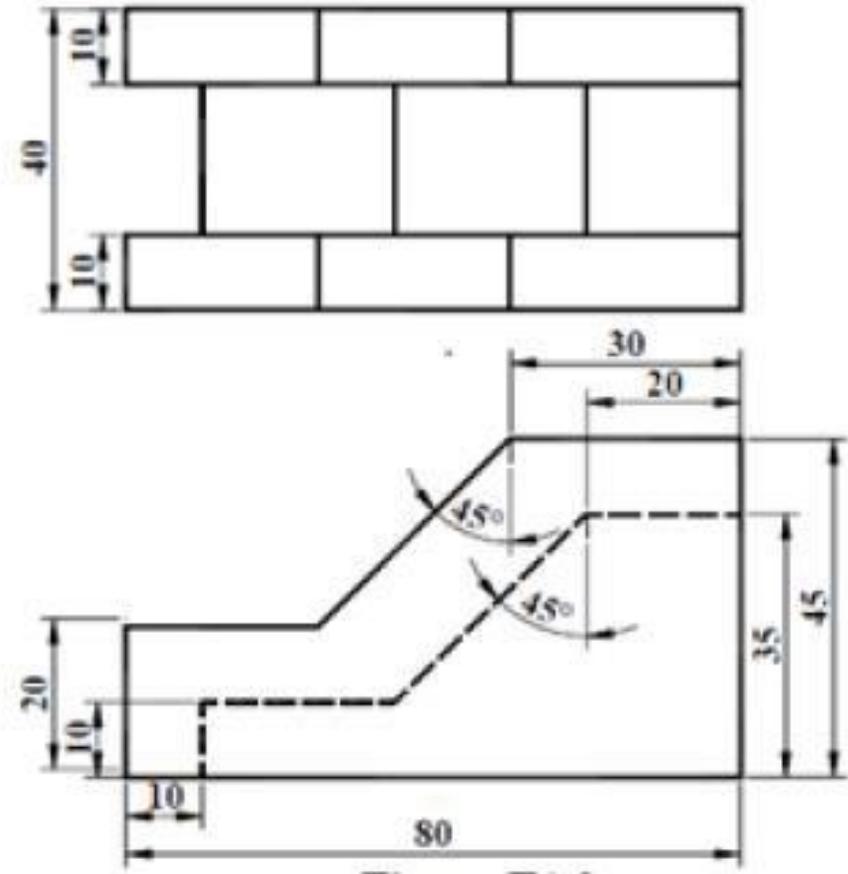
# ISOMETRIC- SOLUTIONS



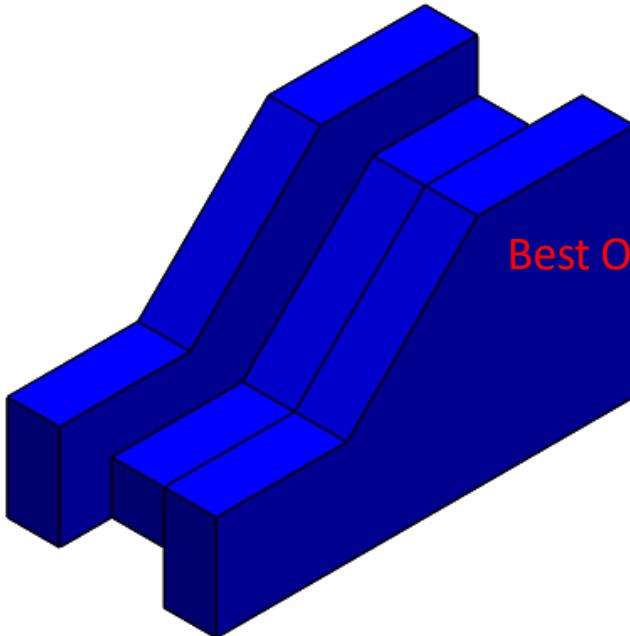
**Figure P2.1**



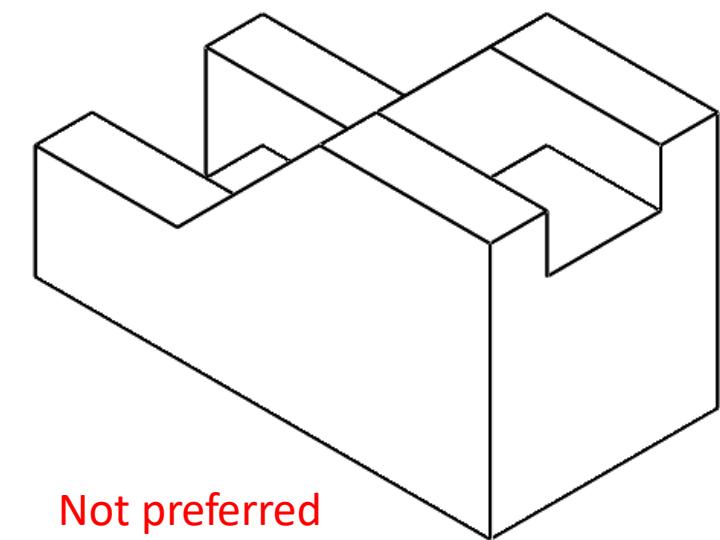
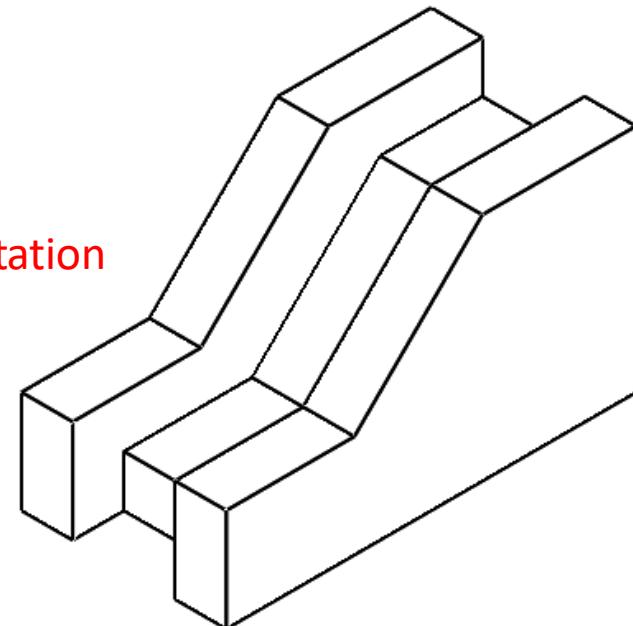
Not preferred



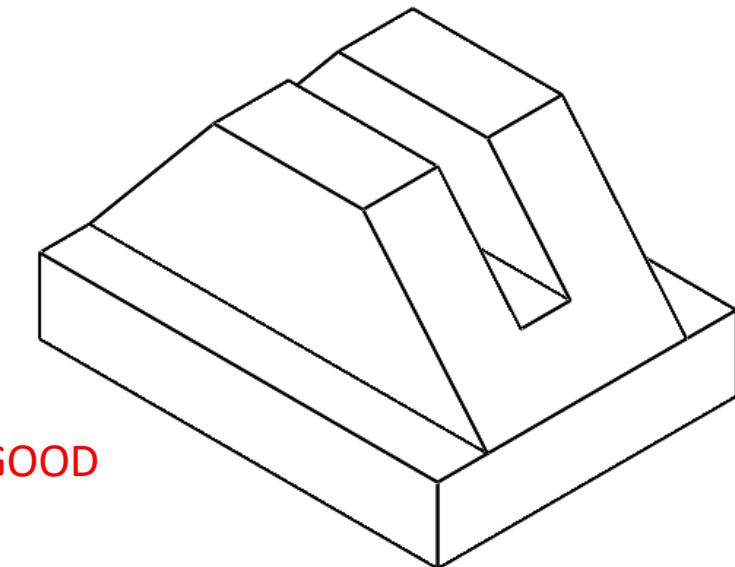
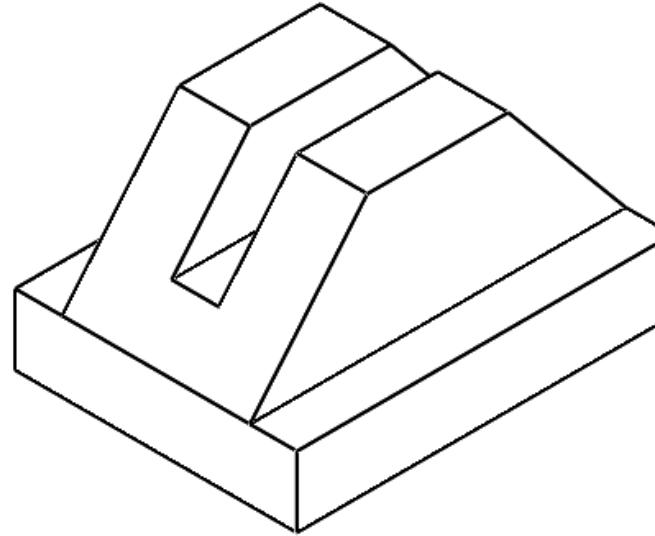
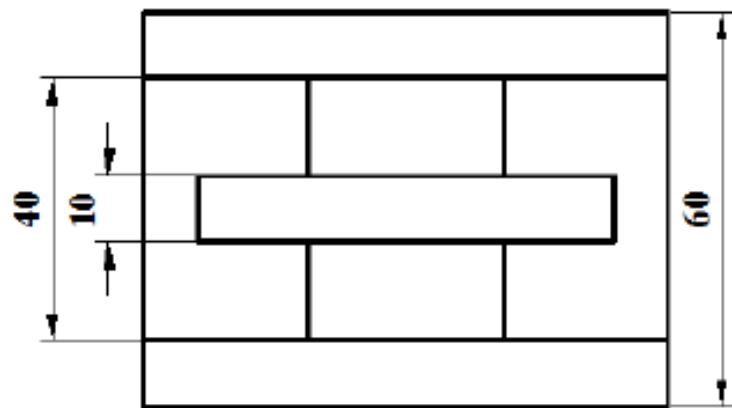
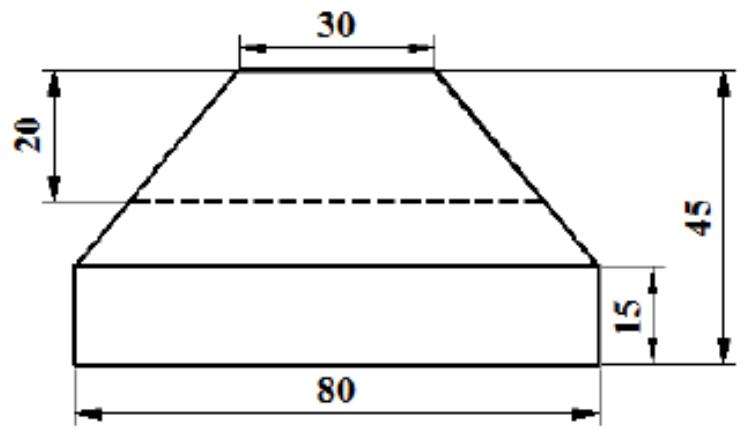
**Figure P2.2**



Best Orientation



Not preferred



Both GOOD

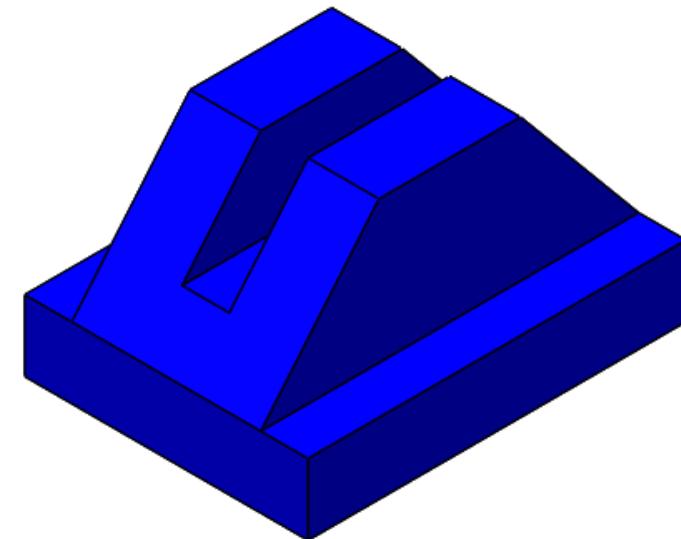


Figure P2.3

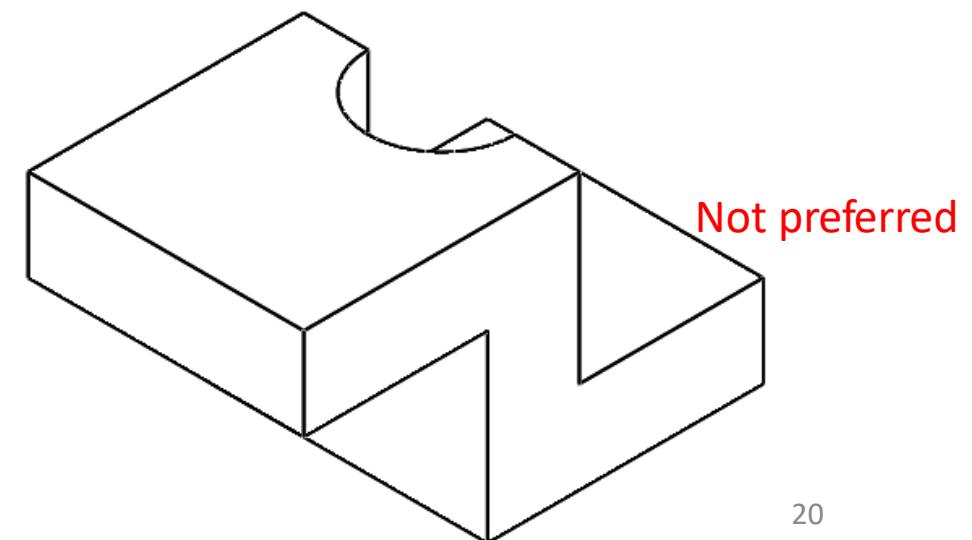
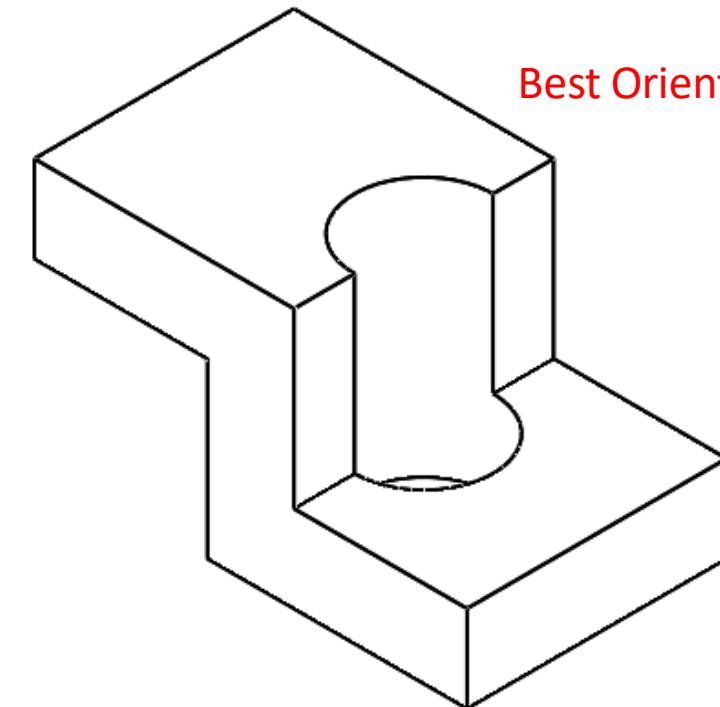
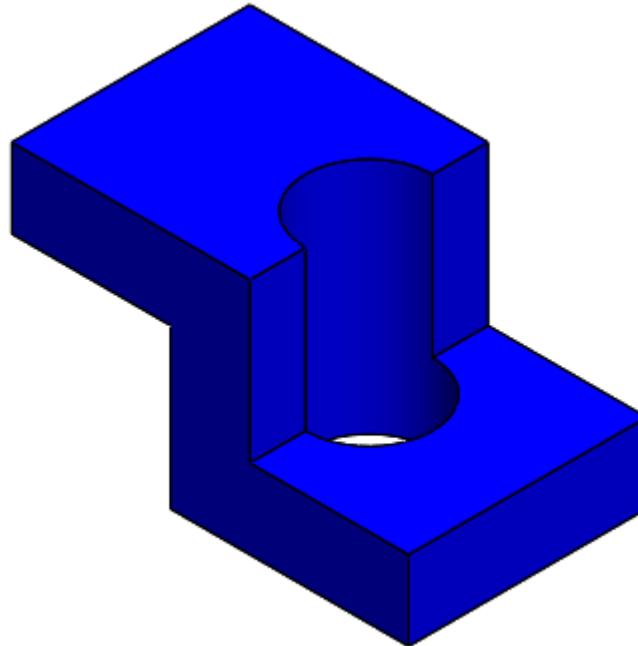
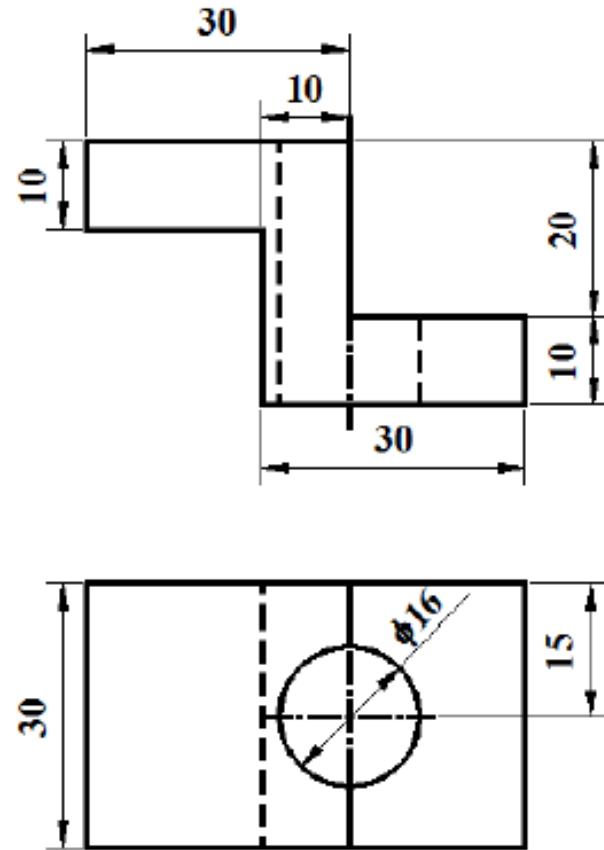
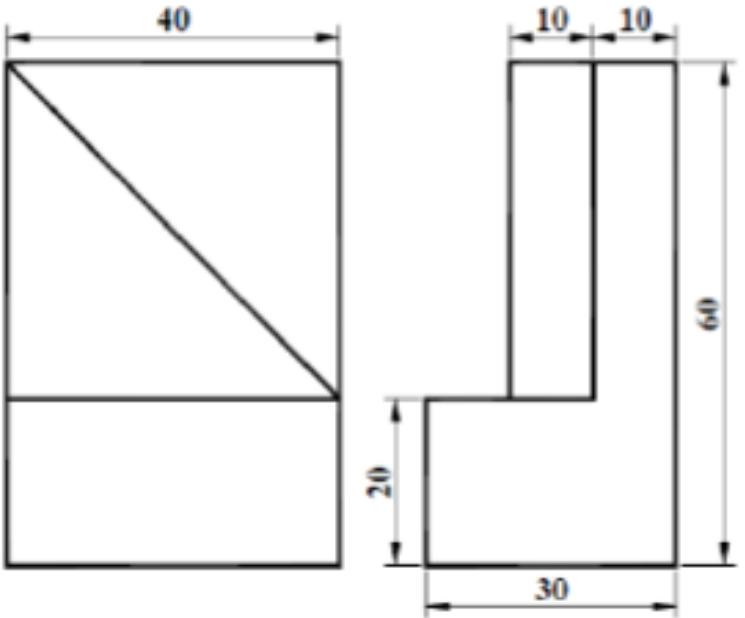
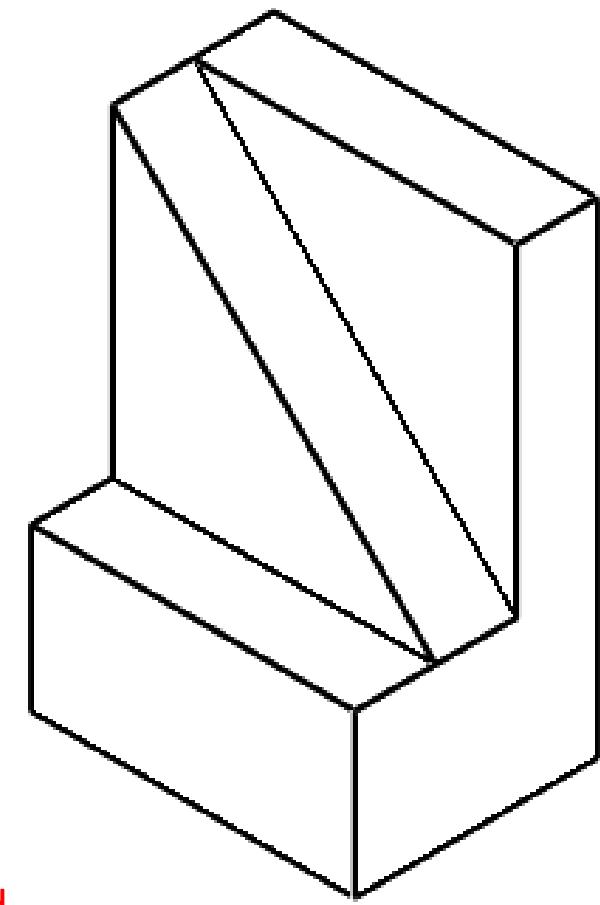
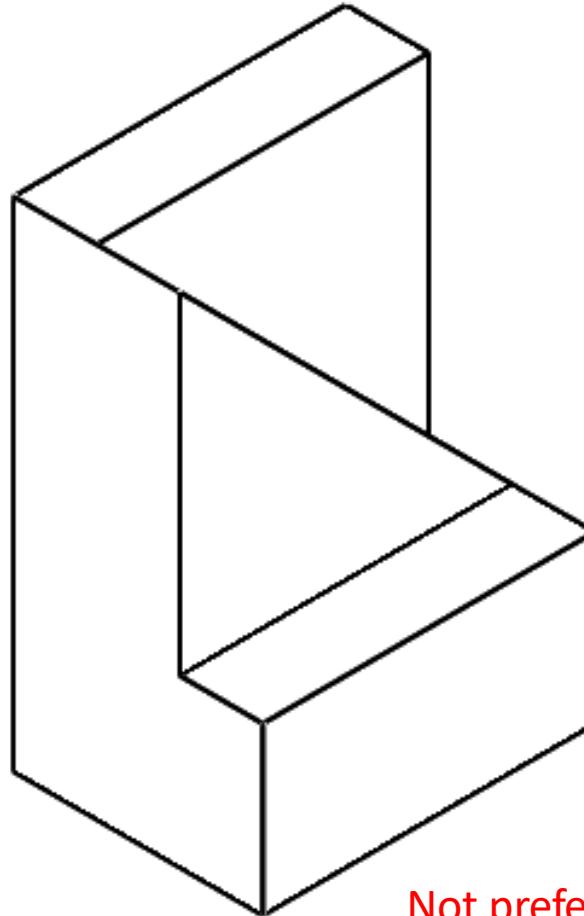
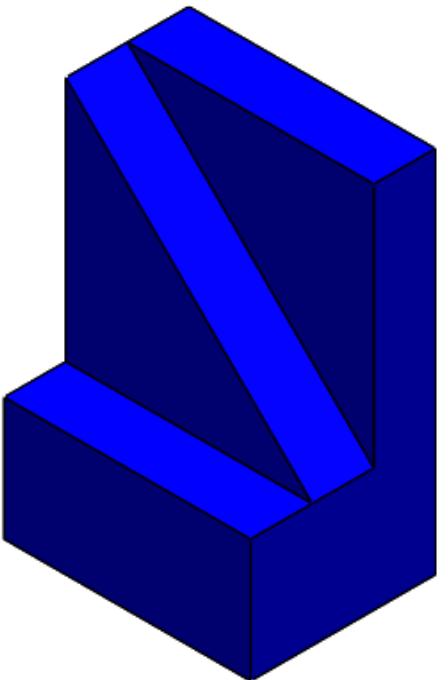
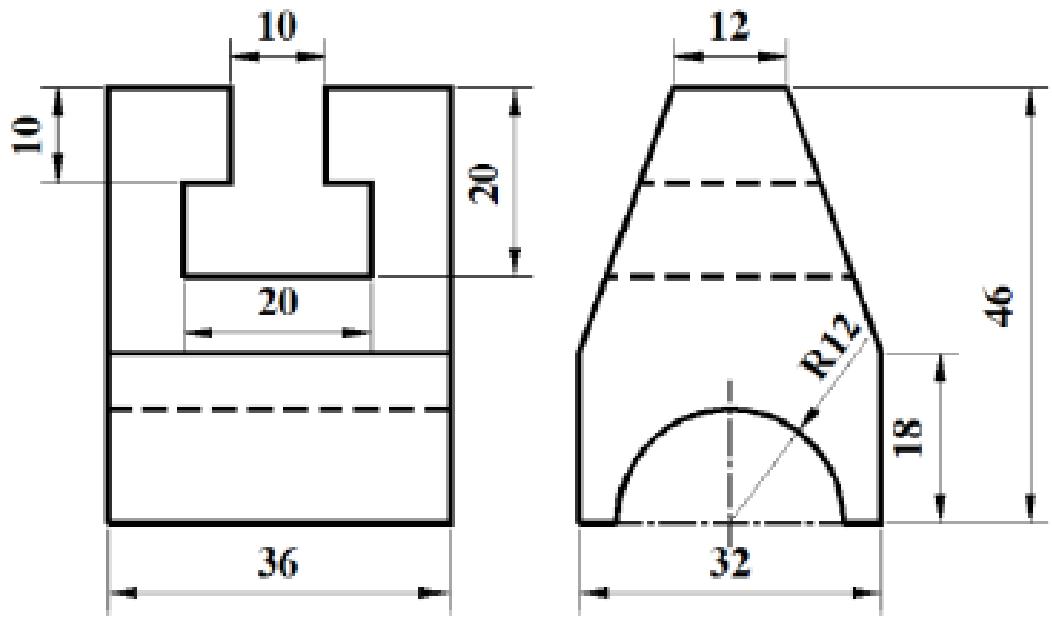


Figure P2.4

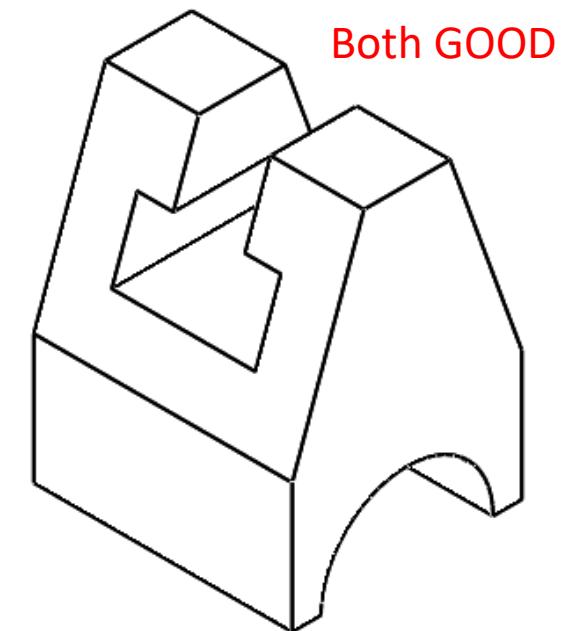
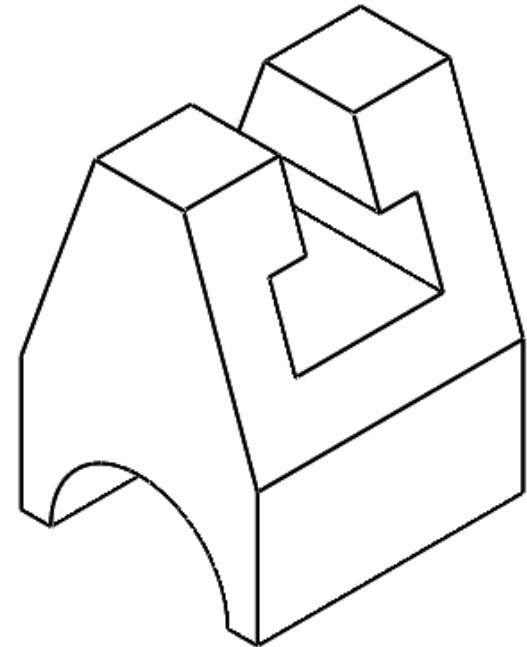
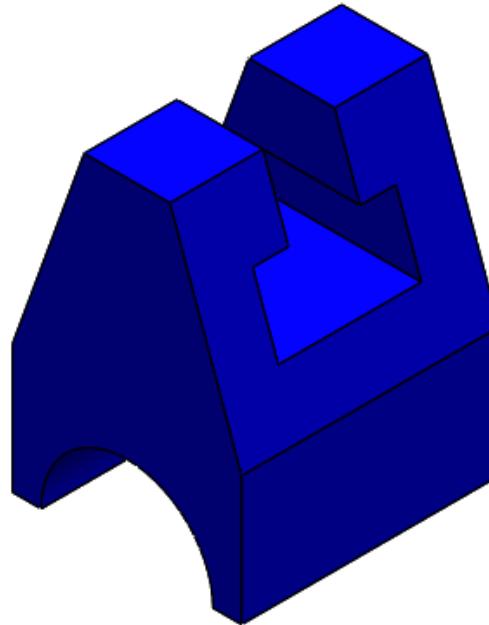


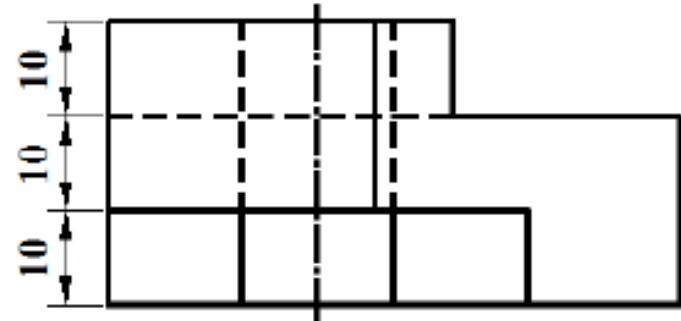
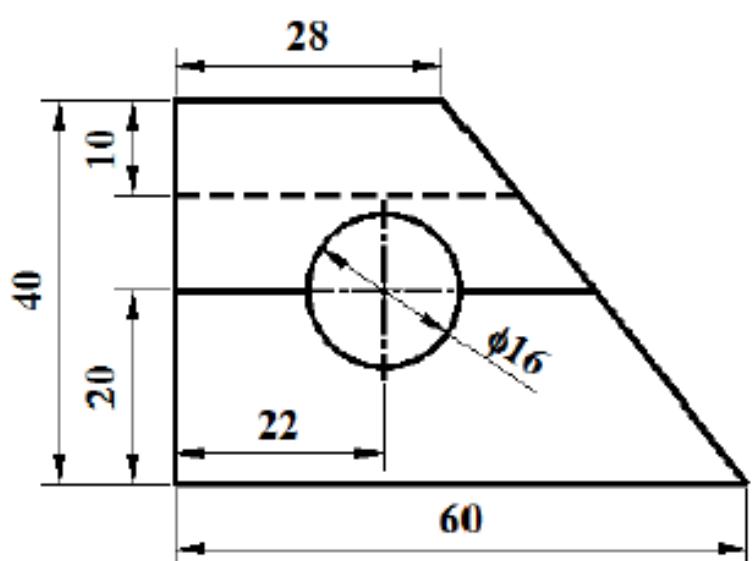
**Figure P2.5**



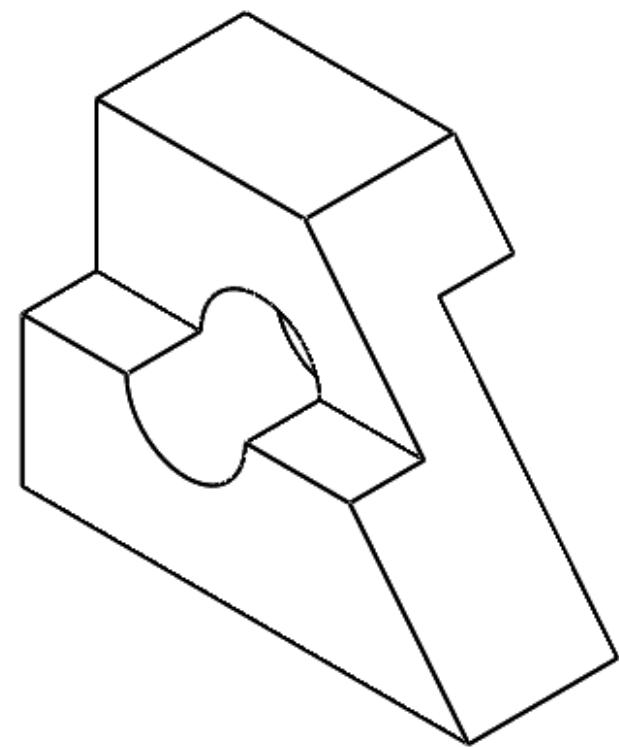
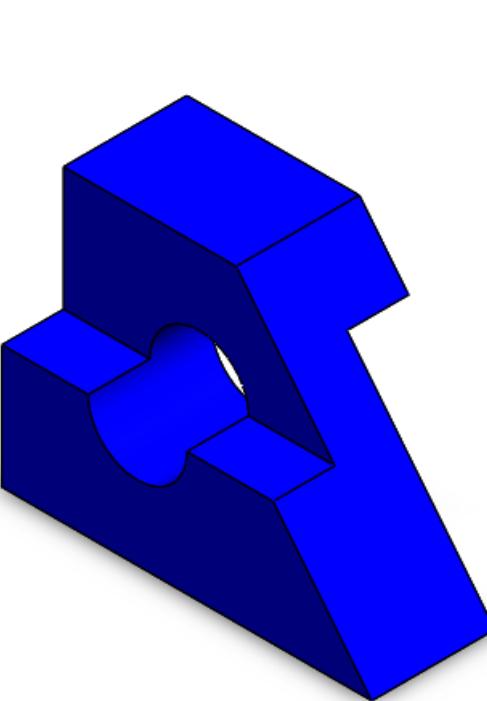


**Figure P2.6**

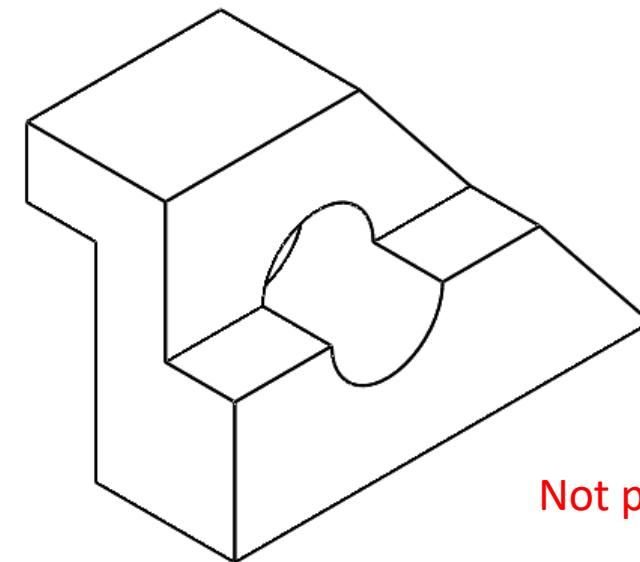




**Figure P2.7**



Best Orientation



Not preferred

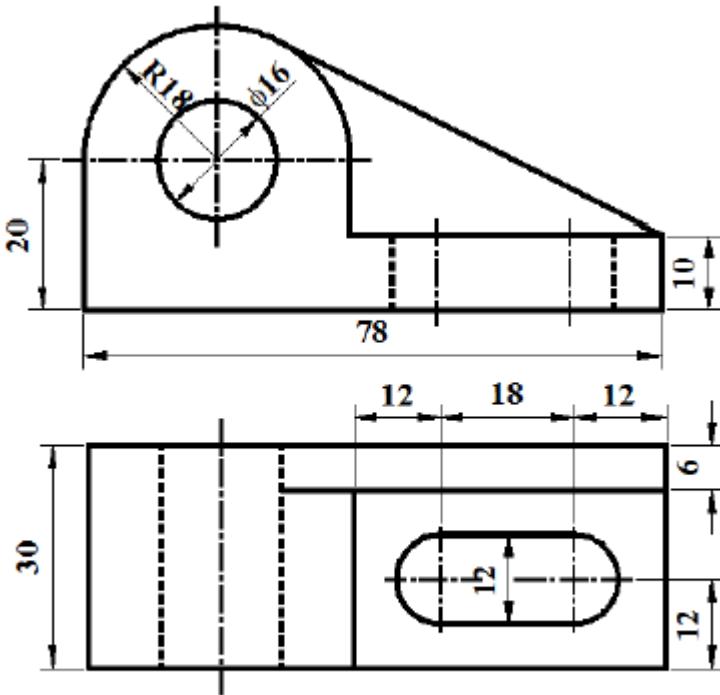
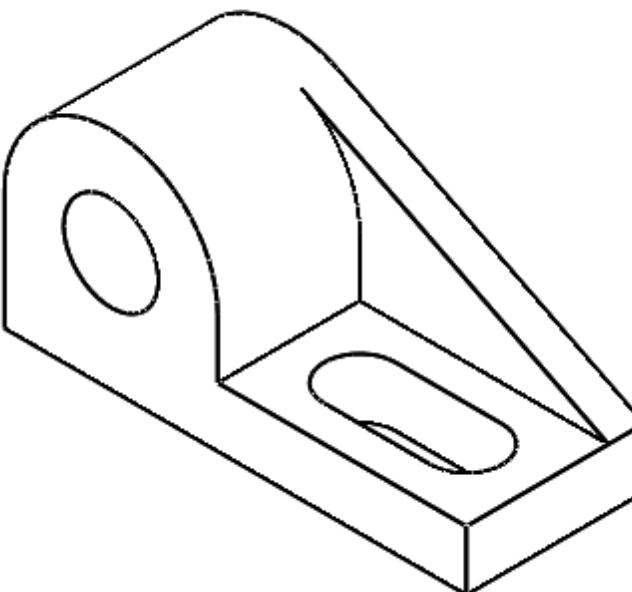
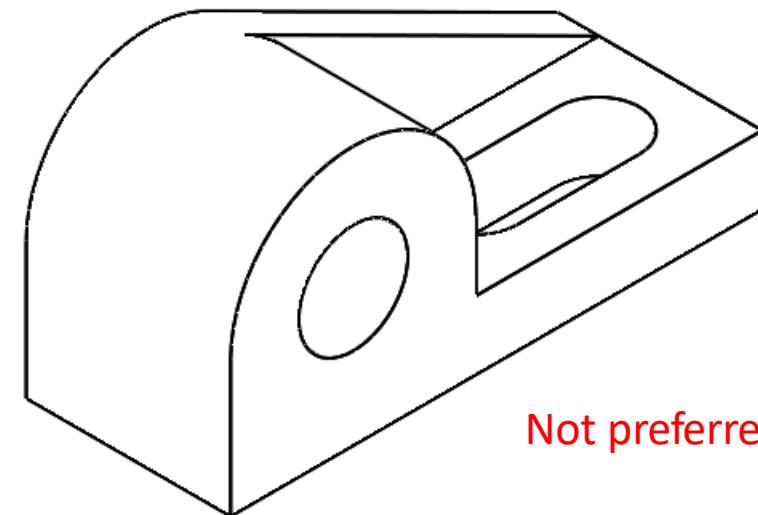
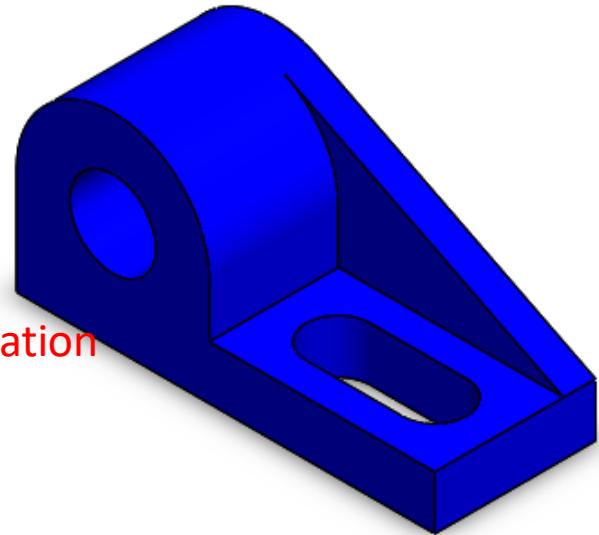


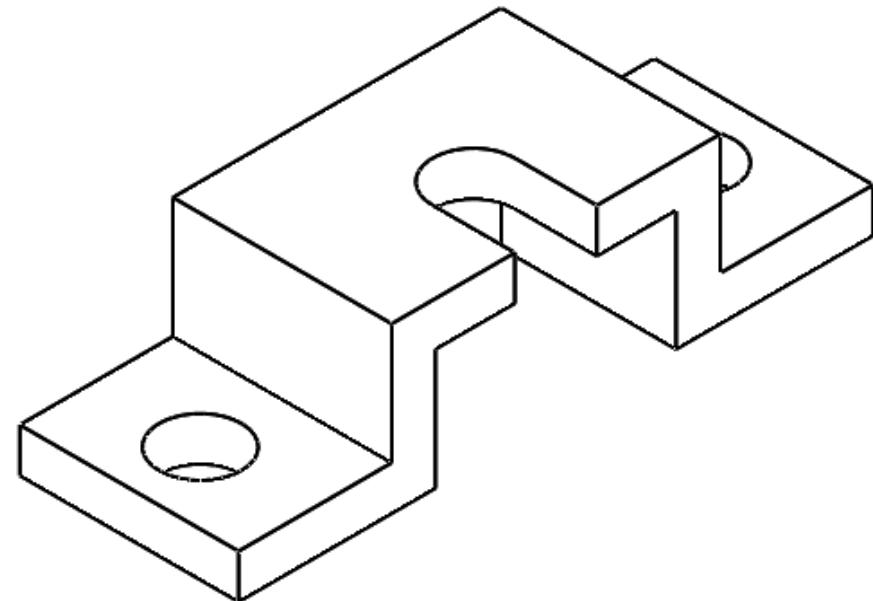
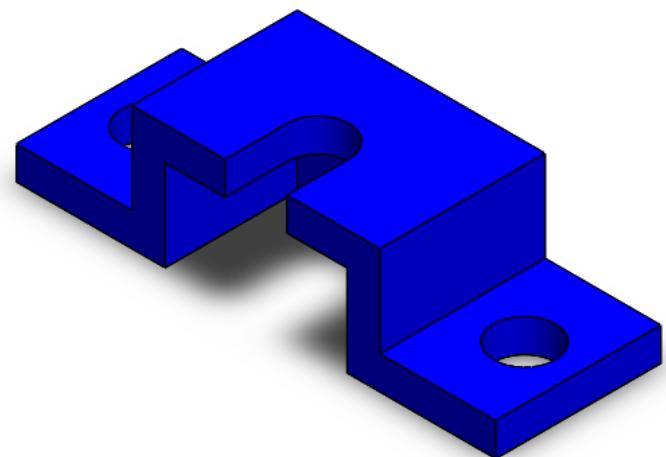
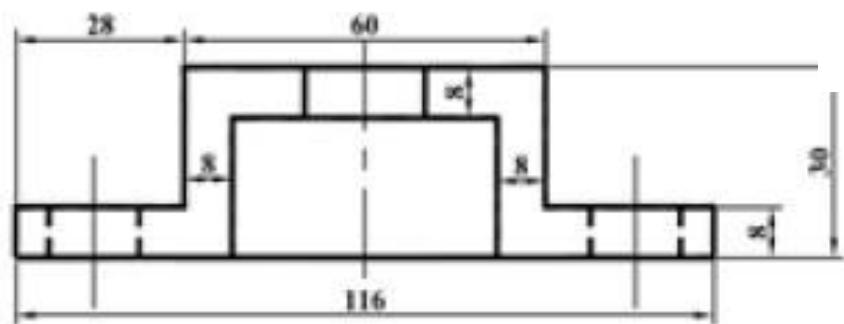
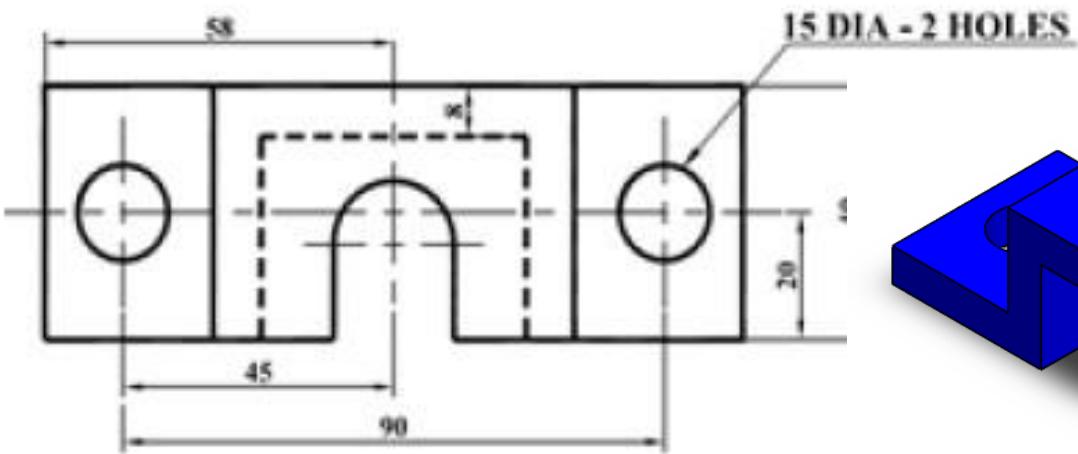
Figure P2.8



Best Orientation



Not preferred



Both GOOD

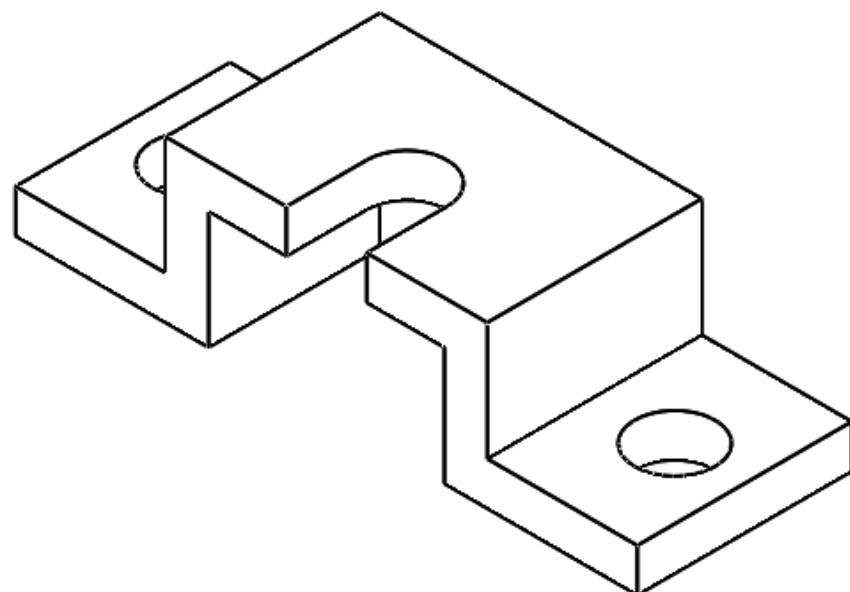
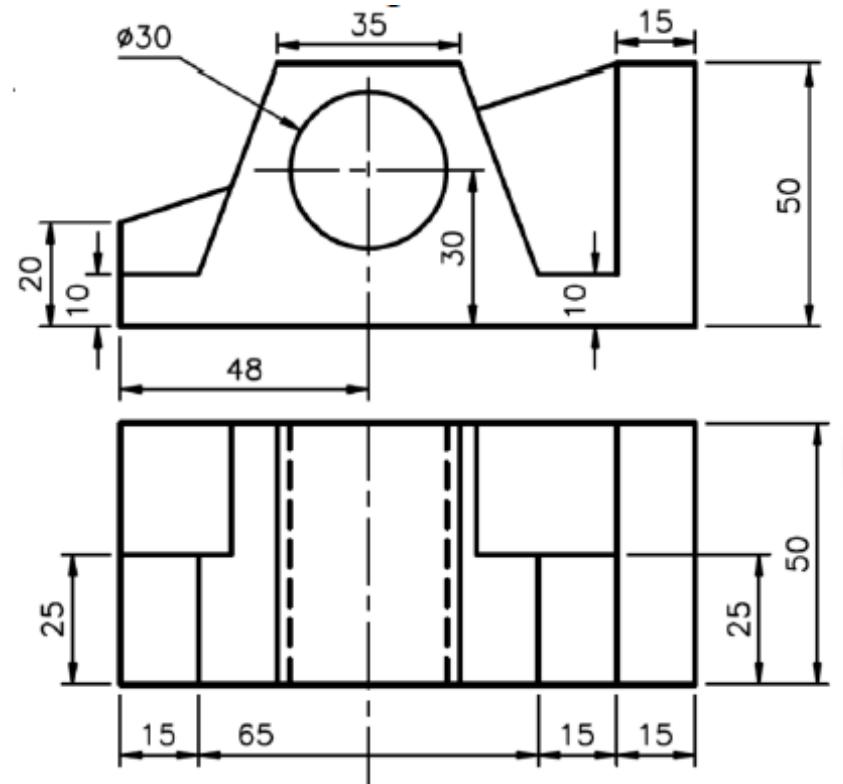
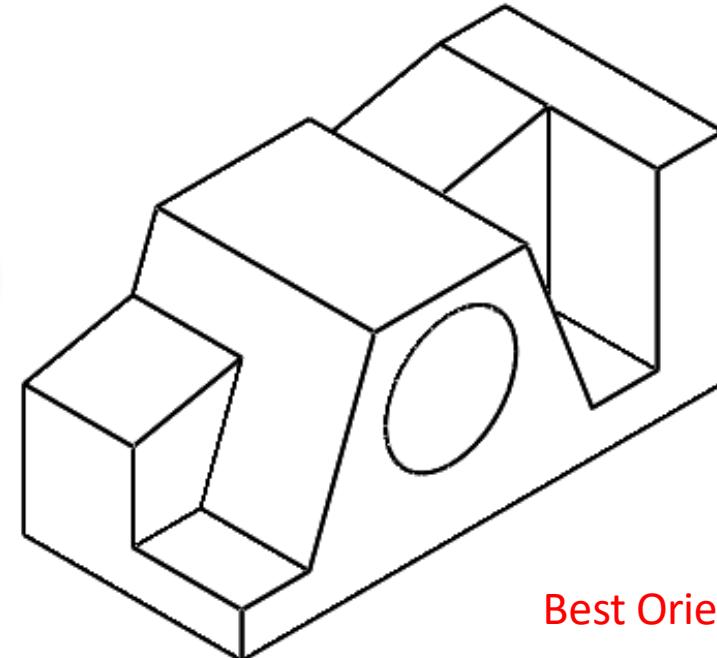
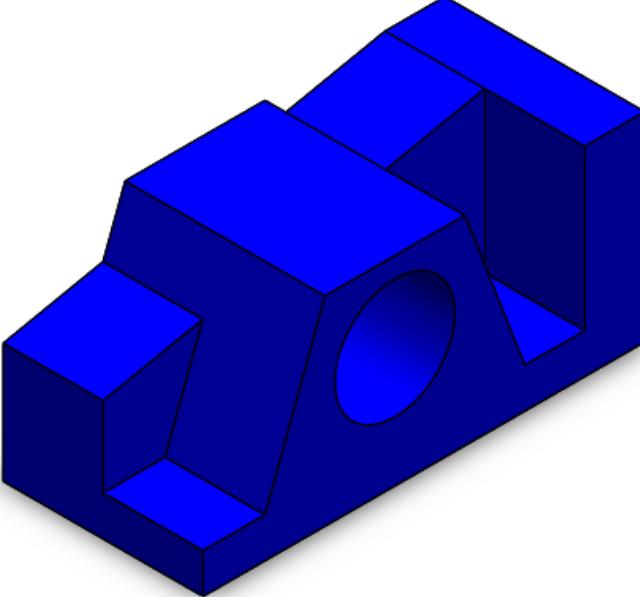


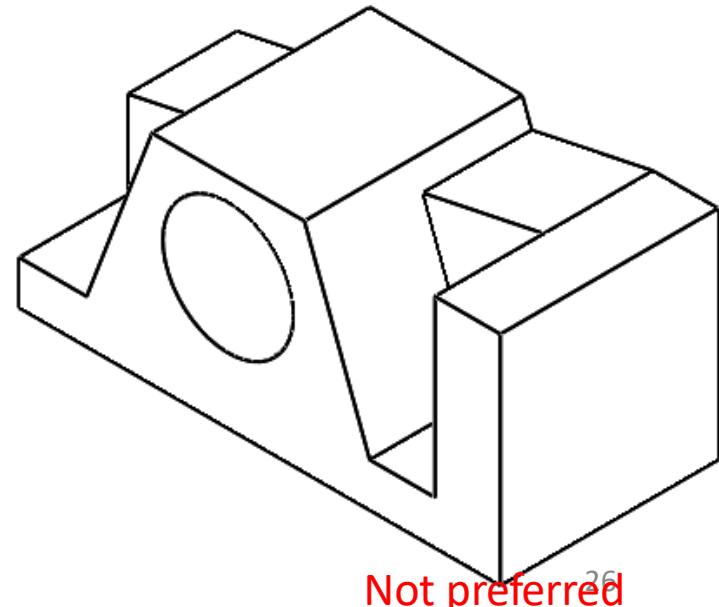
Figure P2.9



**Figure P2.10**

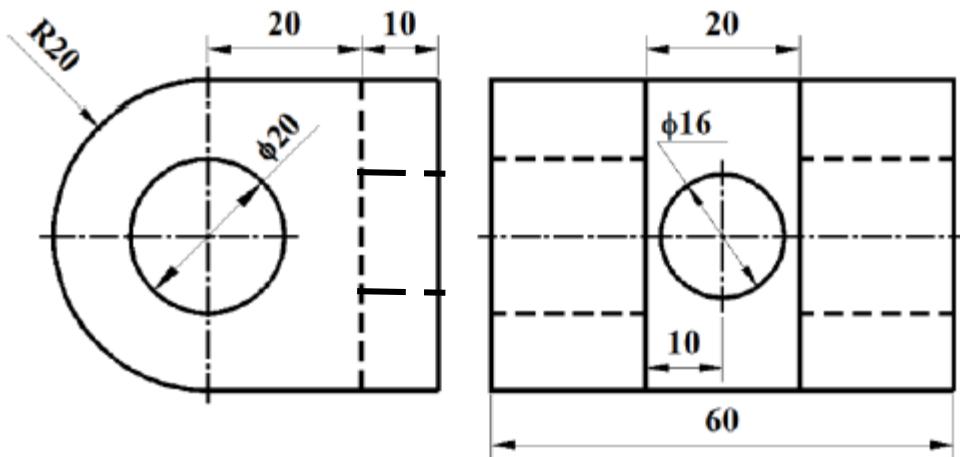


**Best Orientation**

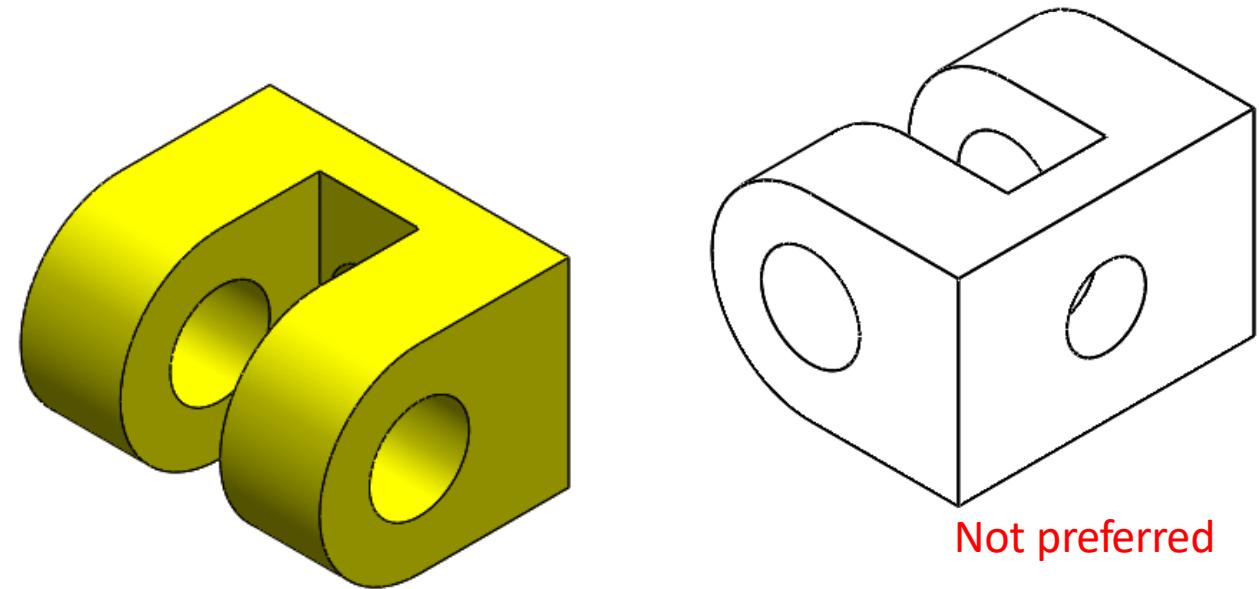


**Not preferred**

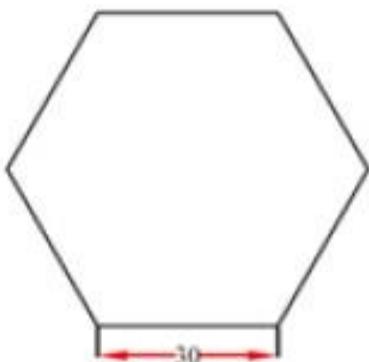
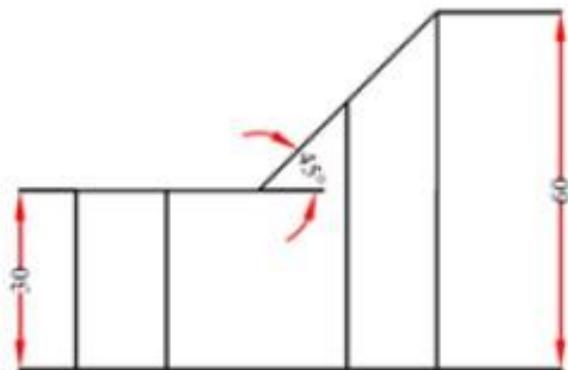
1. Draw an isometric drawing of the object with given orthographic views.



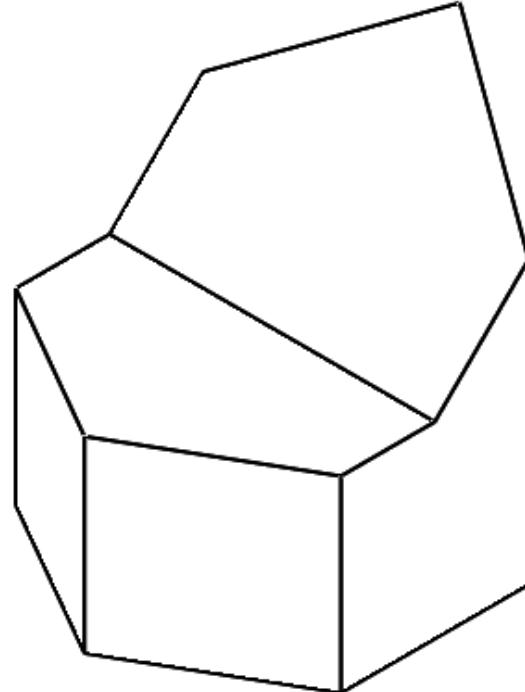
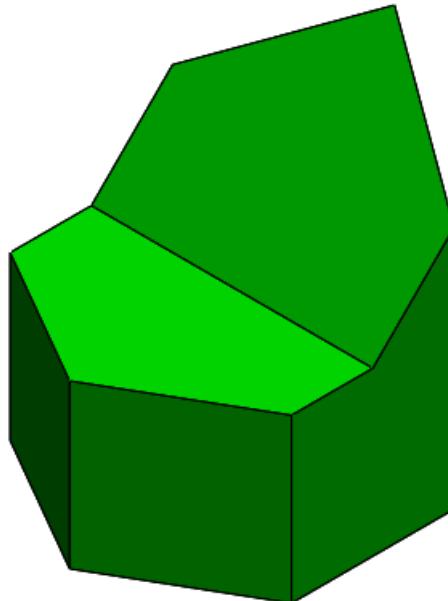
(a)



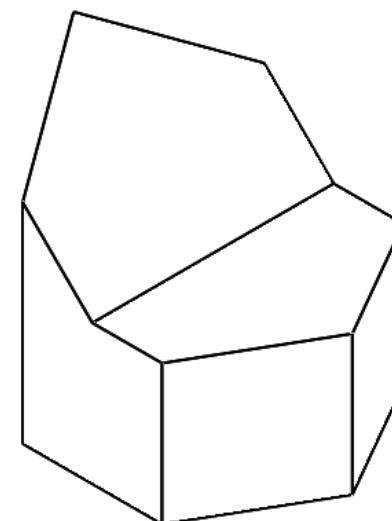
Not preferred



(b)



Both GOOD



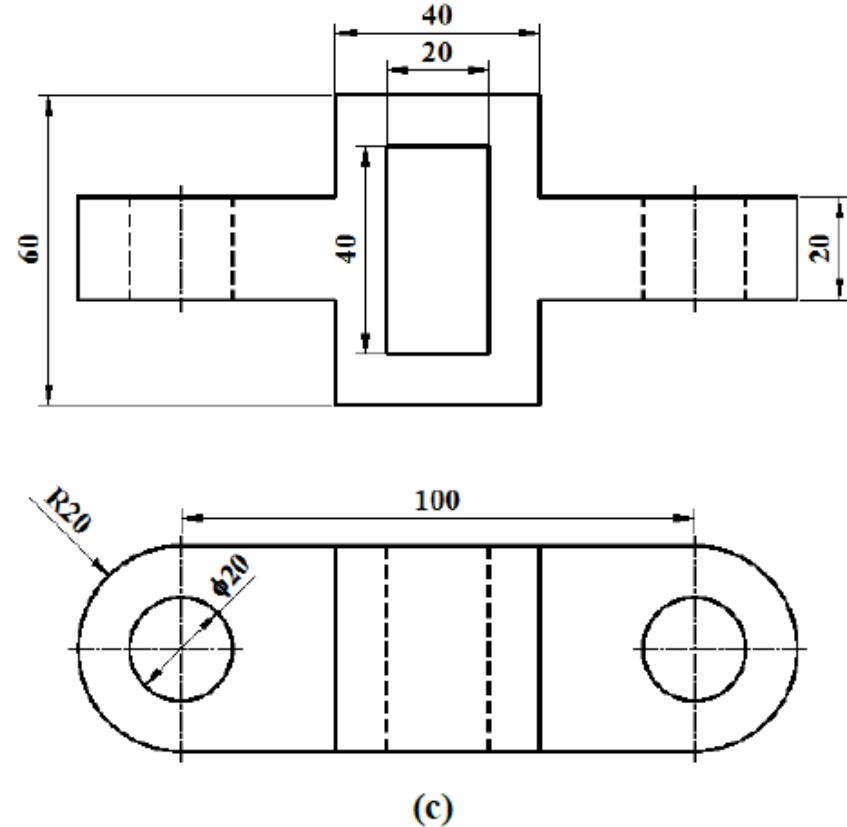
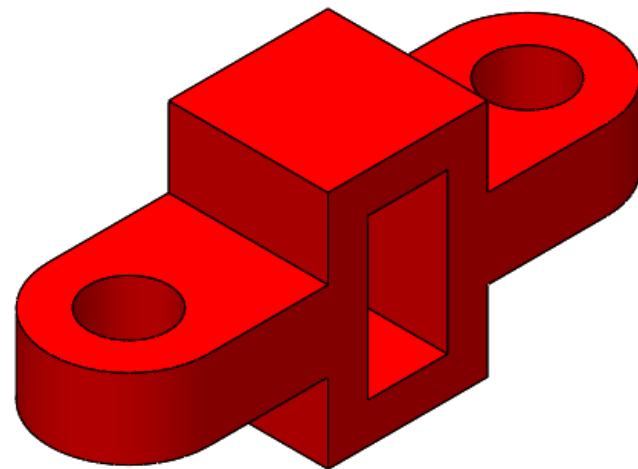
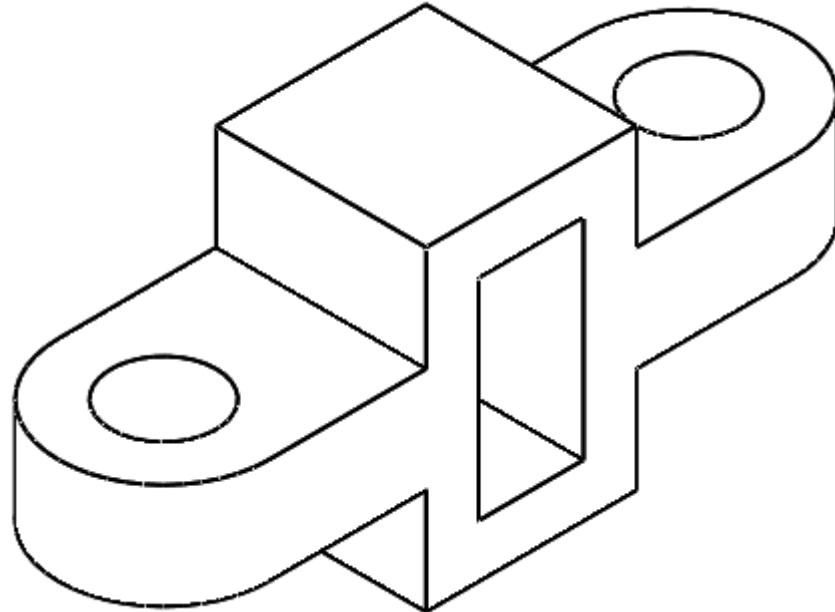
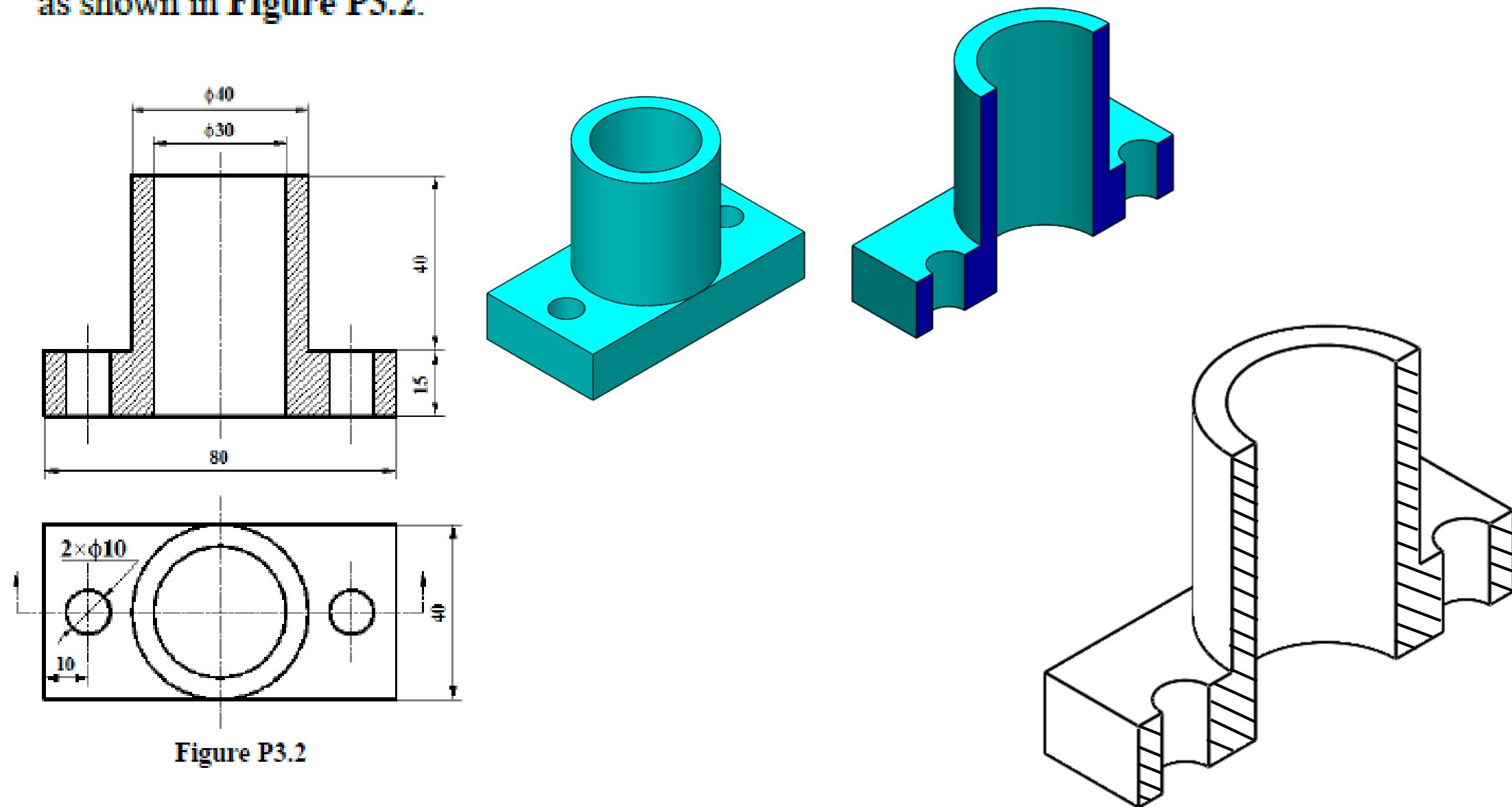
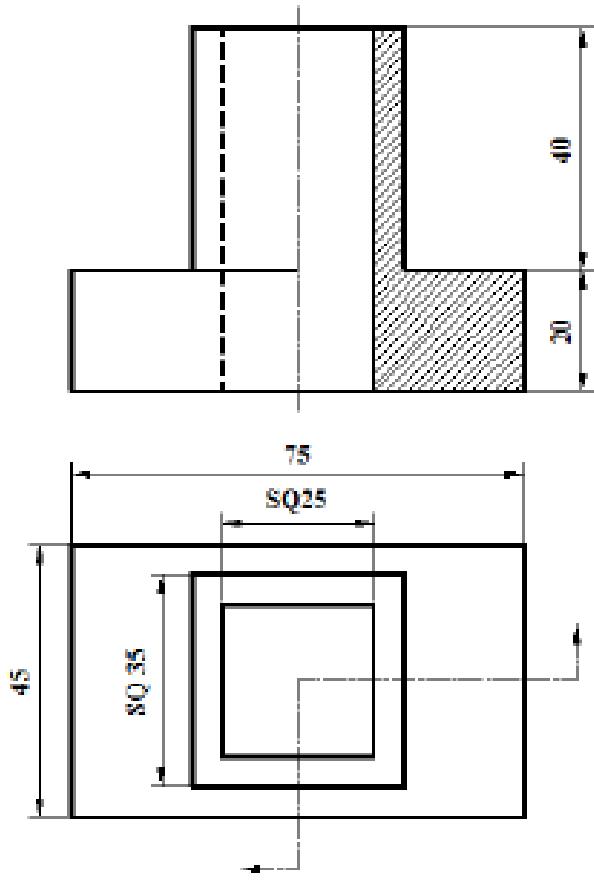


Figure P3.1

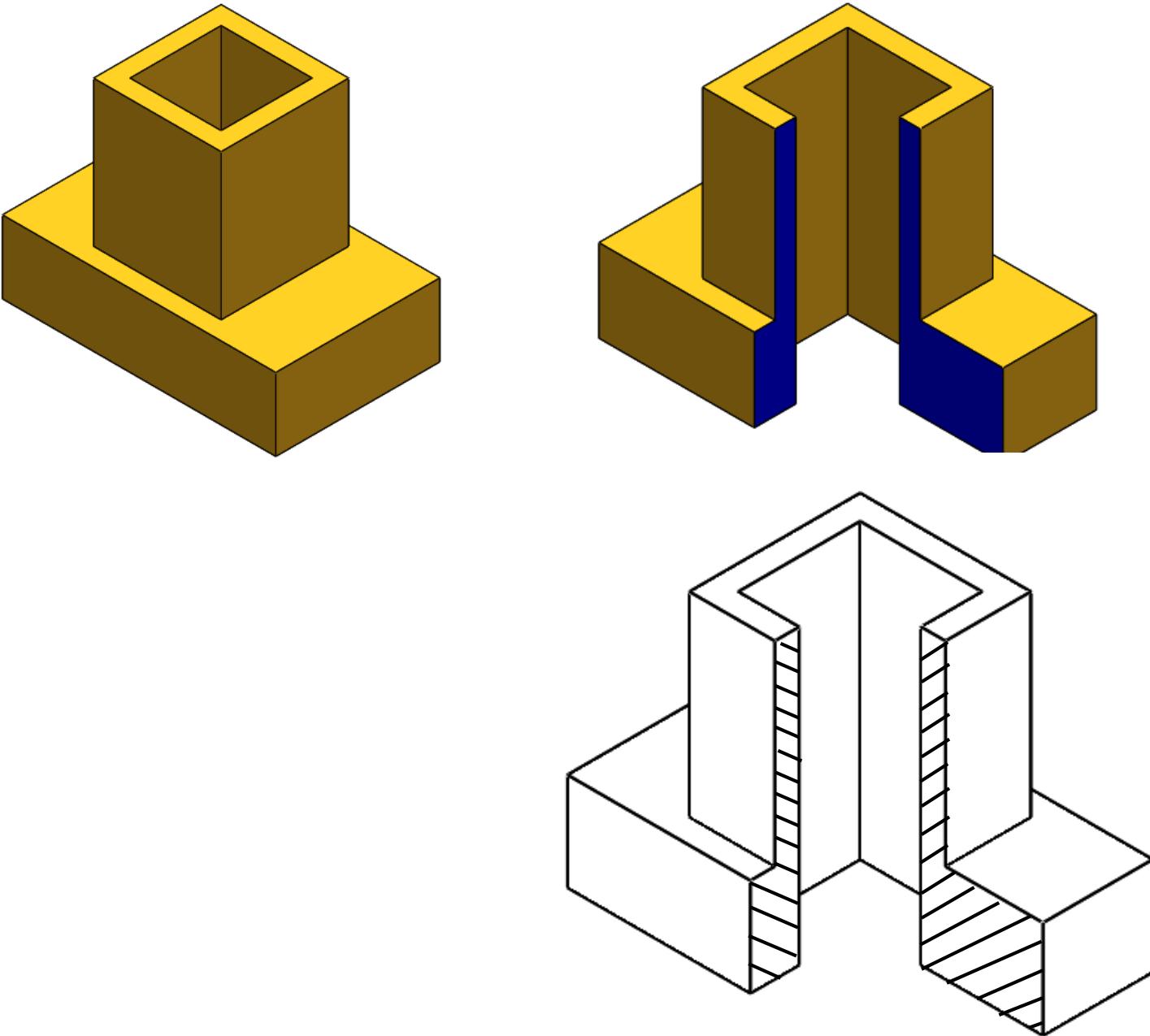


2. Draw sectional isometric drawing of the object with given sectional front view and top view as shown in Figure P3.2.

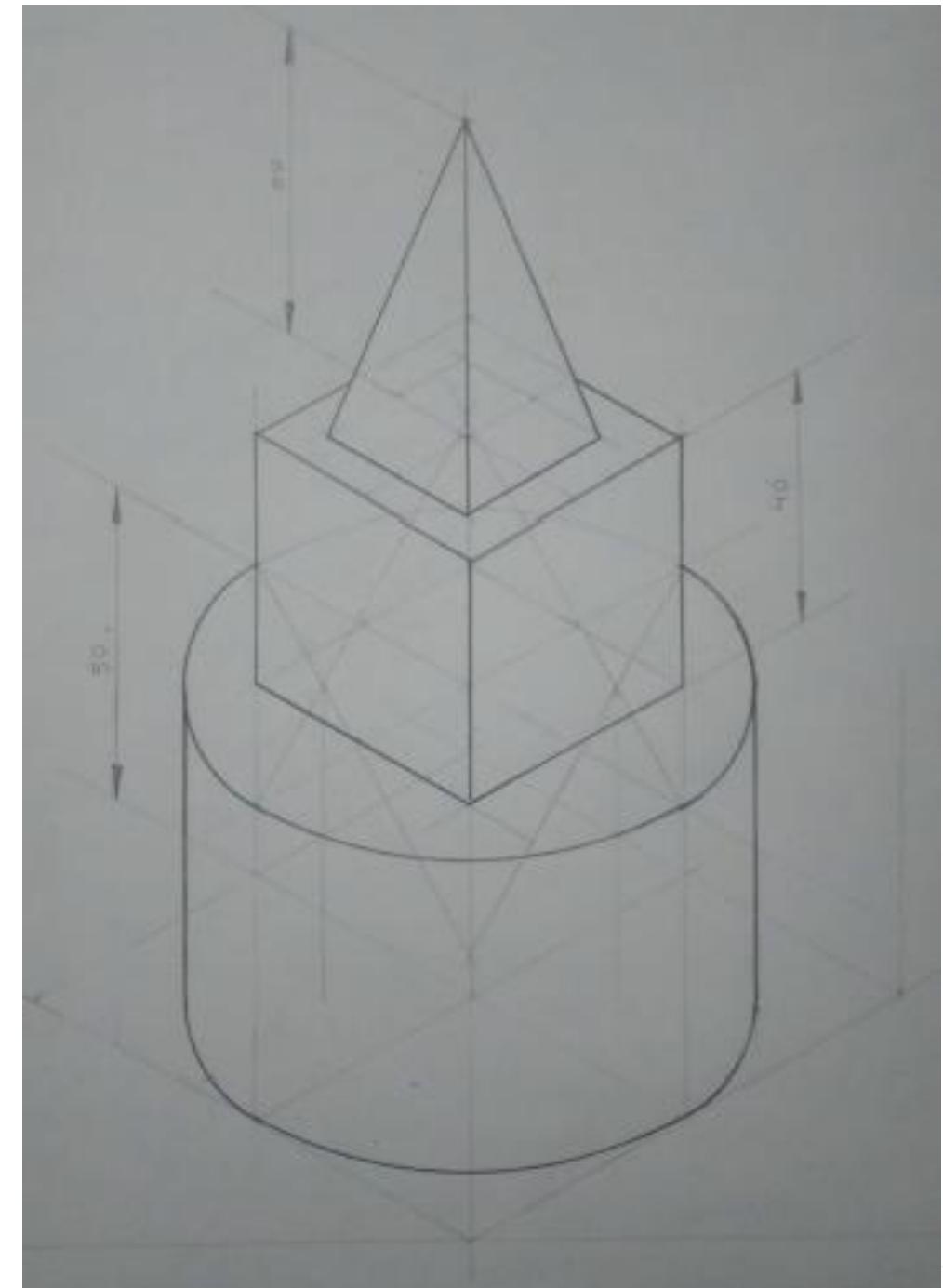




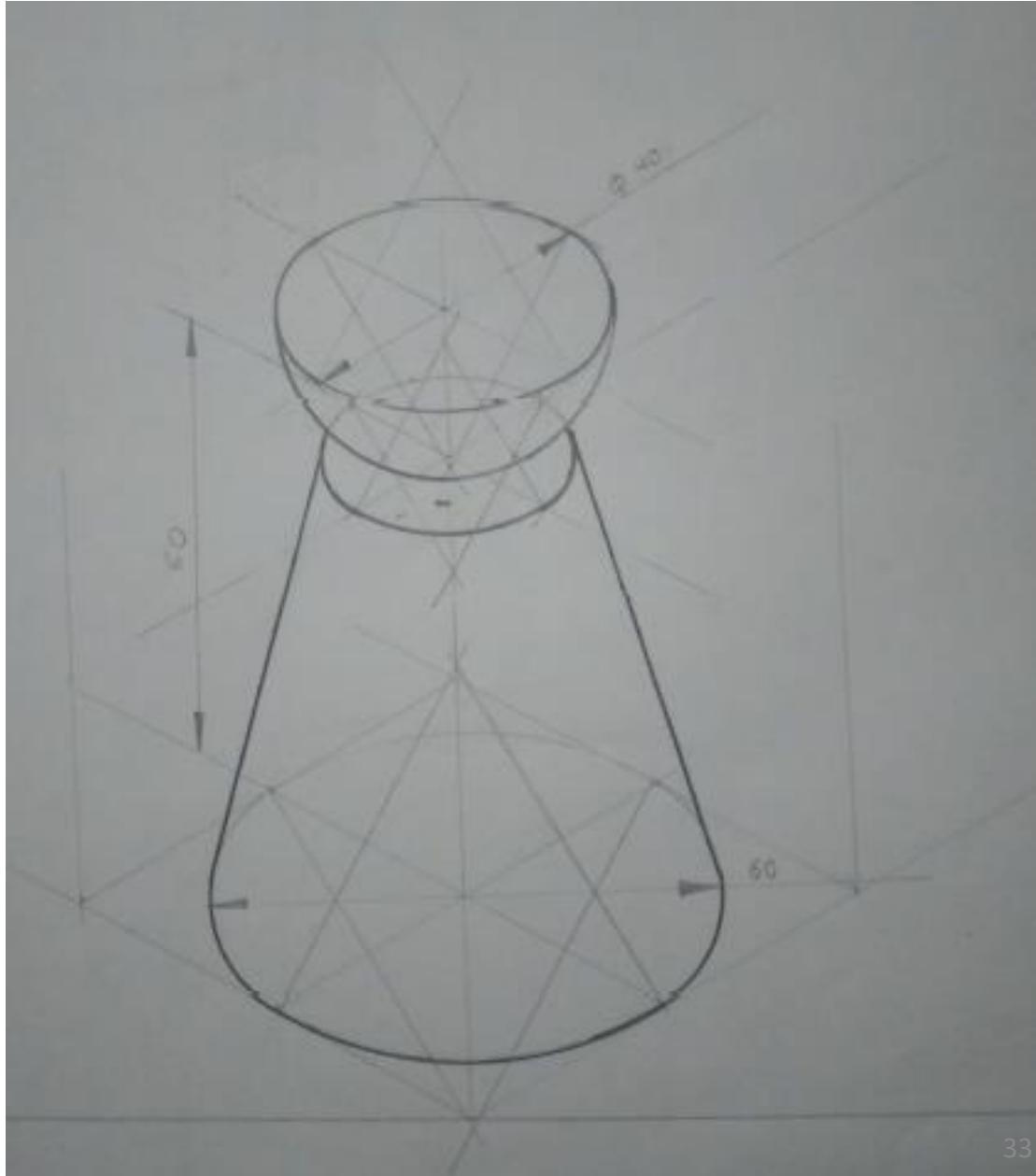
**Figure P3.3**



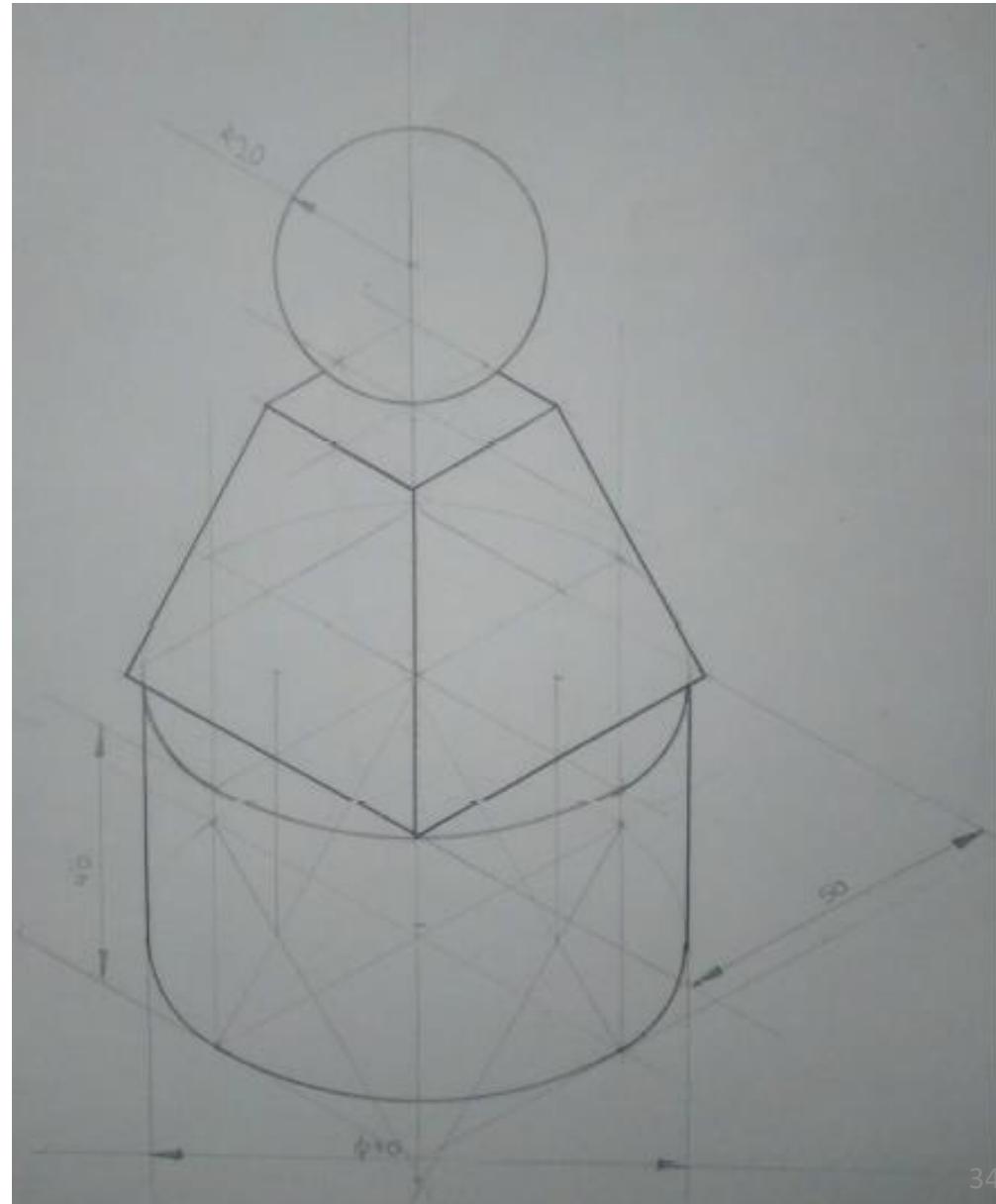
2. A cylindrical slab having 80 mm as diameter and 50 mm thickness, is surmounted by a cube of edge 40 mm. On the top of the cube rests a square pyramid of altitude 50 mm and side of base 25 mm. The axes of the solids are in the same straight line. Draw the isometric view of the combination of these solids.



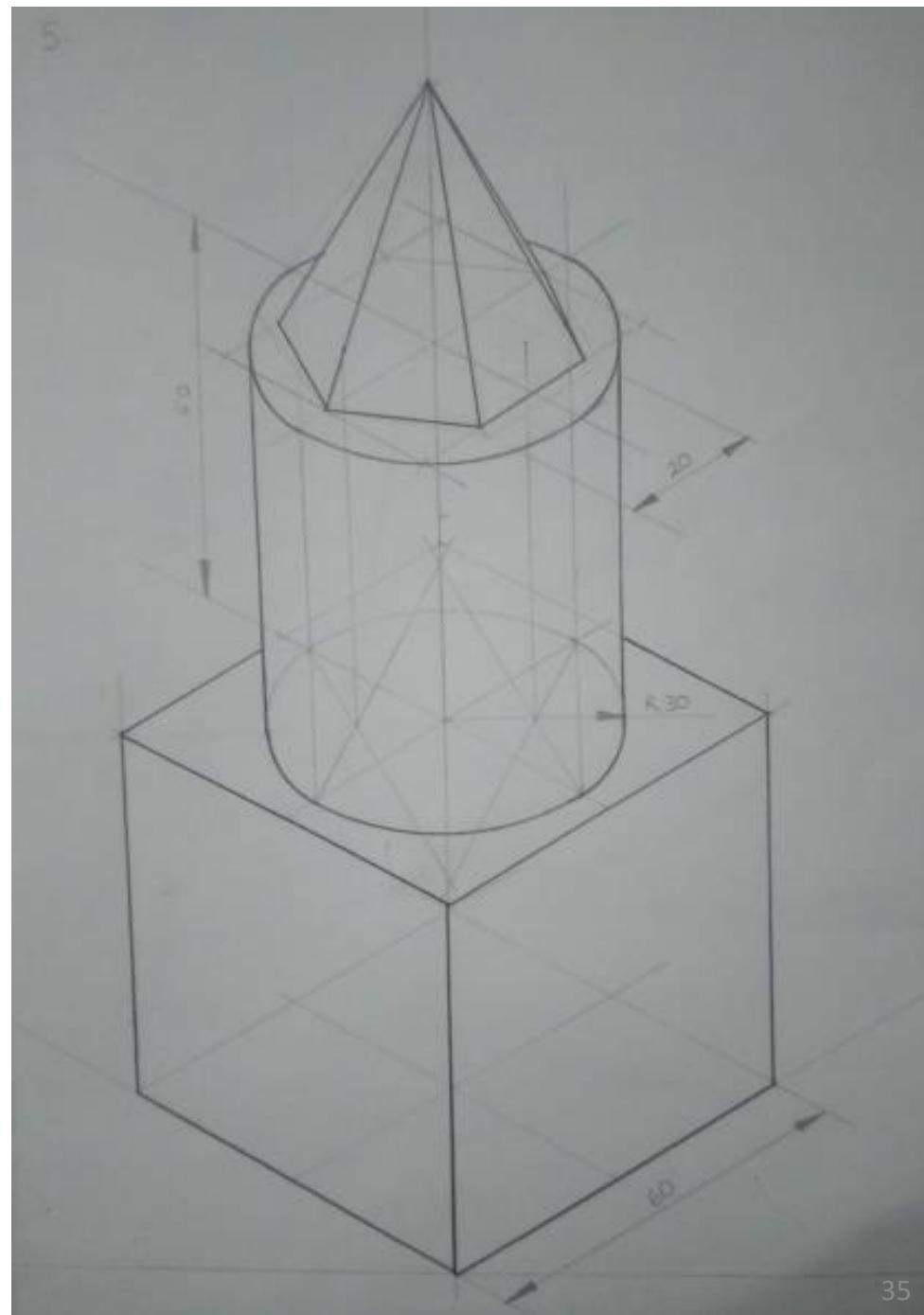
3. A hemisphere of diameter 40 mm rests centrally over a frustum of cone of base diameter 60 mm, top diameter 30 mm and height 60 mm. Draw isometric projections of the combination of solids.



4. A cylindrical slab of 70 mm as diameter and 40 mm thickness is surmounted by a frustum of a square pyramid of base side 50 mm, top base side 25 mm and height 40 mm. The axes of the two solids are on a common straight line. A sphere of diameter 40mm is centrally placed on top of the frustum. Draw the isometric view of the solids.

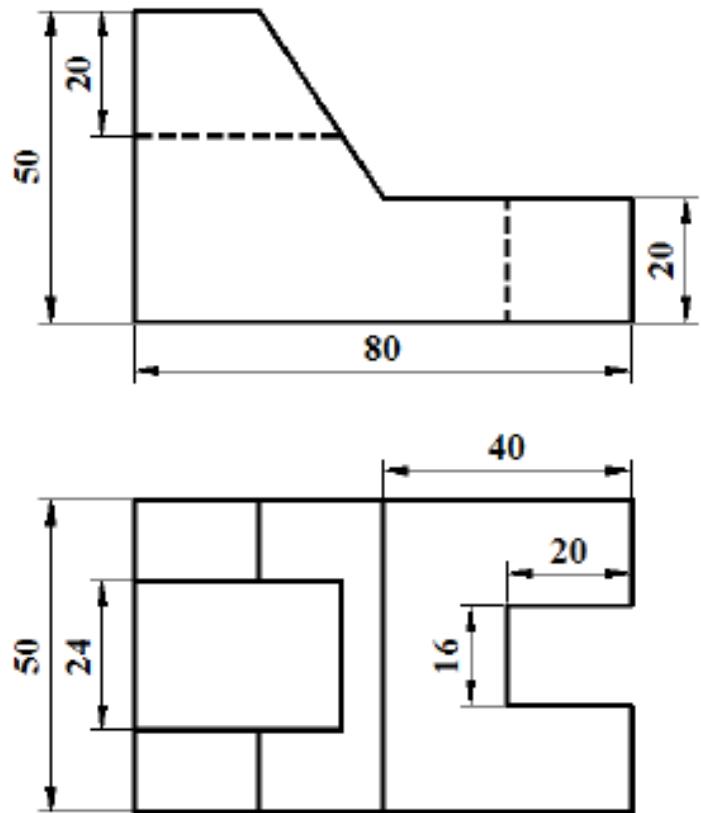


5. A cube of sides 60mm is resting on the ground. A cylinder of base diameter 50 mm and height 60mm is kept over that. On top of the cylinder, a hexagonal pyramid of side of base 20 mm and altitude 40 mm is kept. The axis of the three solids lies in the same vertical line. Draw the isometric view.

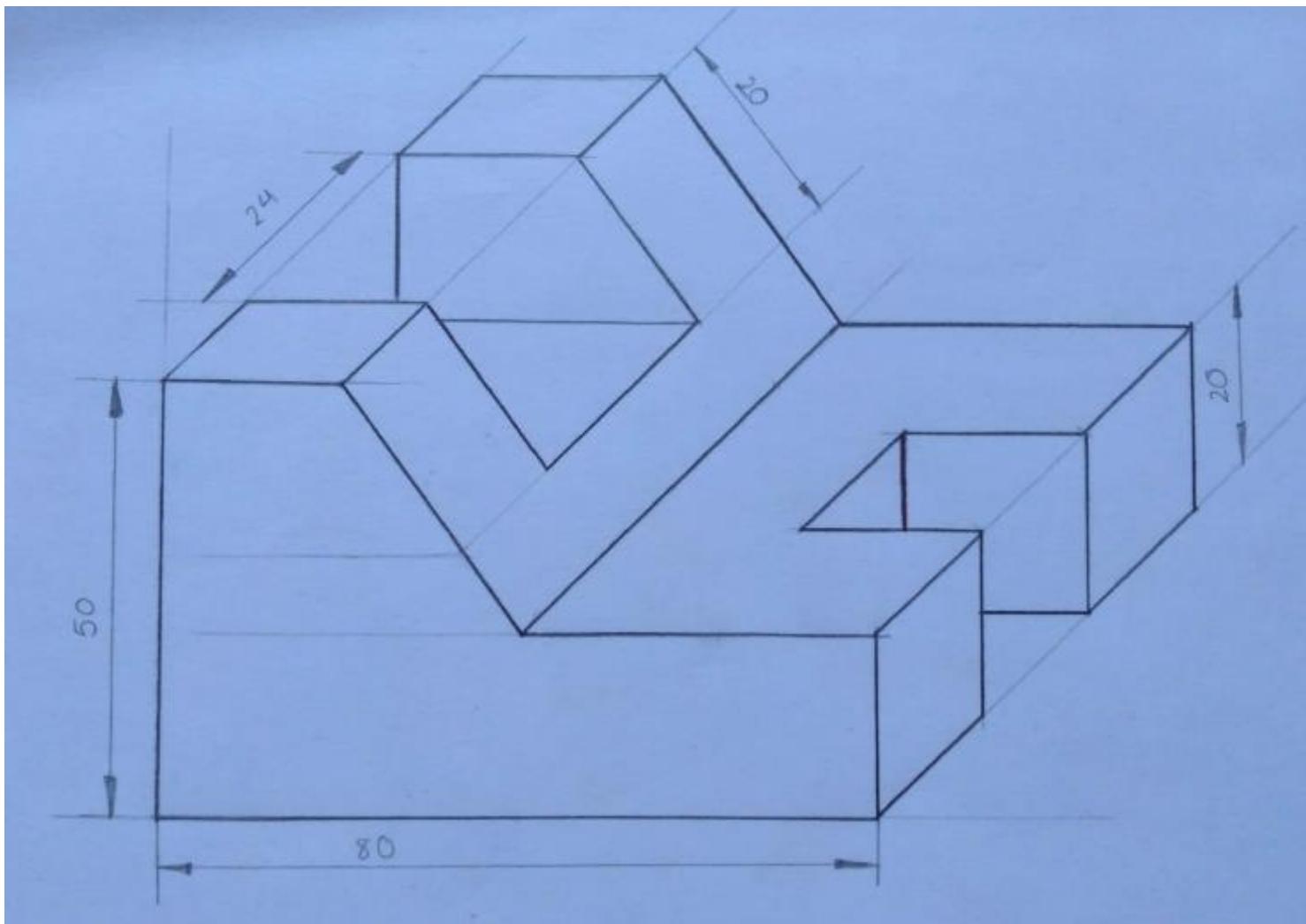


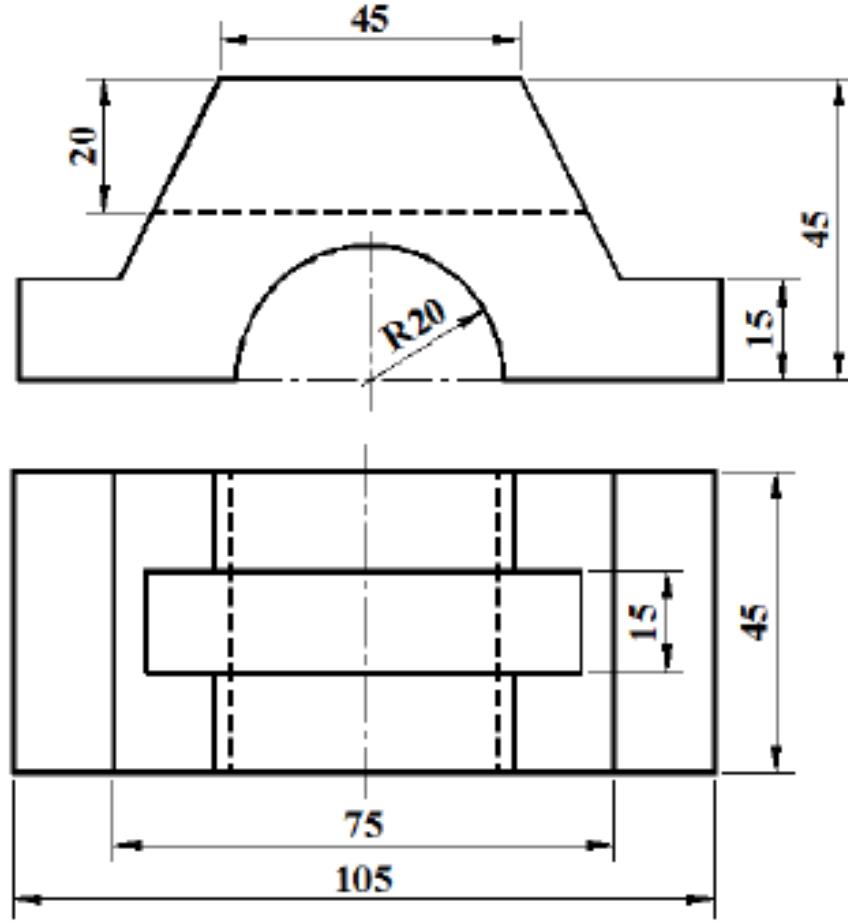
# OBLIQUE- SOLUTIONS

Draw an oblique drawing of the object with given orthographic views.

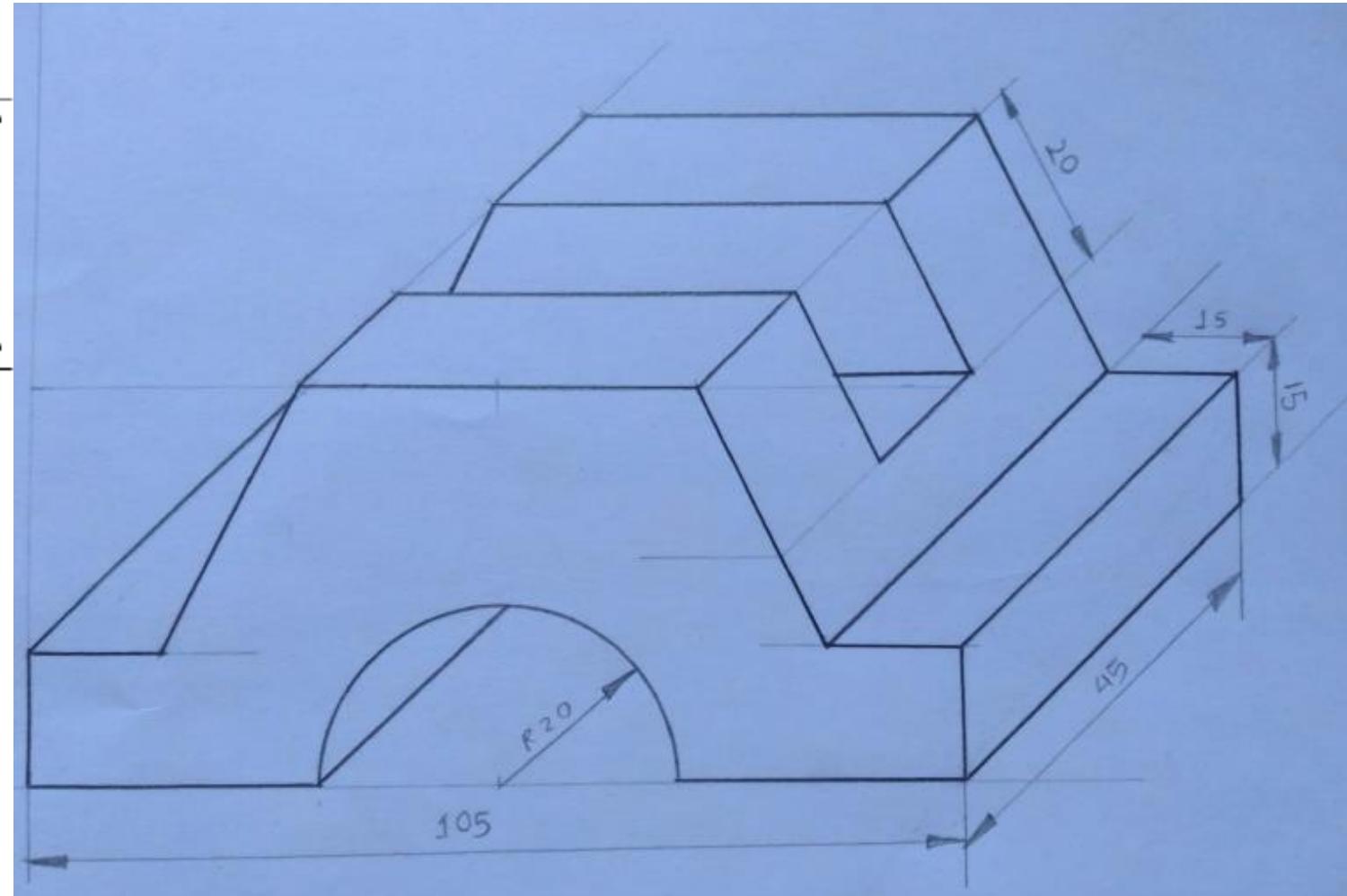


**Figure P4.1**

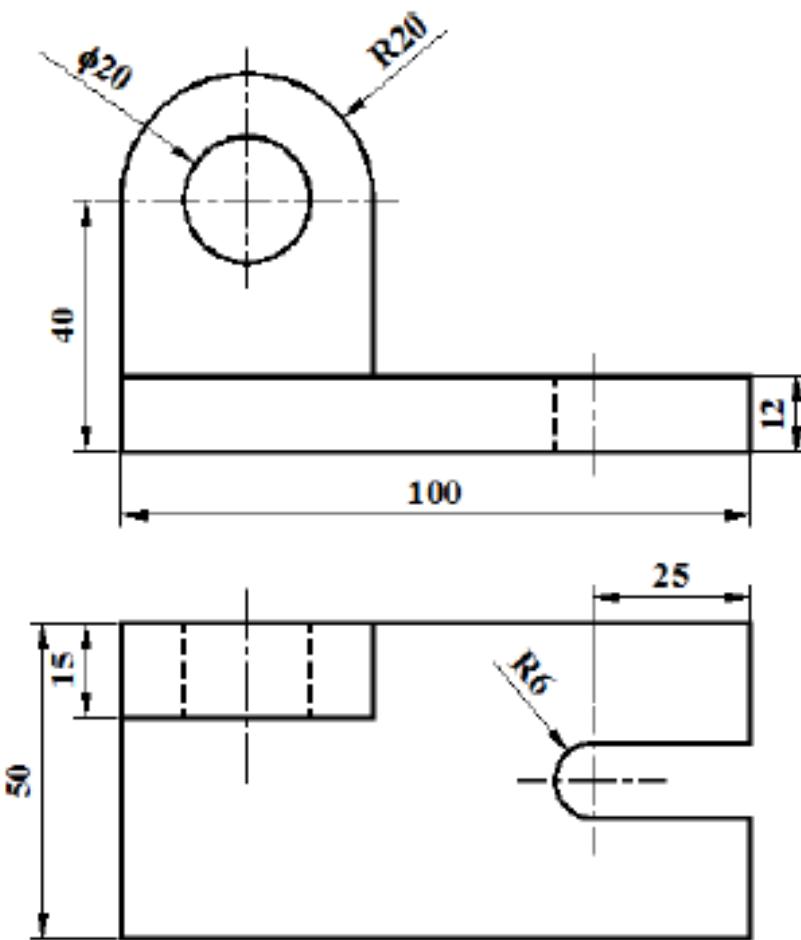




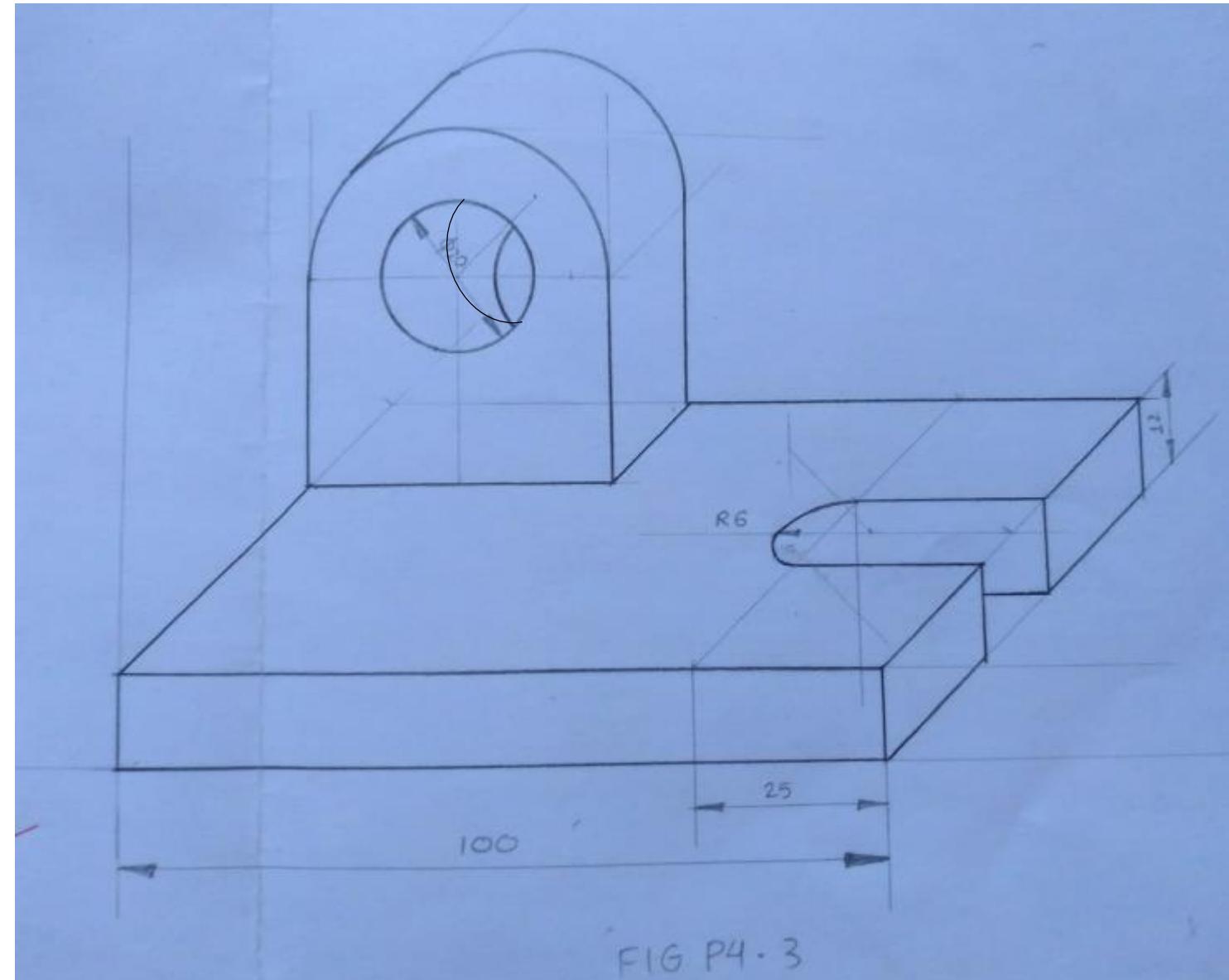
**Figure P4.2**



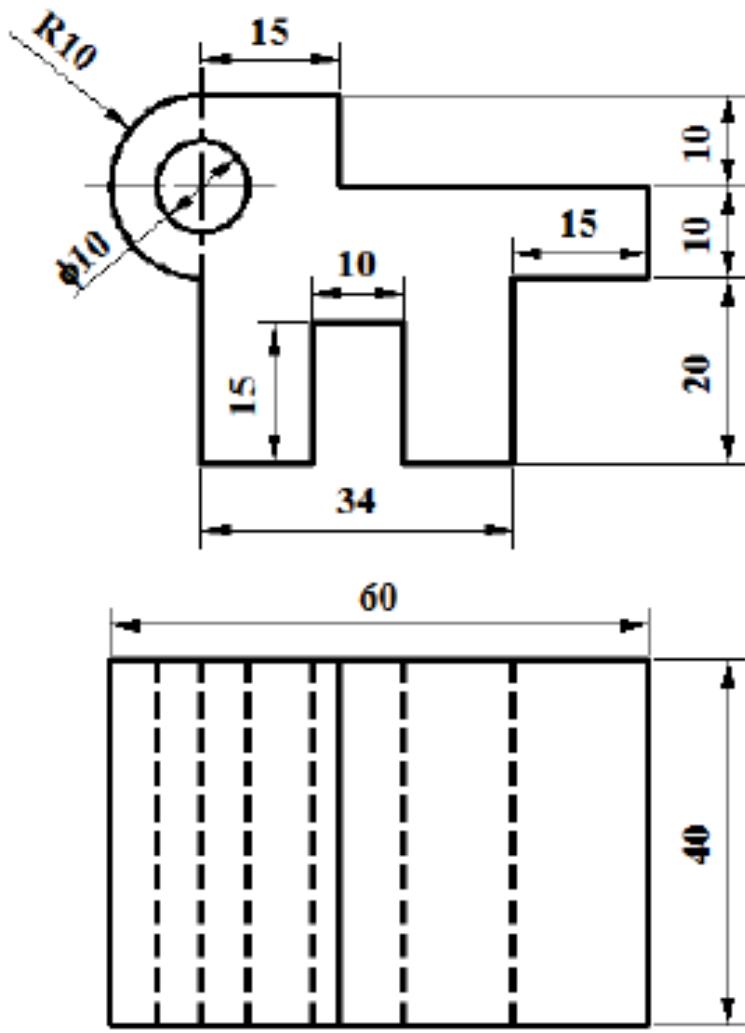
**FIG P4.2**



**Figure P4.3**



**FIG P4.3**



**Figure P4.4**

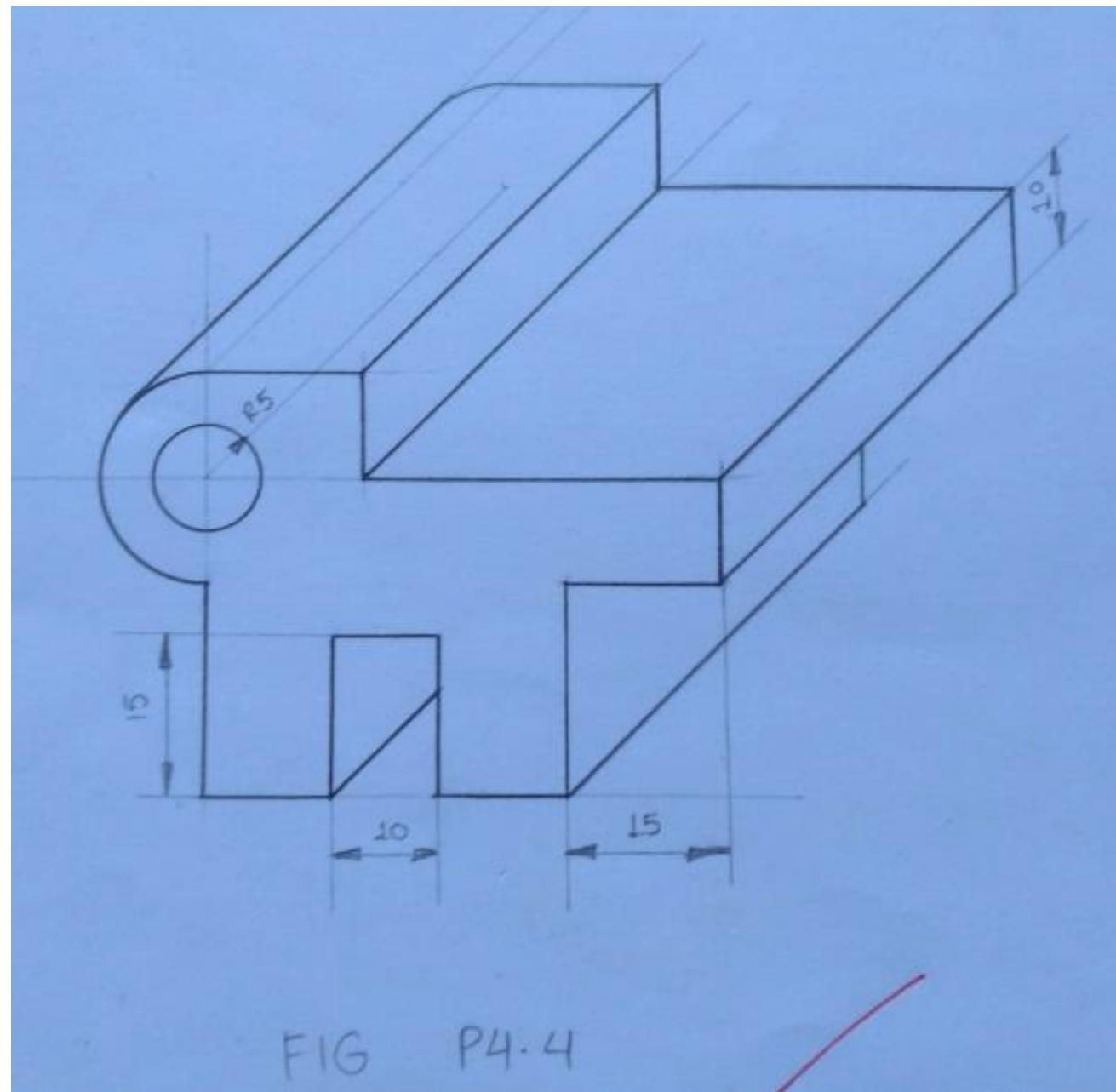
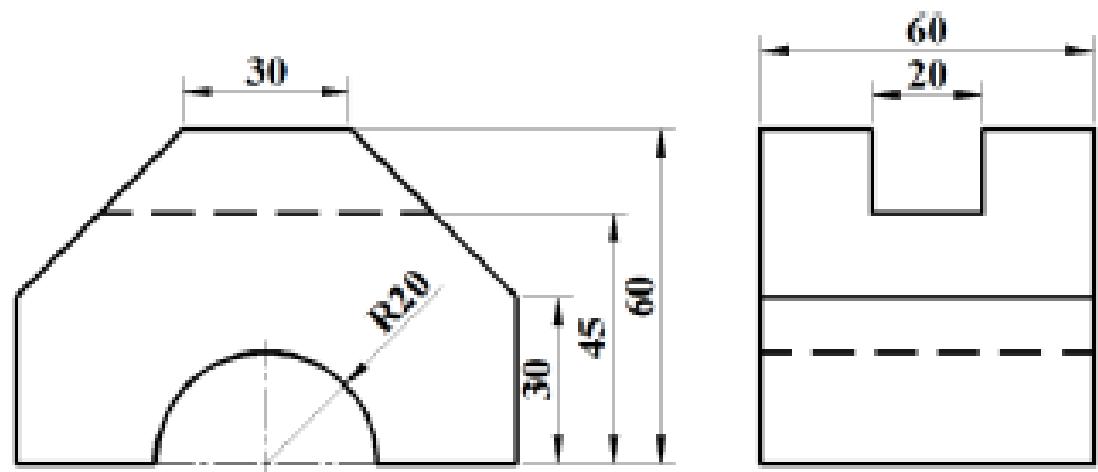


FIG P4.4



**Figure P4.5**

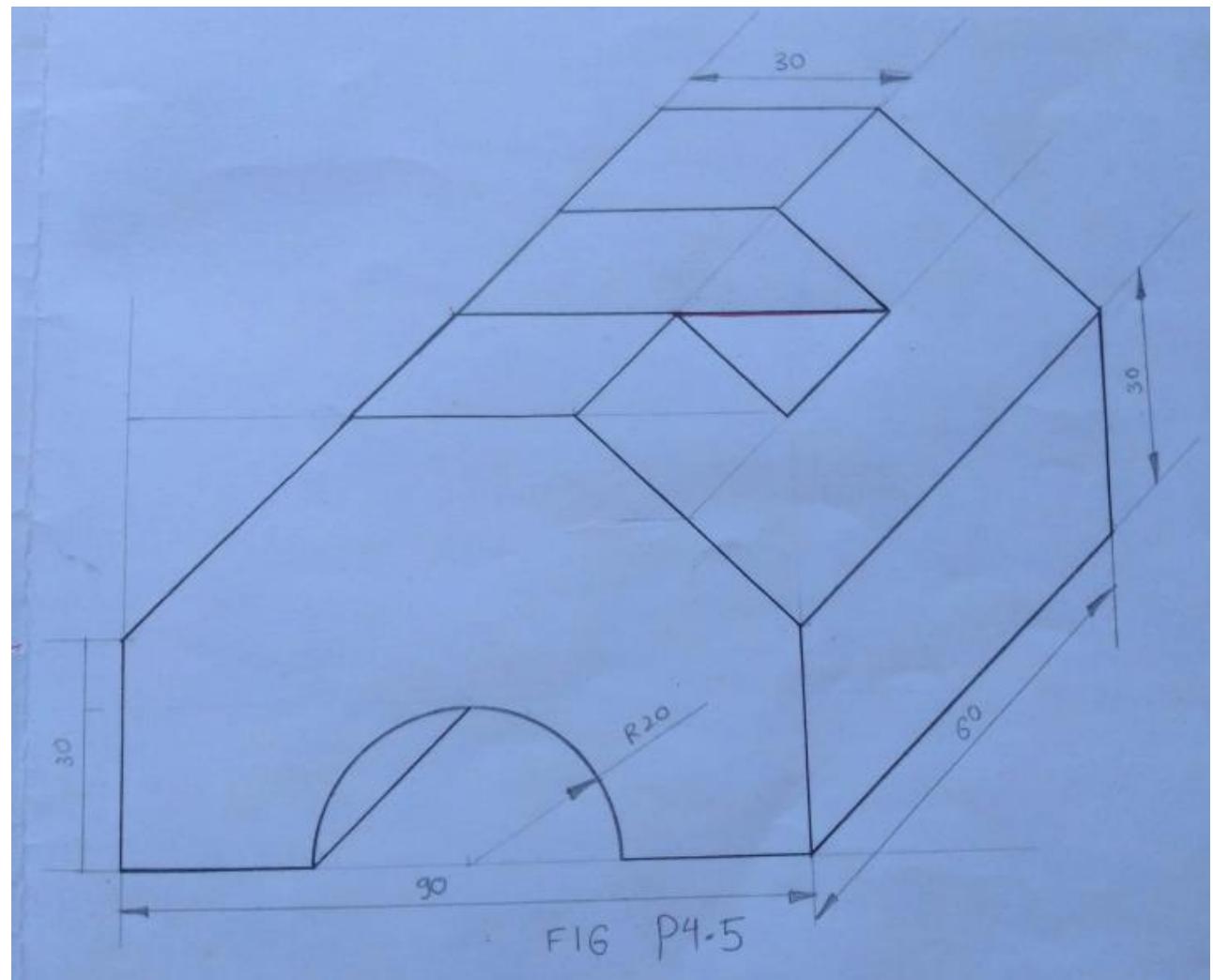
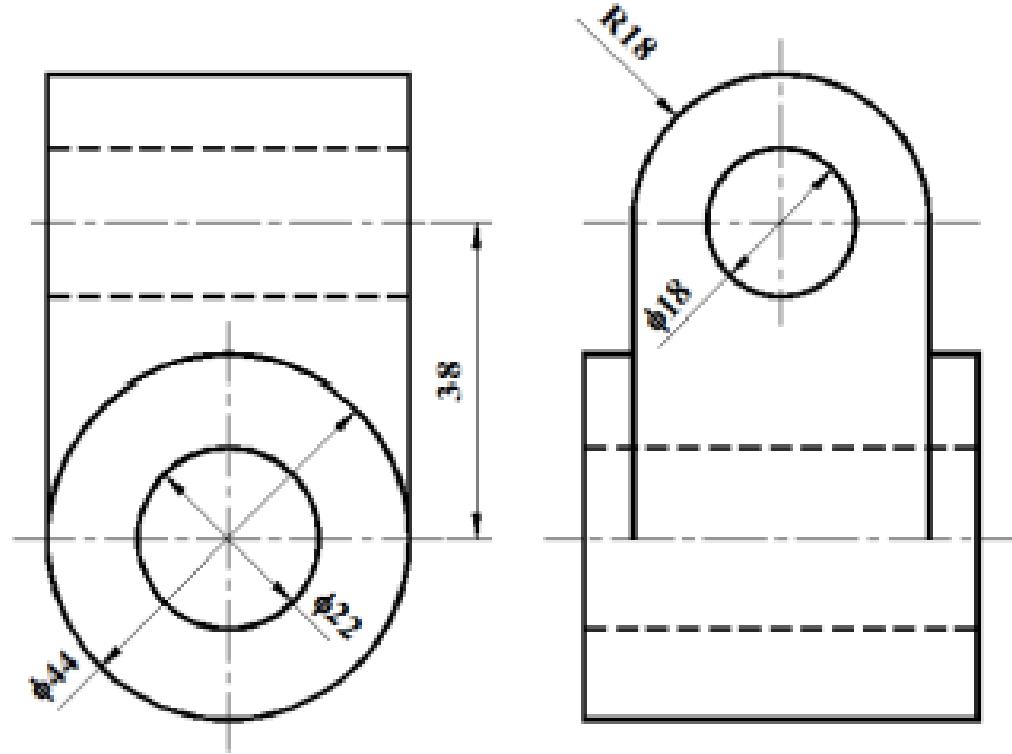
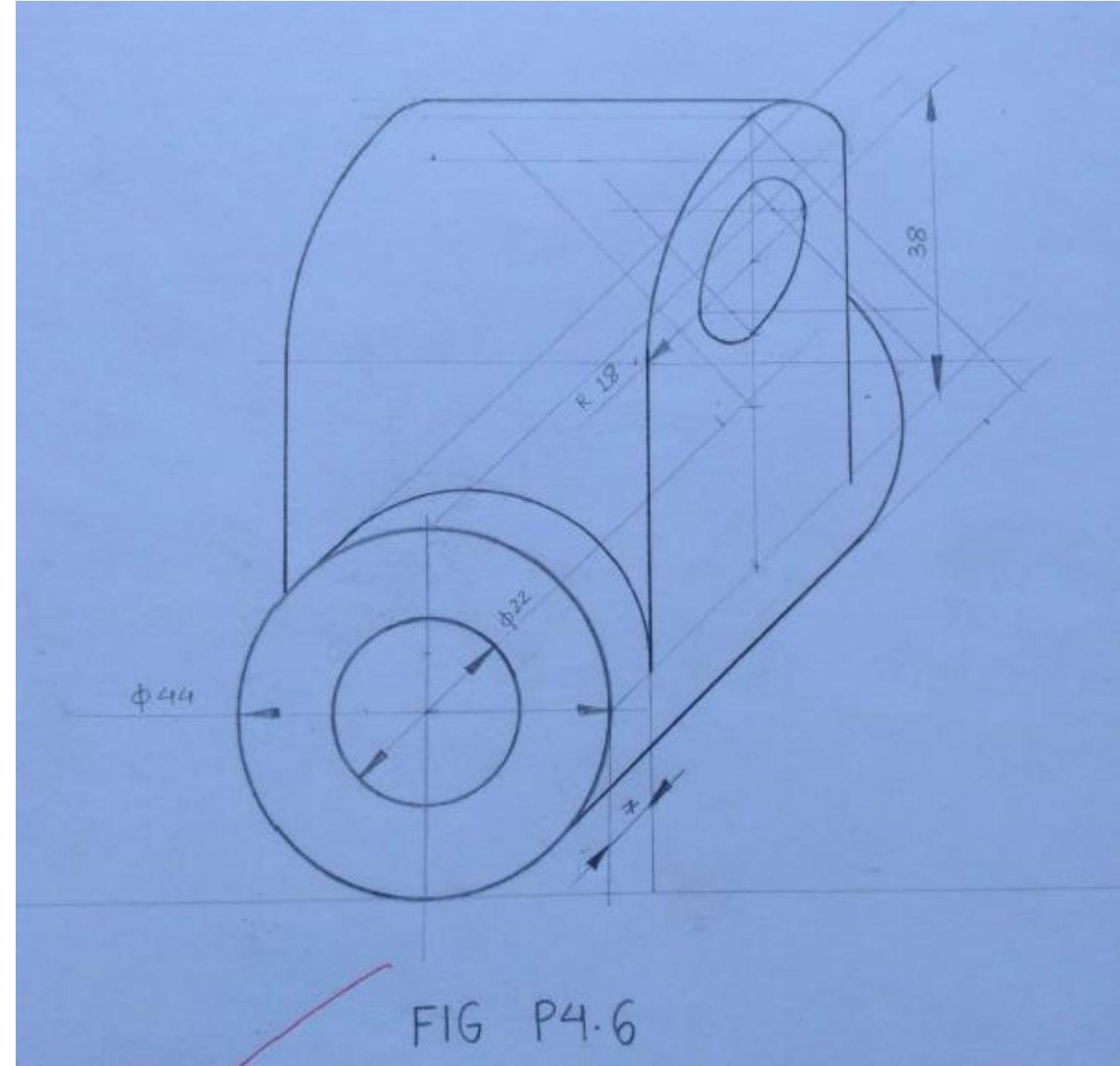


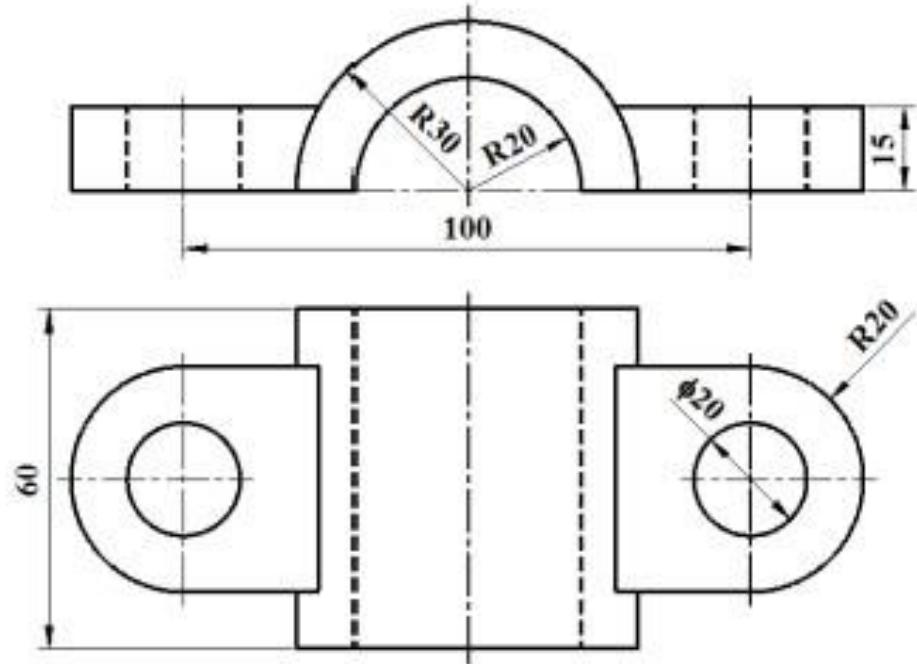
FIG P4.5



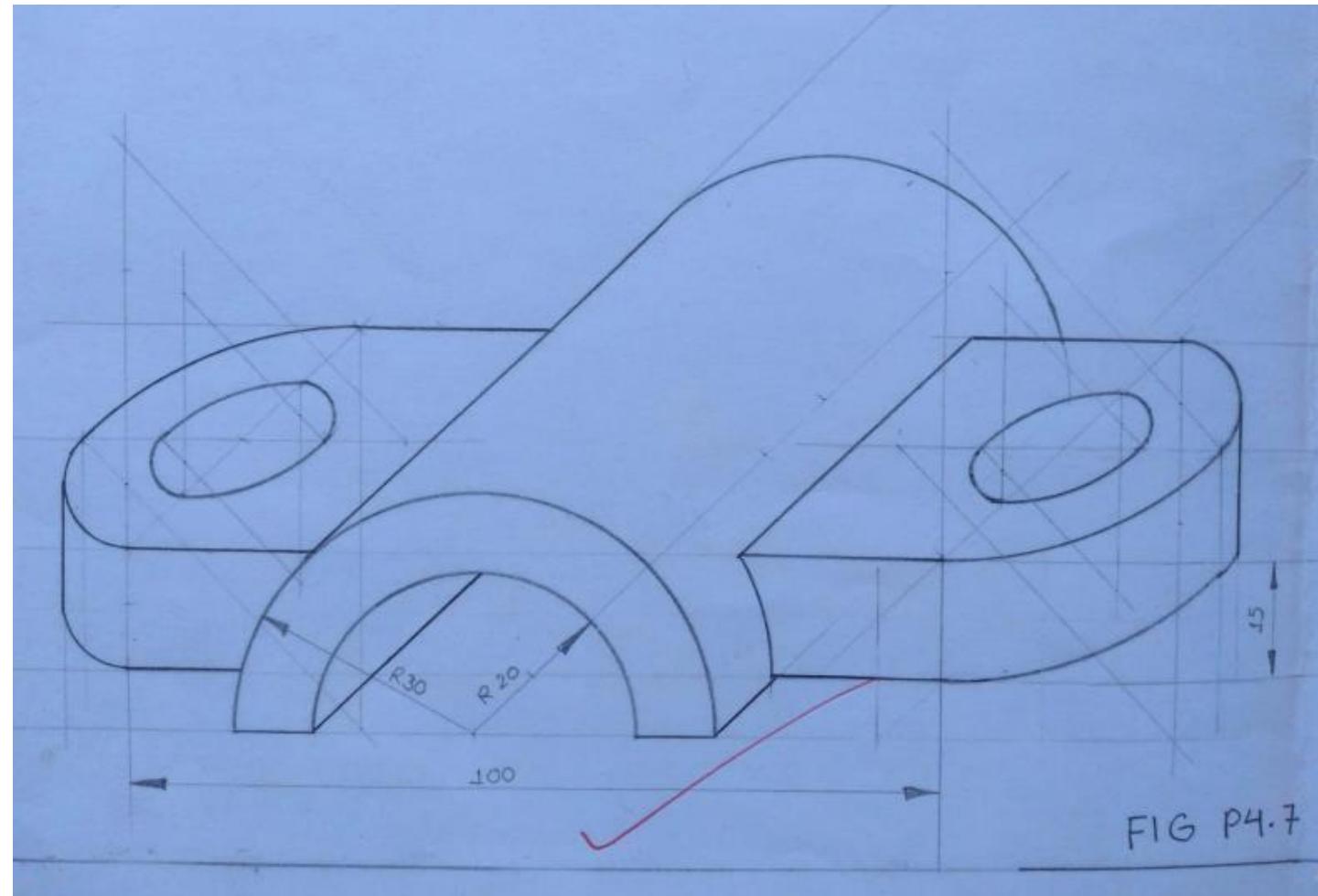
**Figure P4.6**

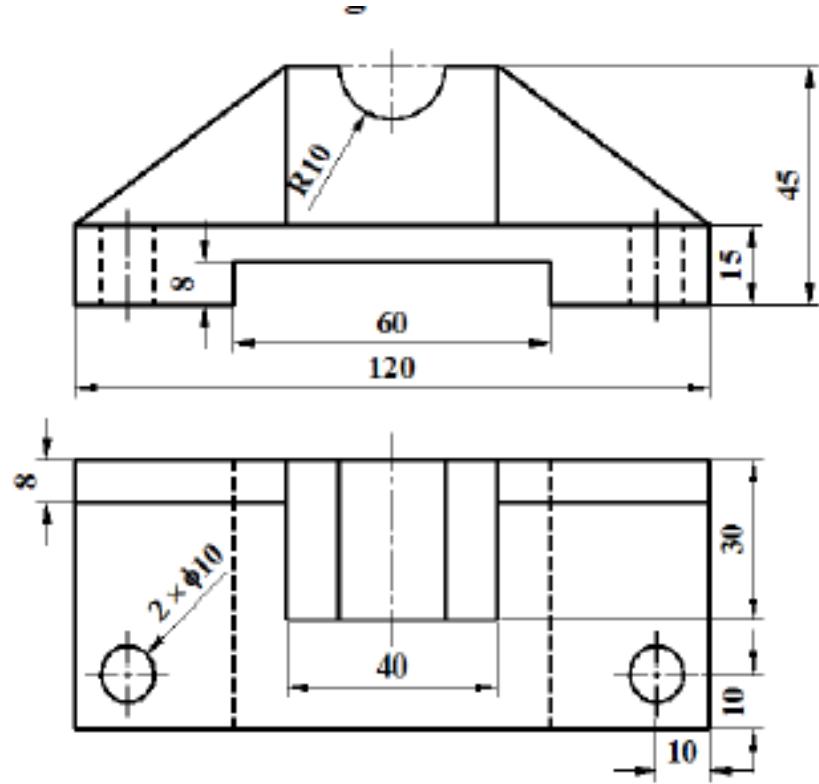


**FIG P4.6**

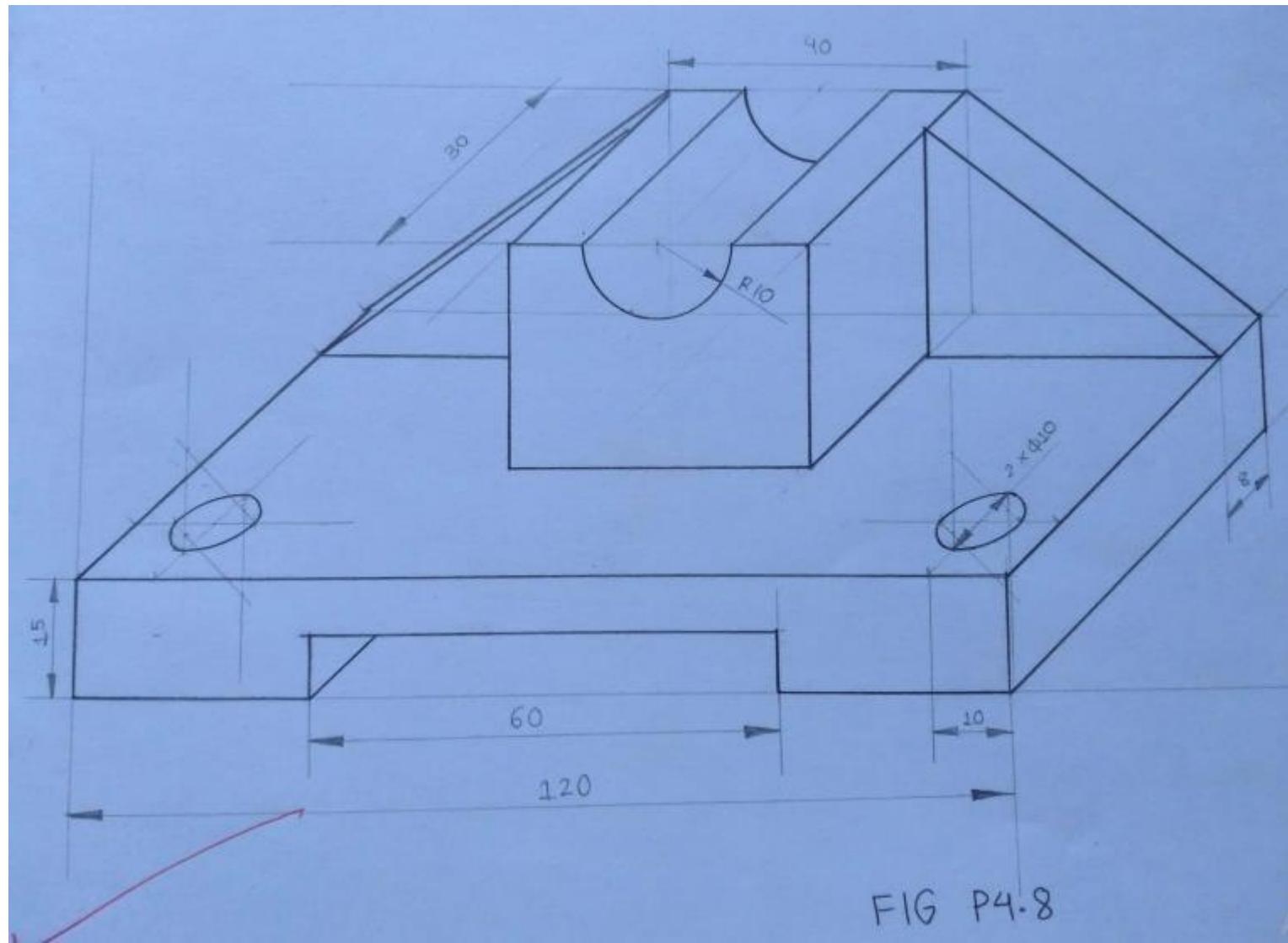


**Figure P4.7**





**Figure P4.8**



**FIG P4.8**

From old tutorial

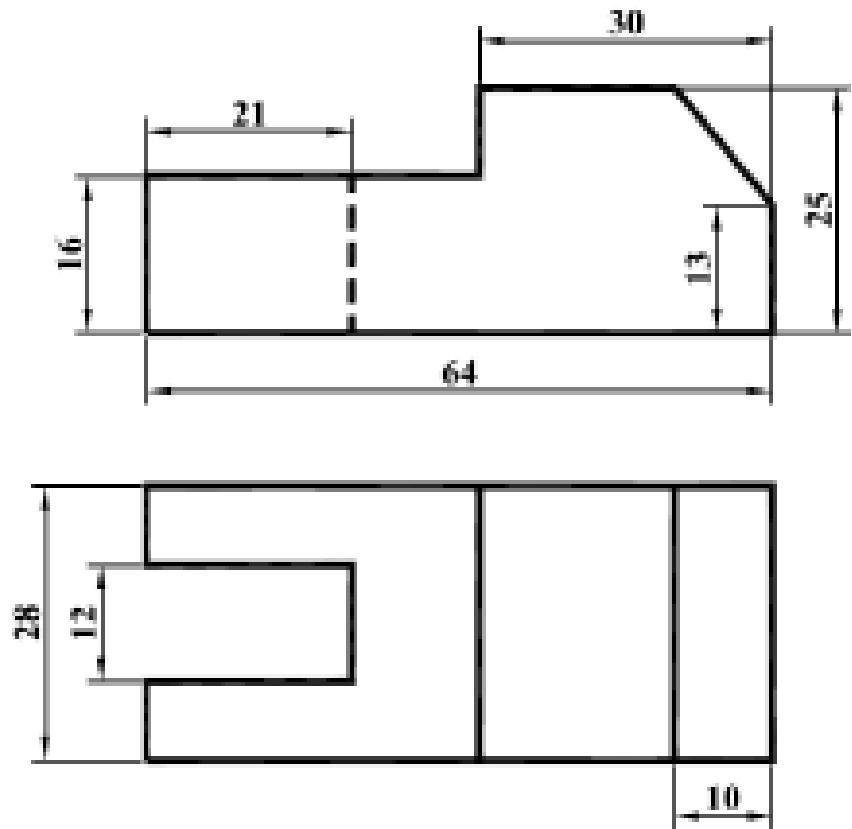
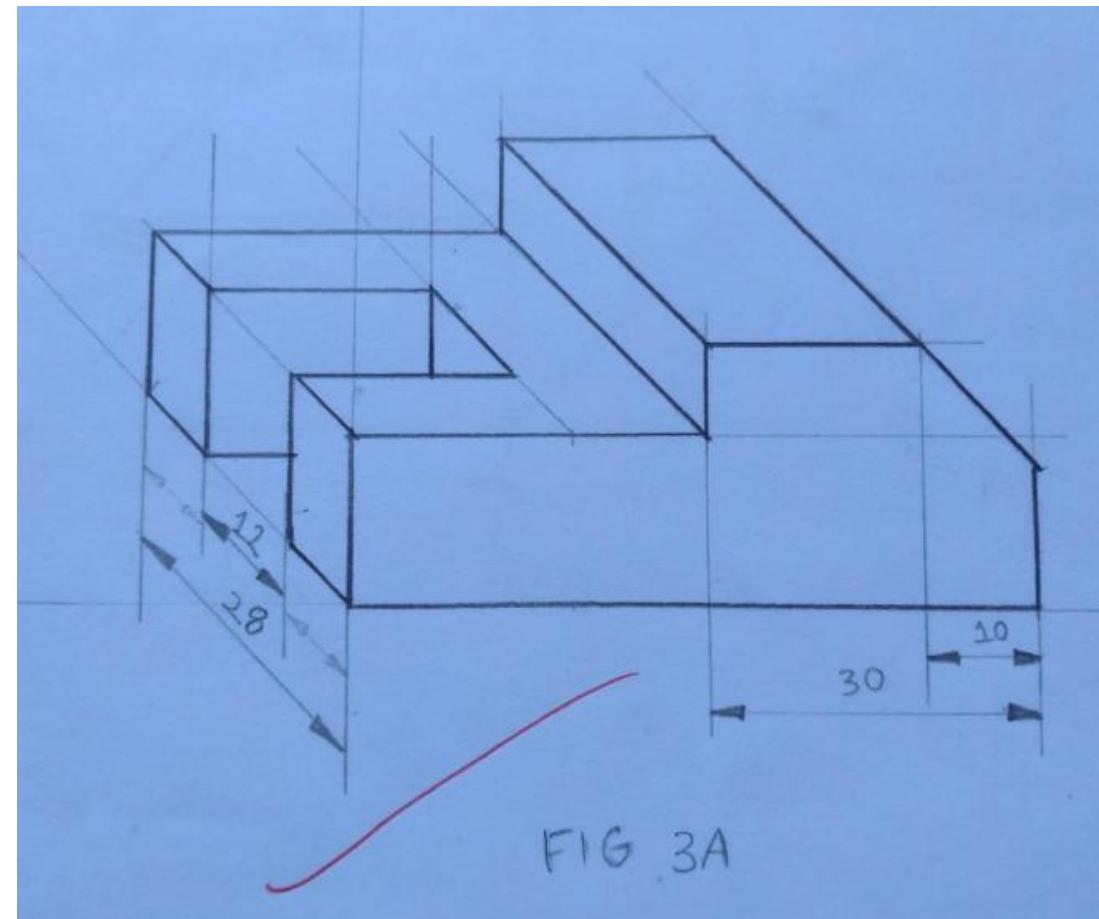


Figure 3a



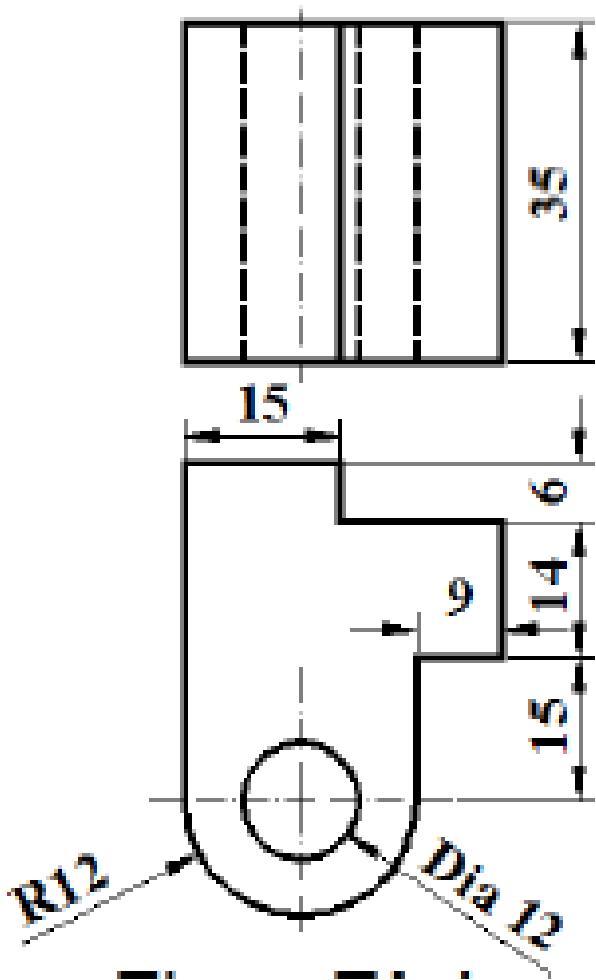


Figure 3e

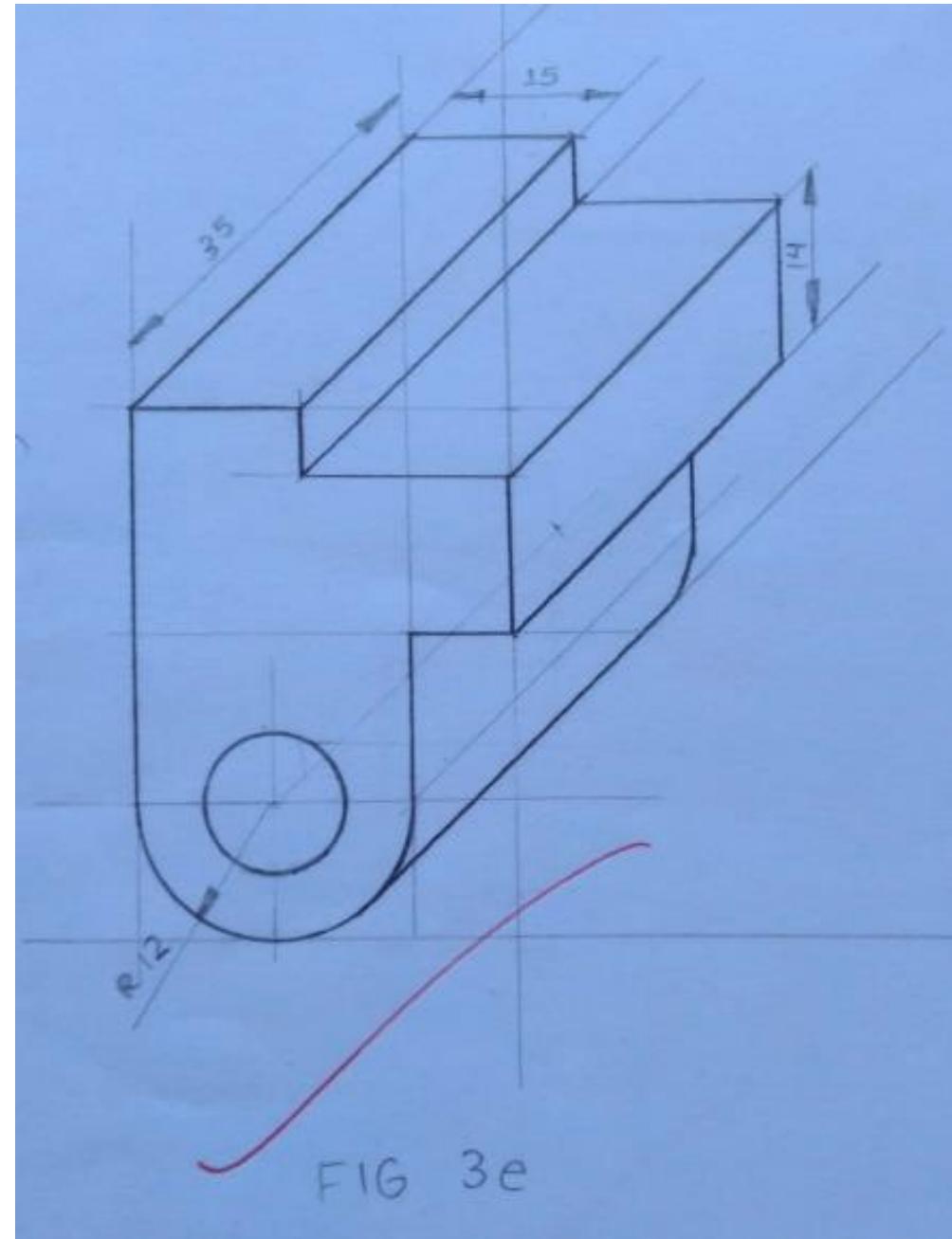


FIG 3e

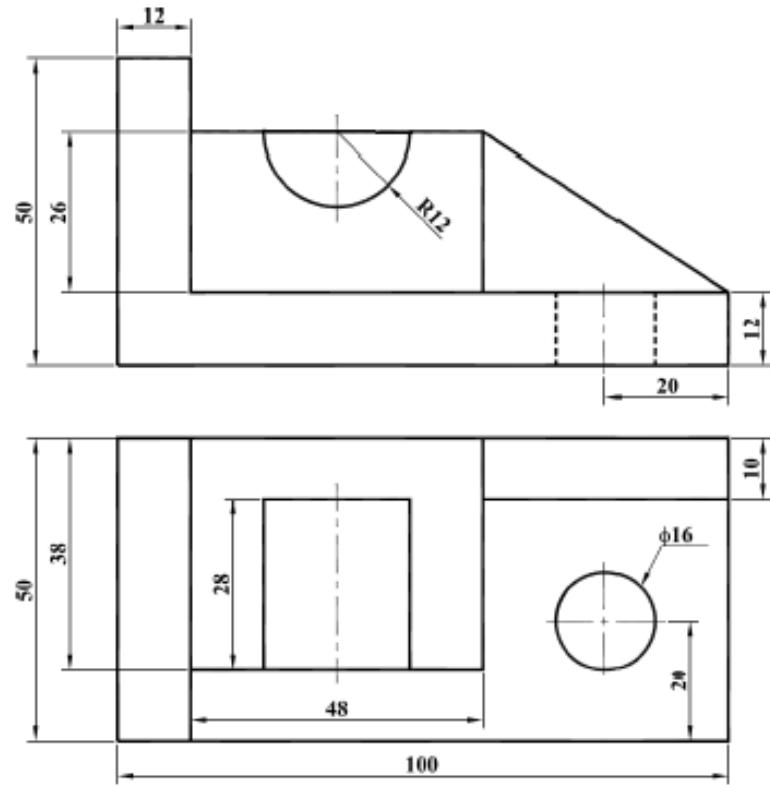
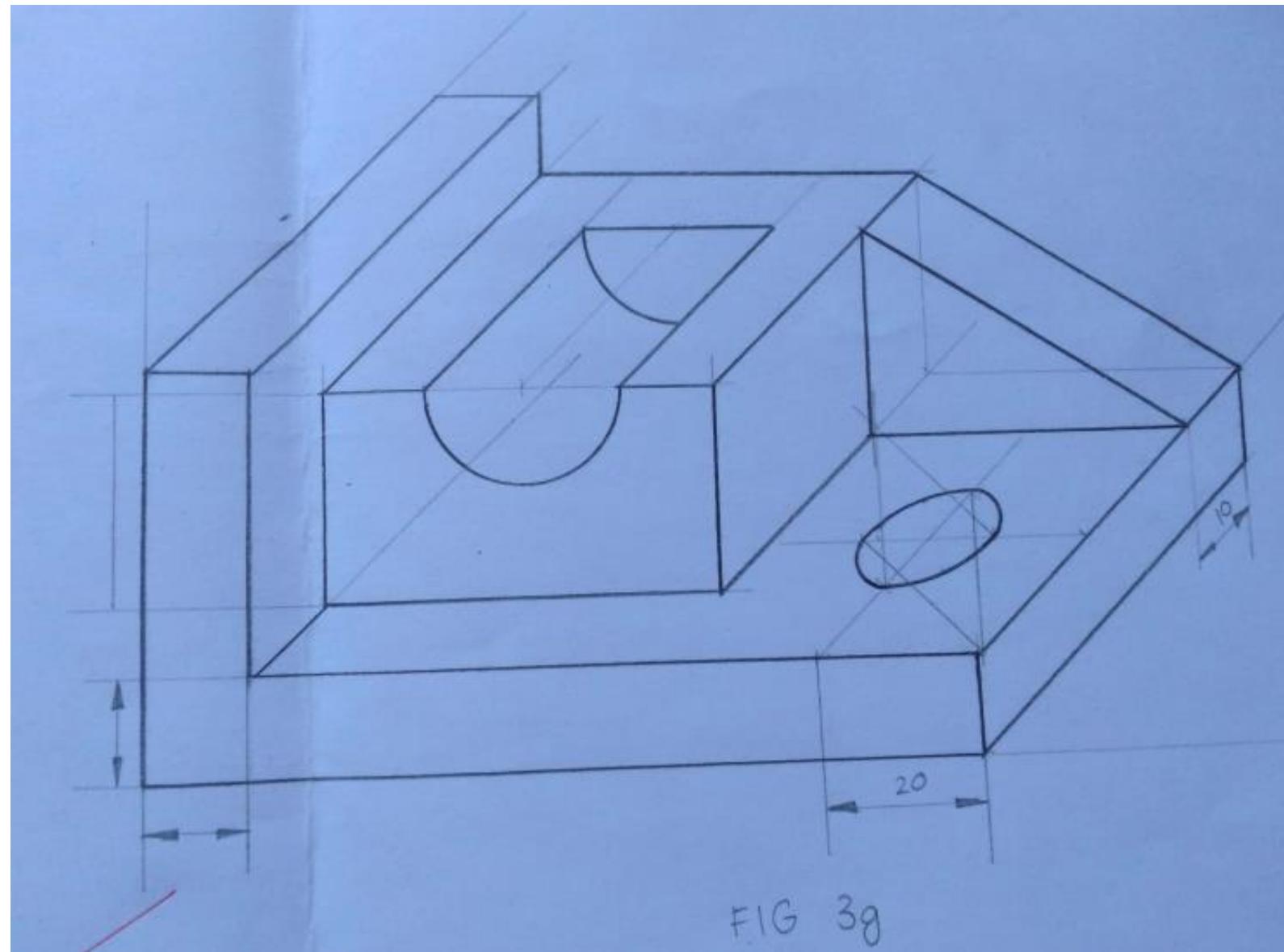
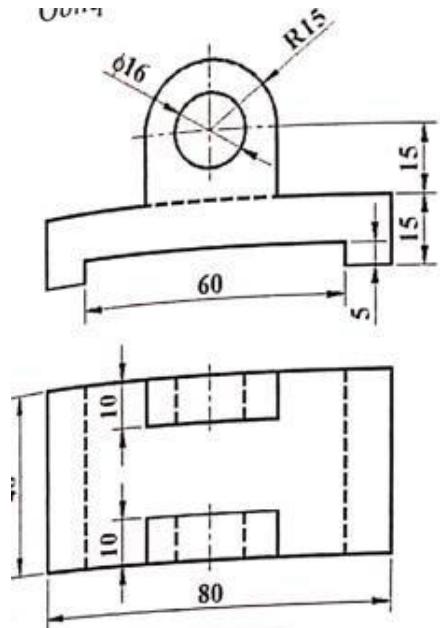
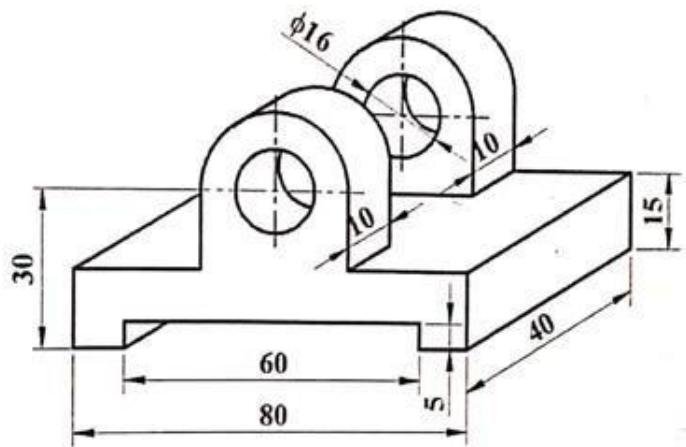


Figure 3g

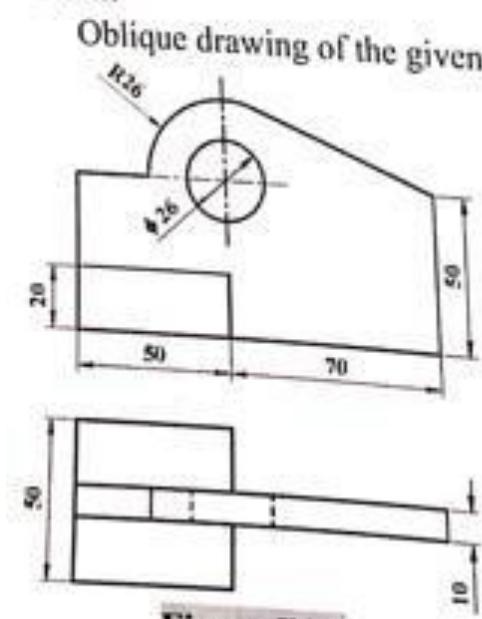




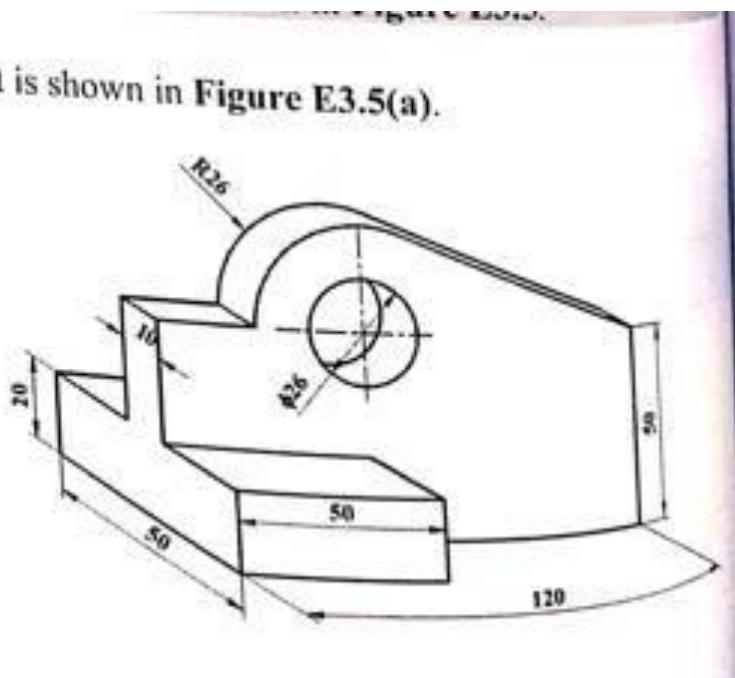
**Figure E3.6**



**Figure E3.6(a)**



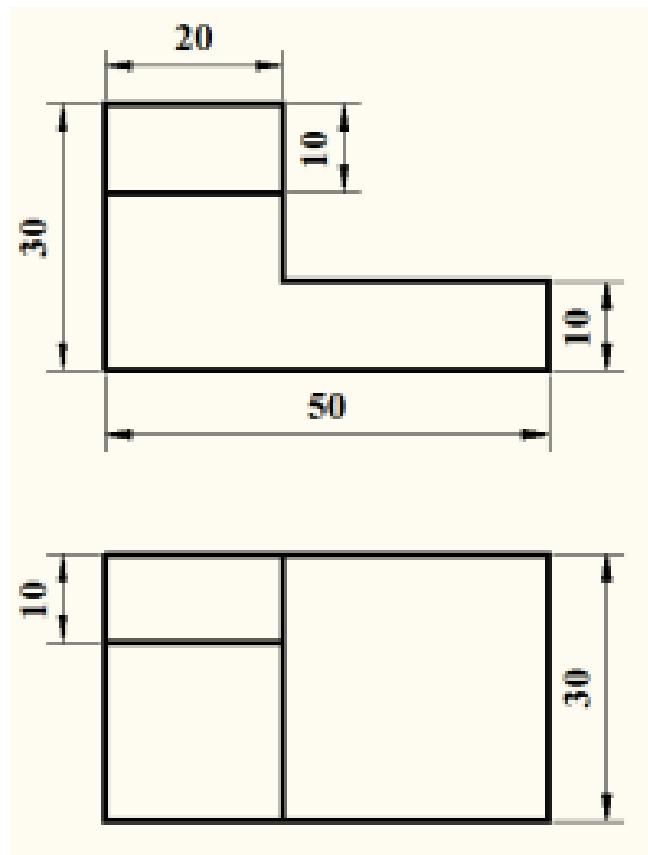
**Figure E3.5**



Oblique drawing of the given object is shown in **Figure E3.5(a)**.

# PERSPECTIVE- SOLUTIONS

1. Draw parallel perspective for the objects shown in Figure 5.1 with given orthographic views. Use parallel perspective for (a), (c), (e) and angular perspective for (b), (d), (f)



(a)

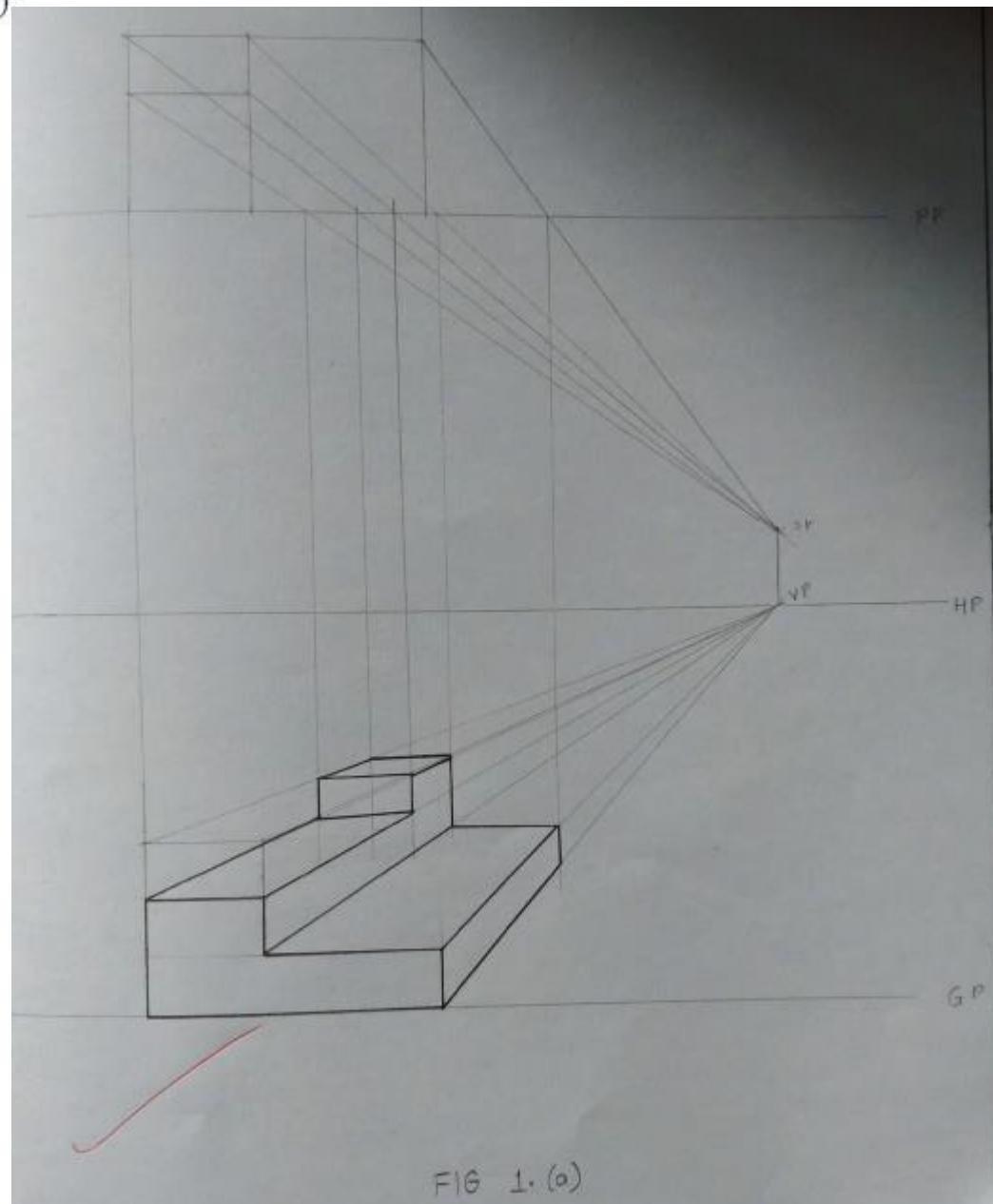
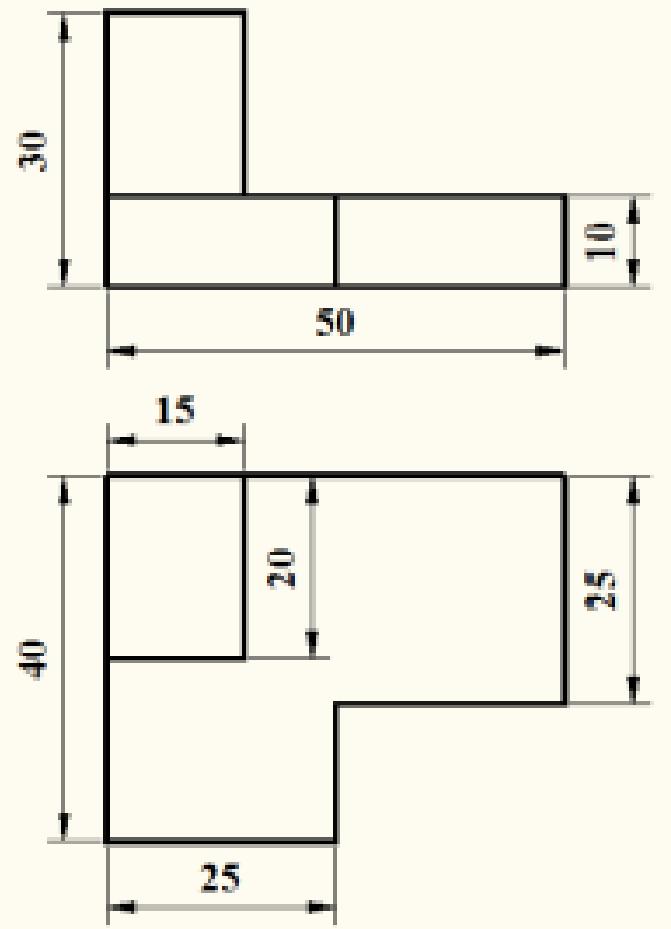
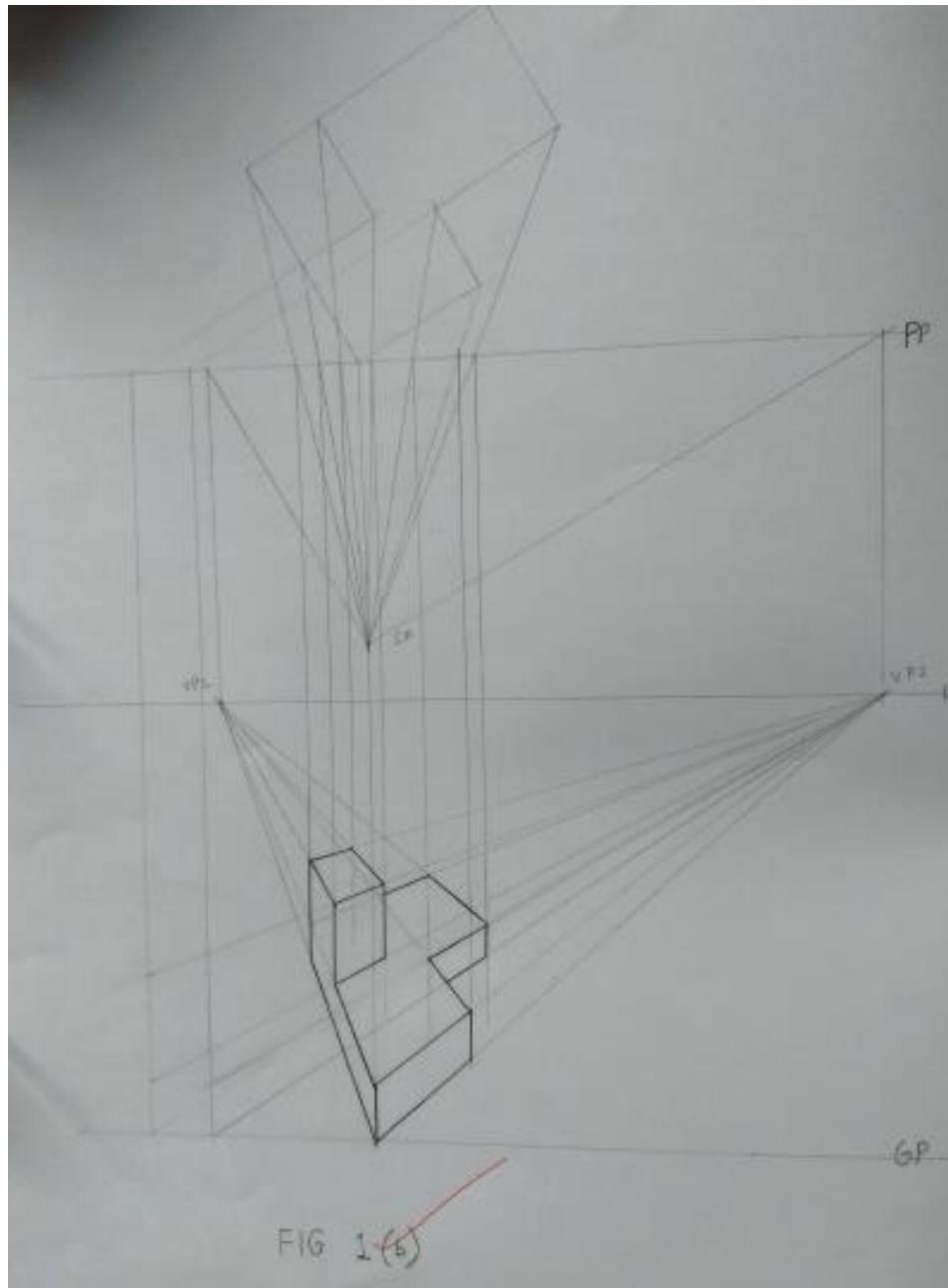
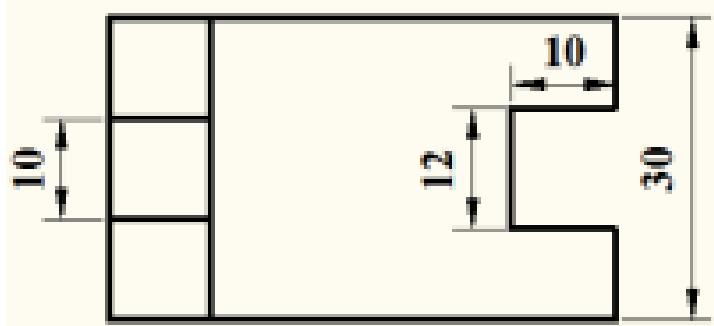
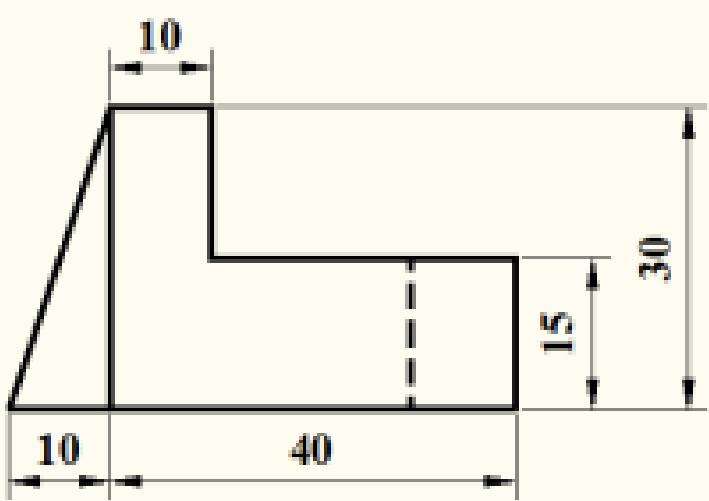


FIG 1. (a)



(b)





(c)

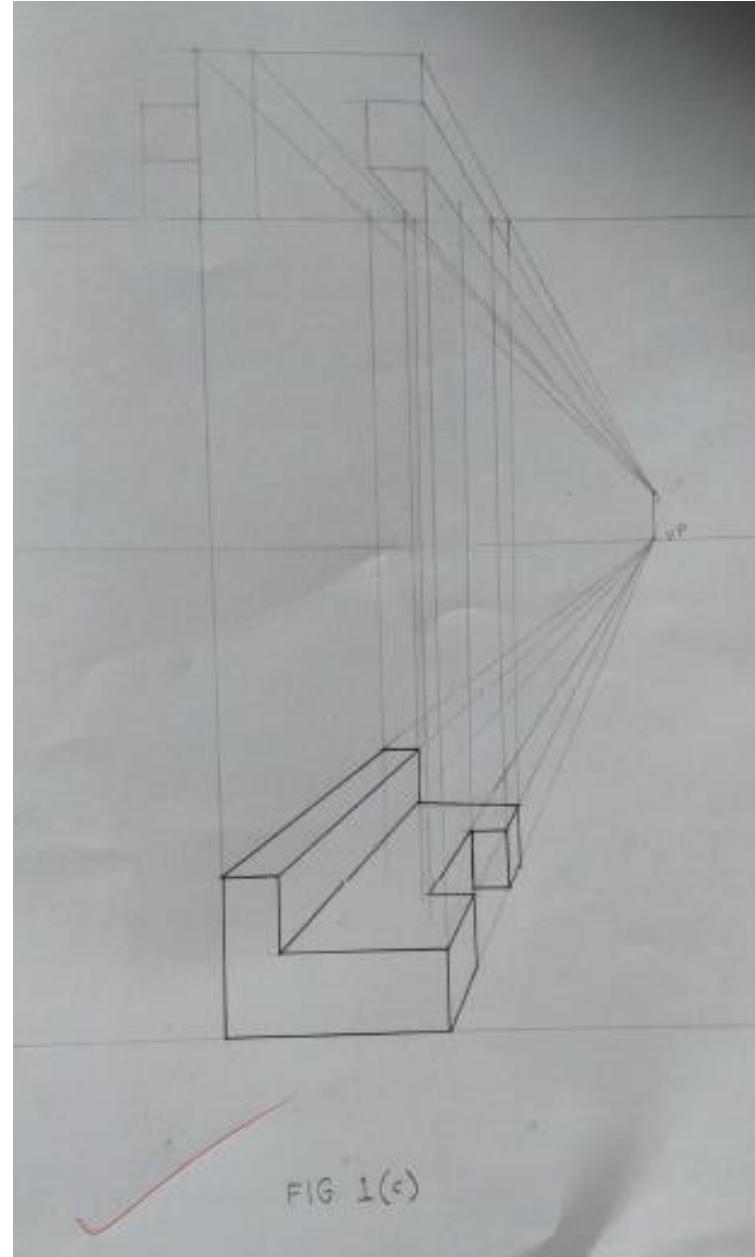
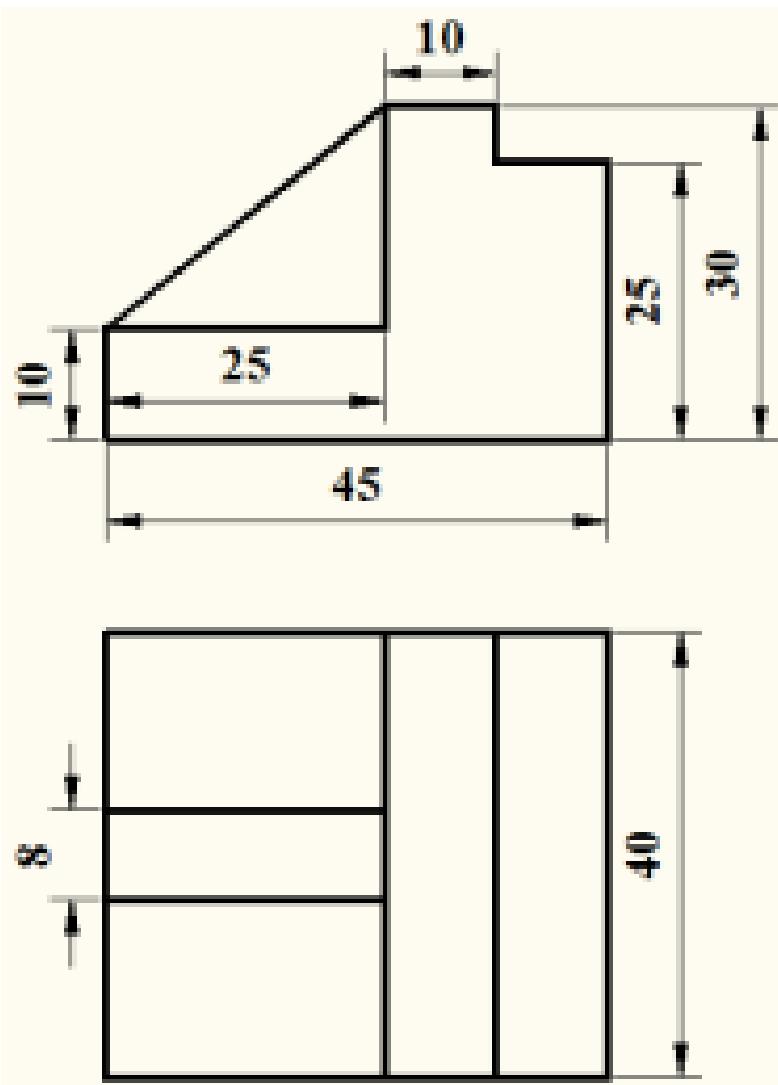


FIG. 1(c)



(d)

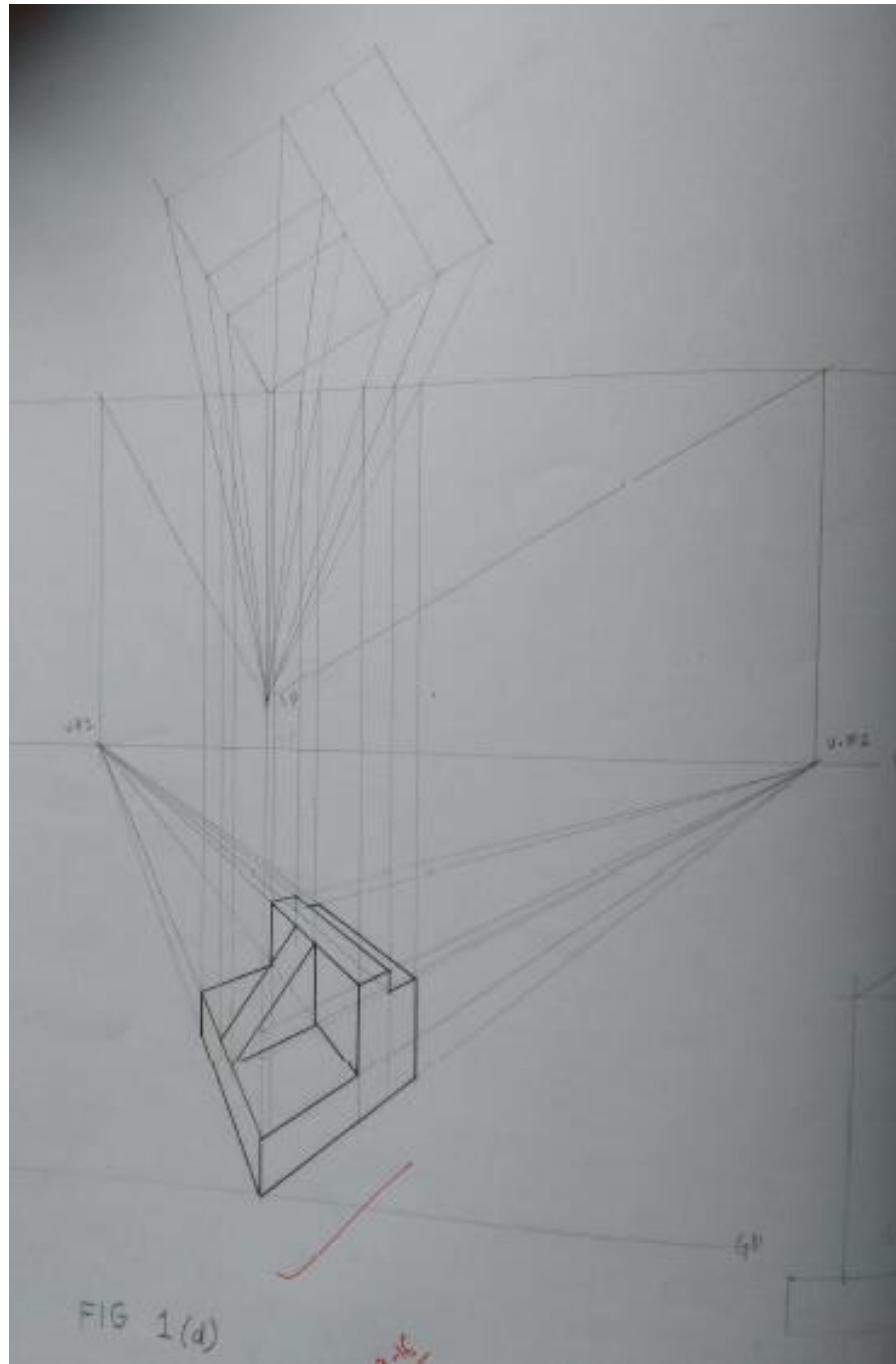
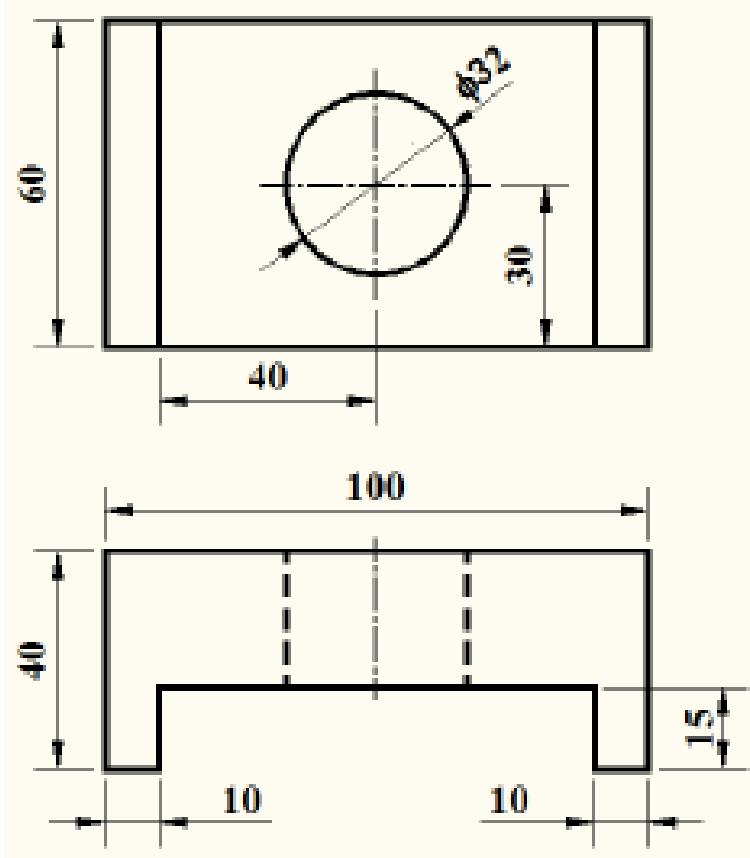
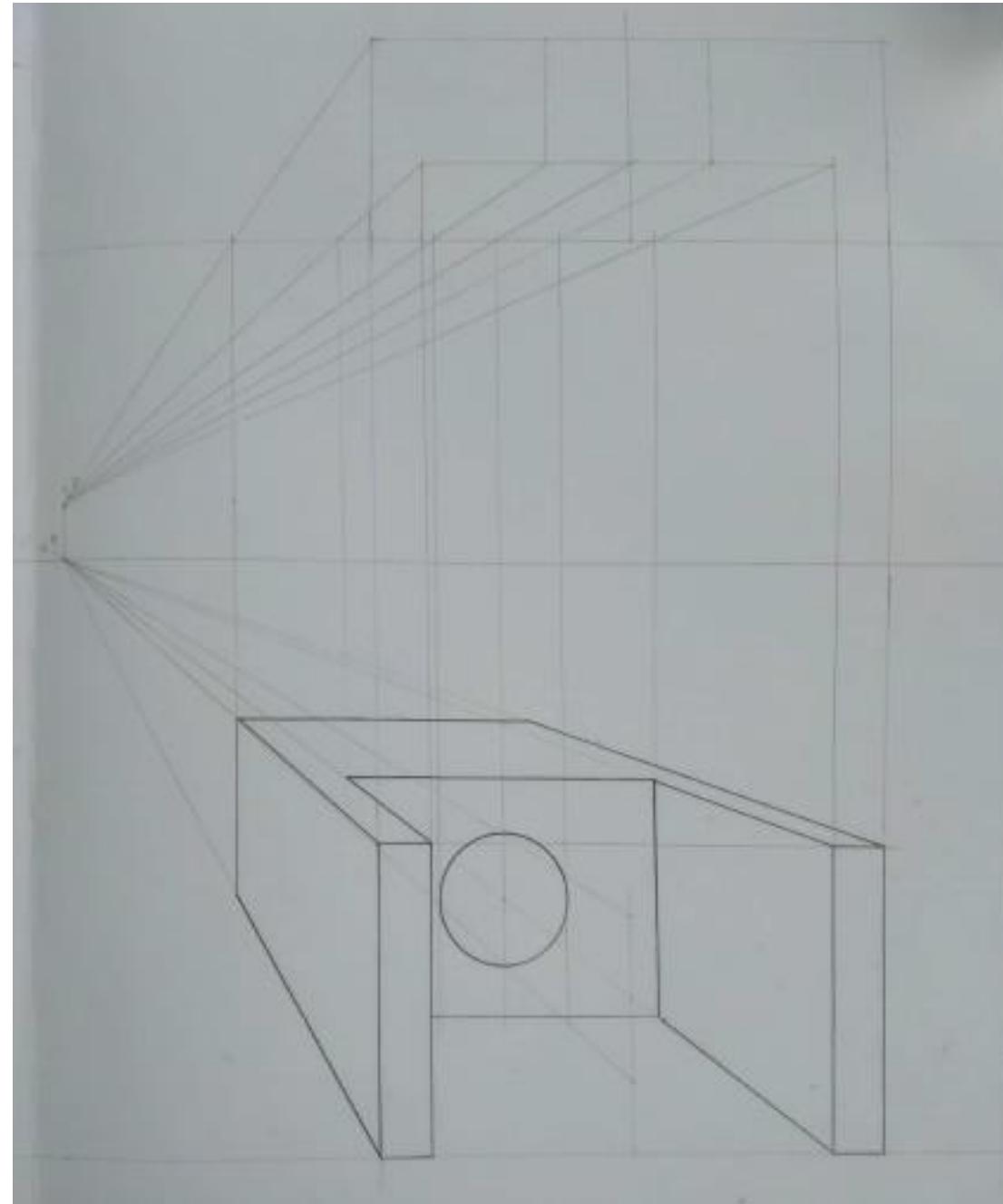


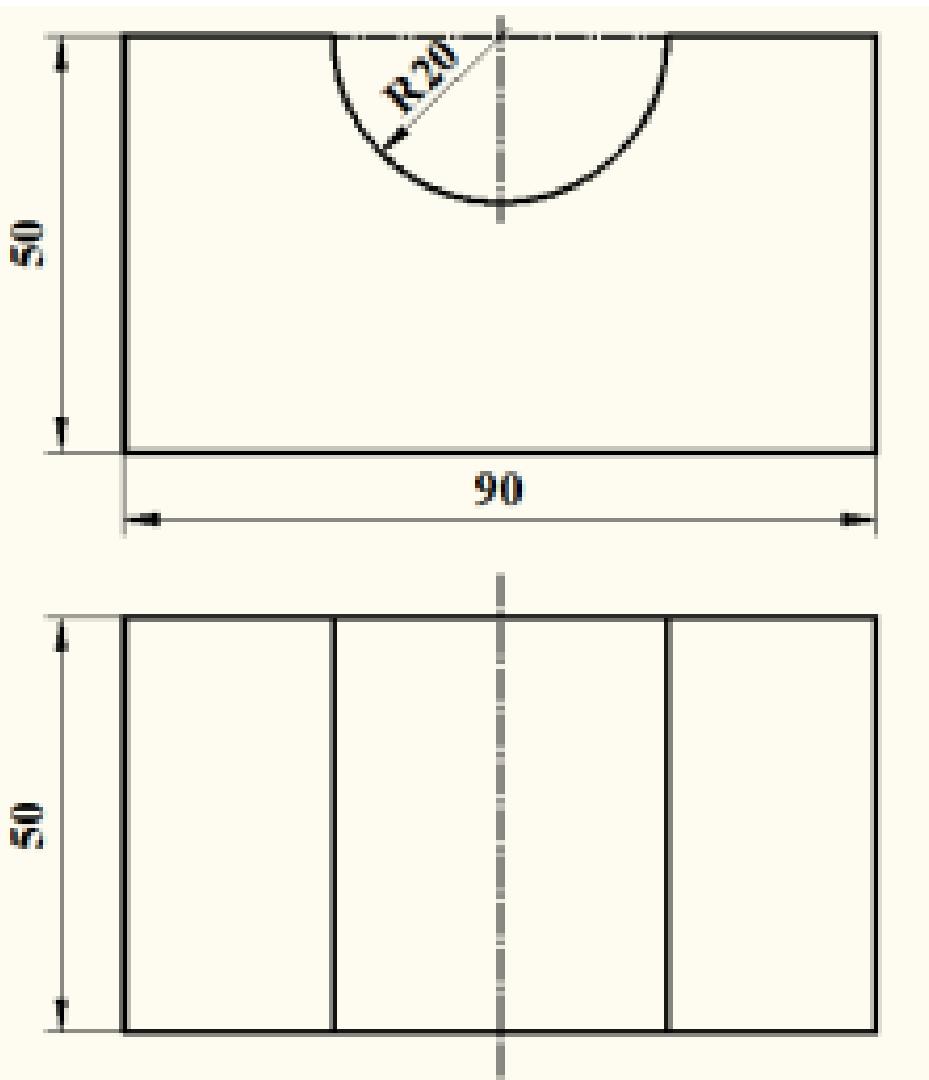
FIG 1(d)



(e)

Figure P5.1





(f)

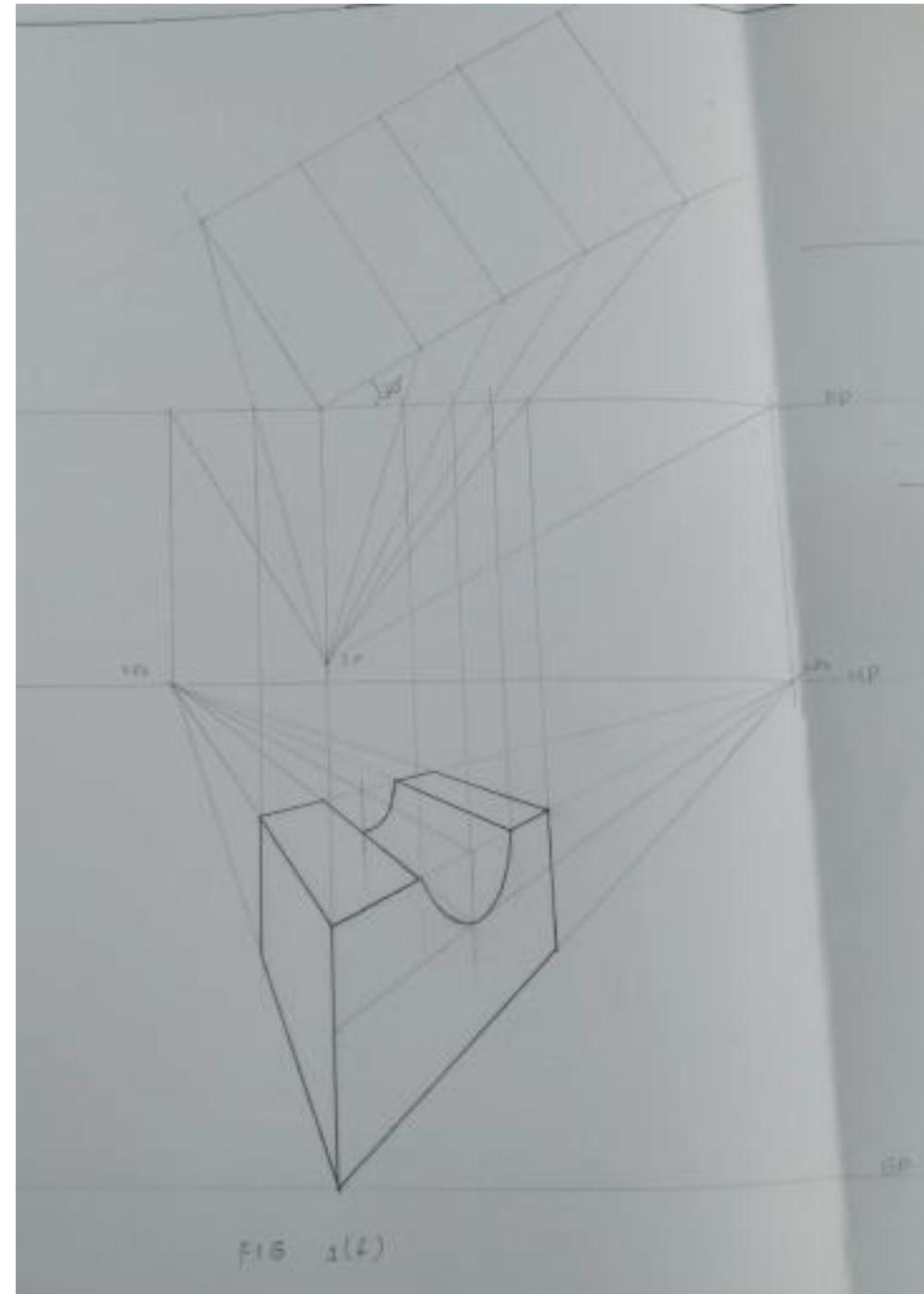


FIG. 4(f)

2. A square prism 30 mm side and 50 mm long is lying on the ground plane on one of its rectangular faces in such a way that one of its square faces is parallel to 10 mm behind the picture plane. The station point is located 50 mm in front of the picture plane and 40 mm above the ground plane. The central plane is 45 mm away from the axis of the prism towards the left. Draw the perspective view of the prism

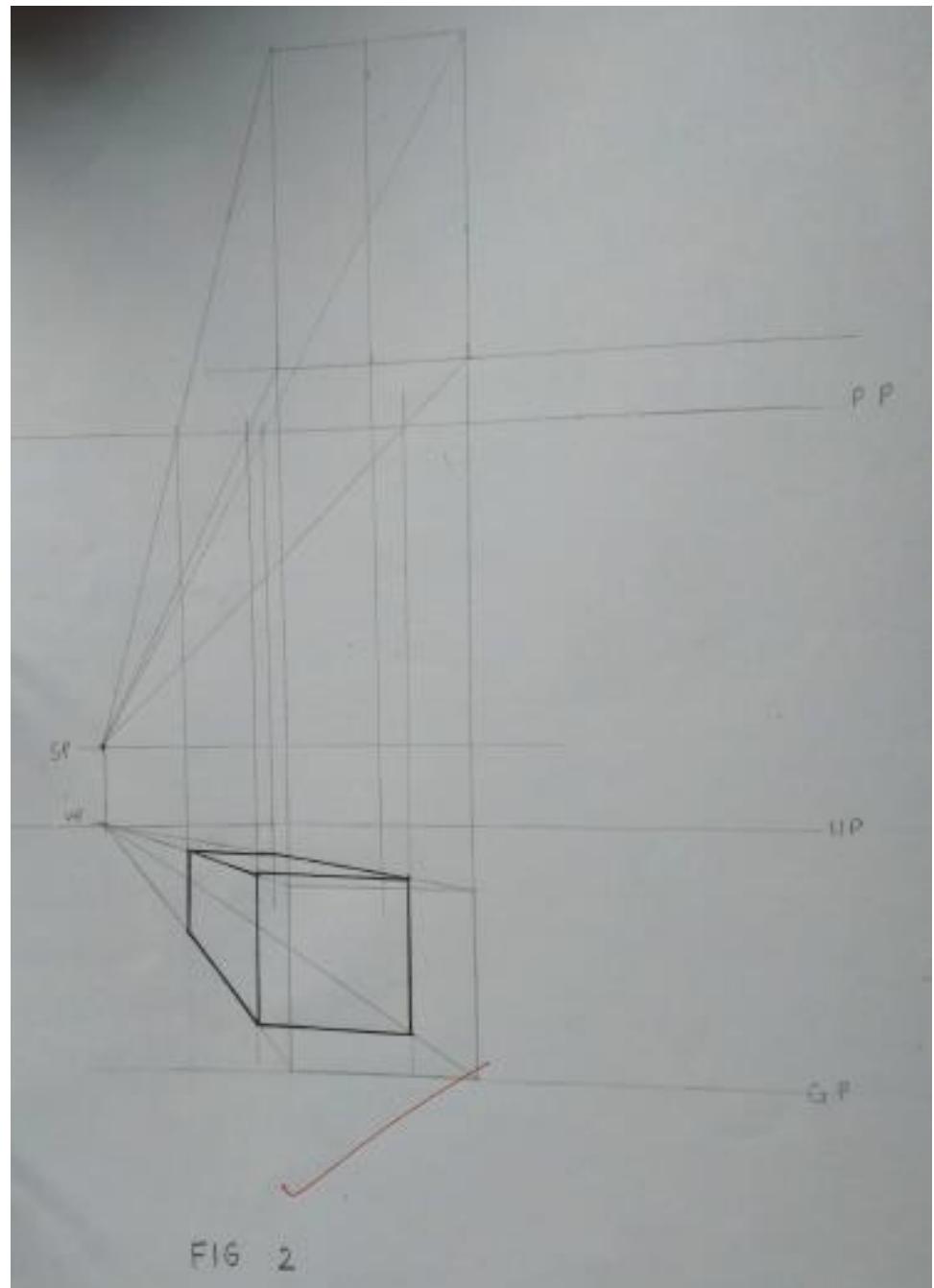
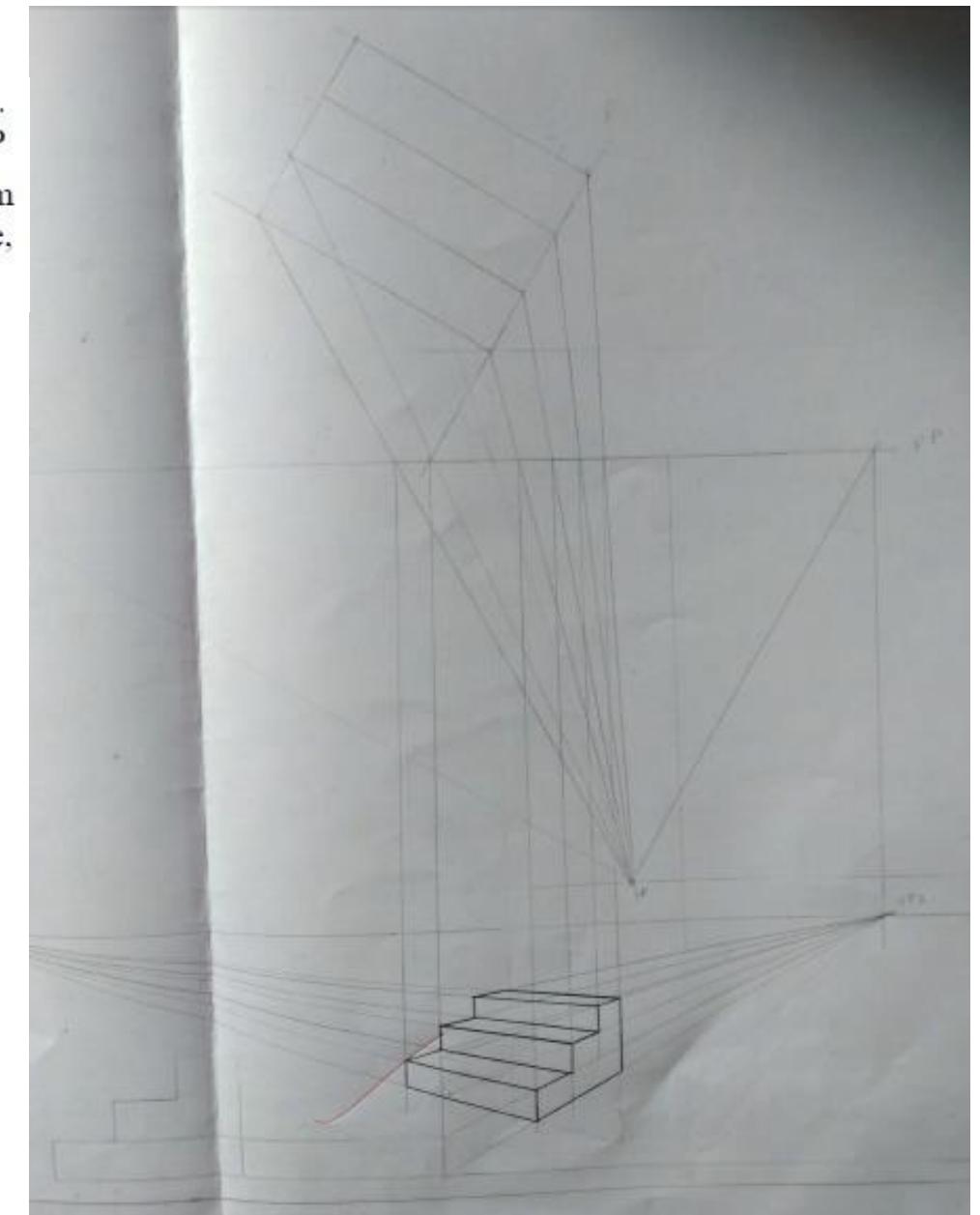


FIG 2

3. A model of steps has 3 steps of 15 mm tread and rise 10 mm. The steps measure 60 mm wide. The vertical edge of bottom steps, which is nearer to the picture plane, is 25 mm behind PP and the width of steps recede to the left at an angle of  $30^{\circ}$  to PP. The station point is 100 mm in front of PP and 60 mm above the ground plane and 30 mm to the right of the vertical edge, which is nearest to PP. Draw the perspective view of the model.



4. A square pyramid of base edge 40 mm and altitude 50 mm, rests with its base on the ground plane such that all the edges of the base are equally inclined to the PP. One of the corners of the base is touching the PP. The station point is 60 mm in front of the PP, 80 mm above the ground plane and lies in a central plane which passes through the axis of the pyramid. Draw the perspective projection.

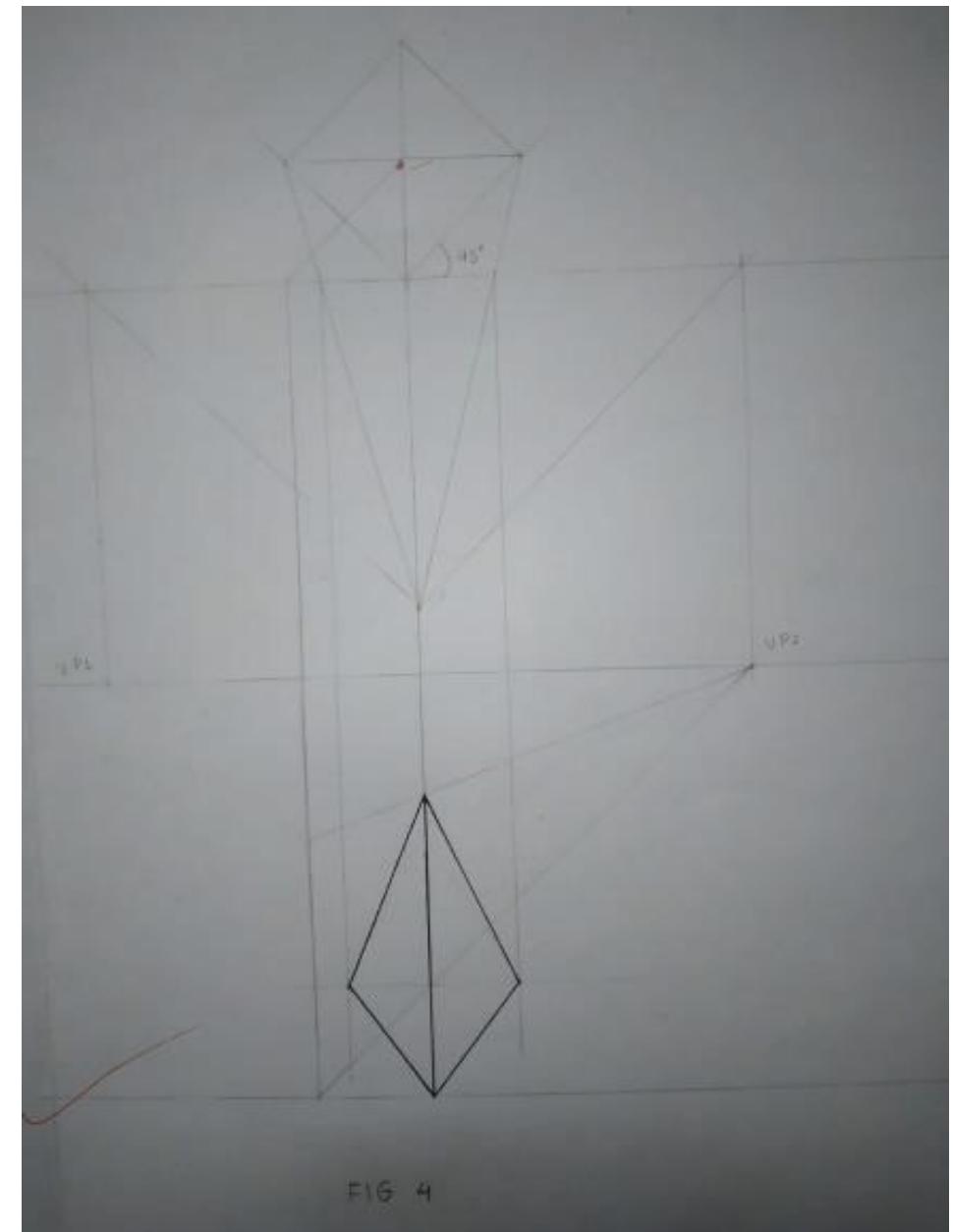
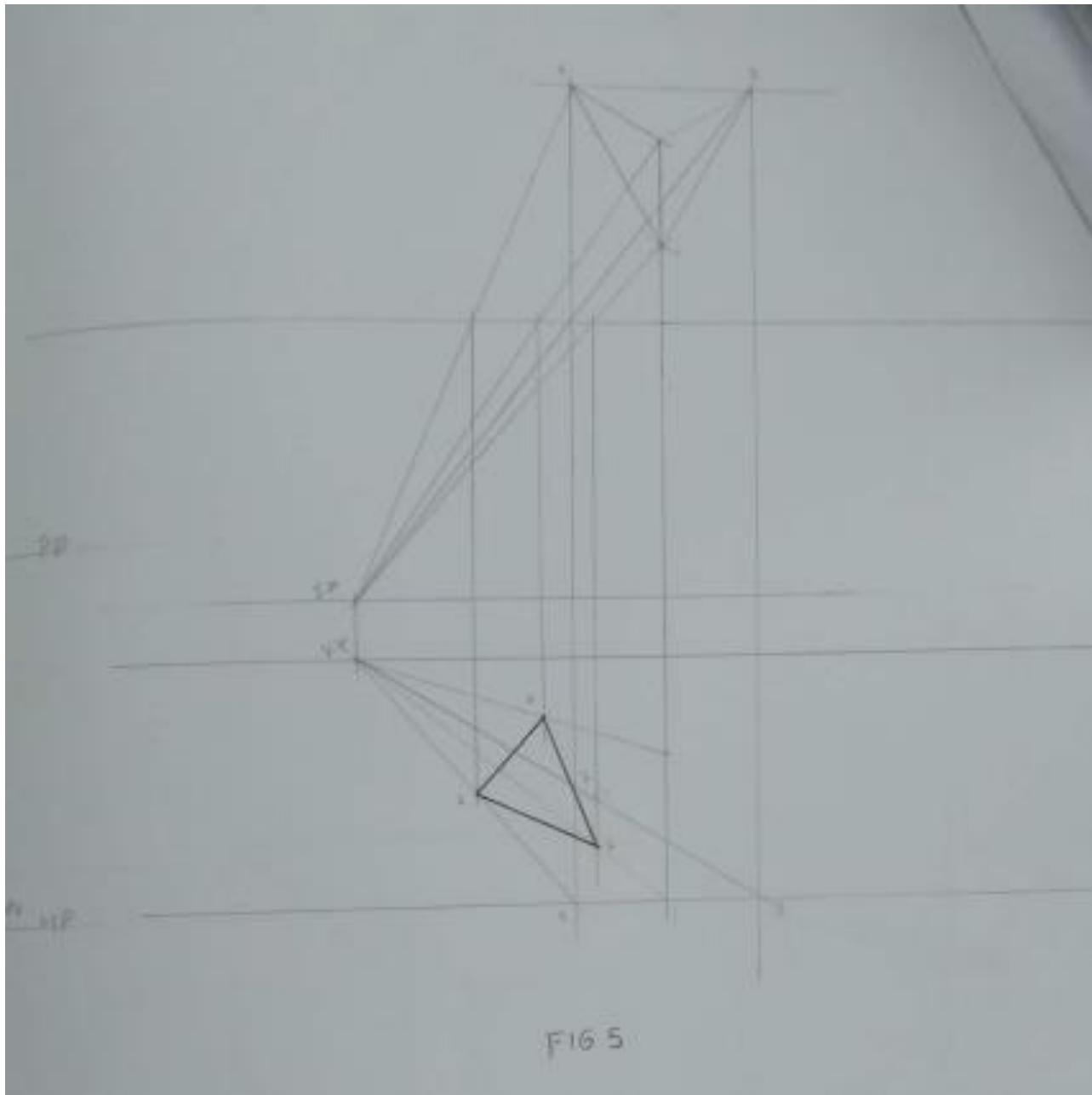


FIG. 4

5. Draw the perspective view of a tetrahedron of 30 mm edge when resting on ground plane on one of its faces with one of resting edges parallel to the picture plane. The vertical axis of the tetrahedron is in between this parallel edge and the picture plane, and 30 mm behind it. The station point is 45 mm in front of the picture plane, 50 mm to the left of the axis and 40 mm above the ground.



F16.5

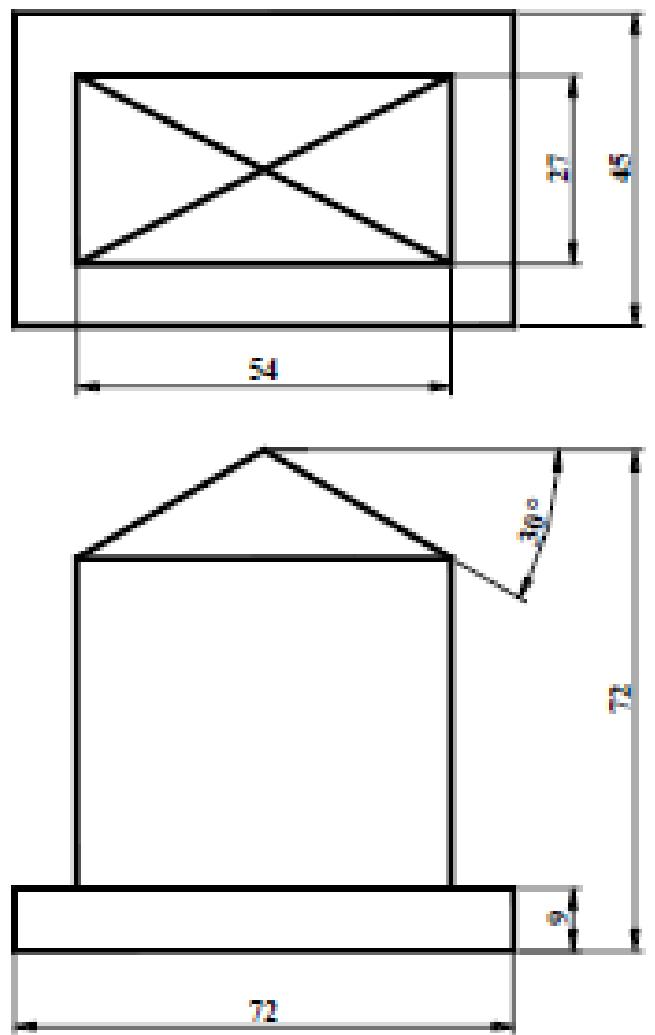
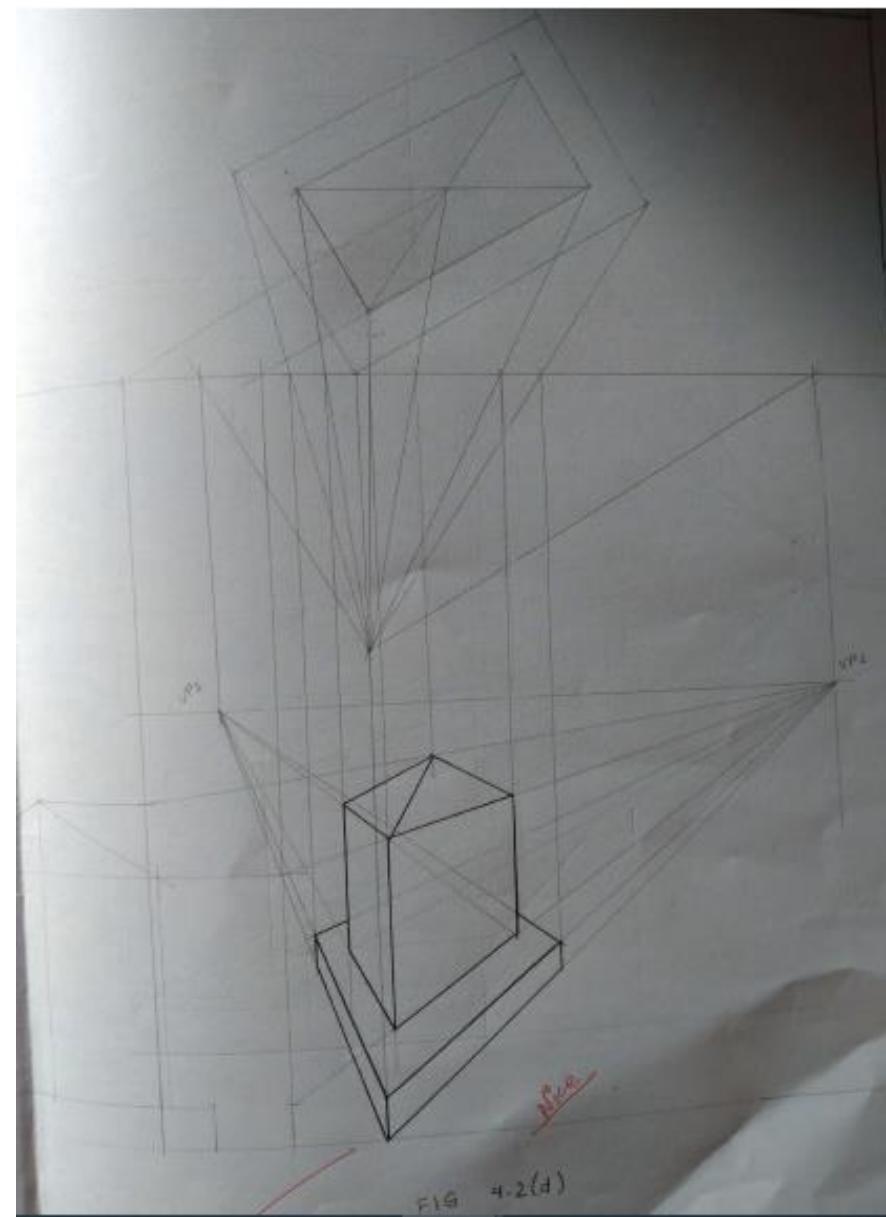


Figure 4.2d



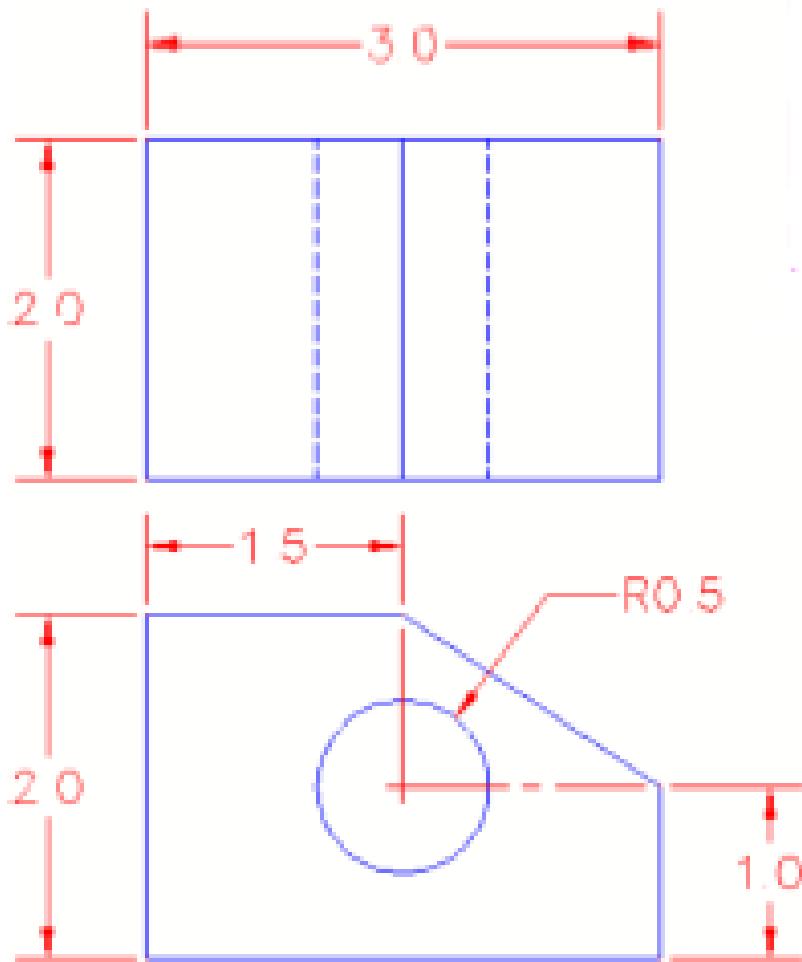
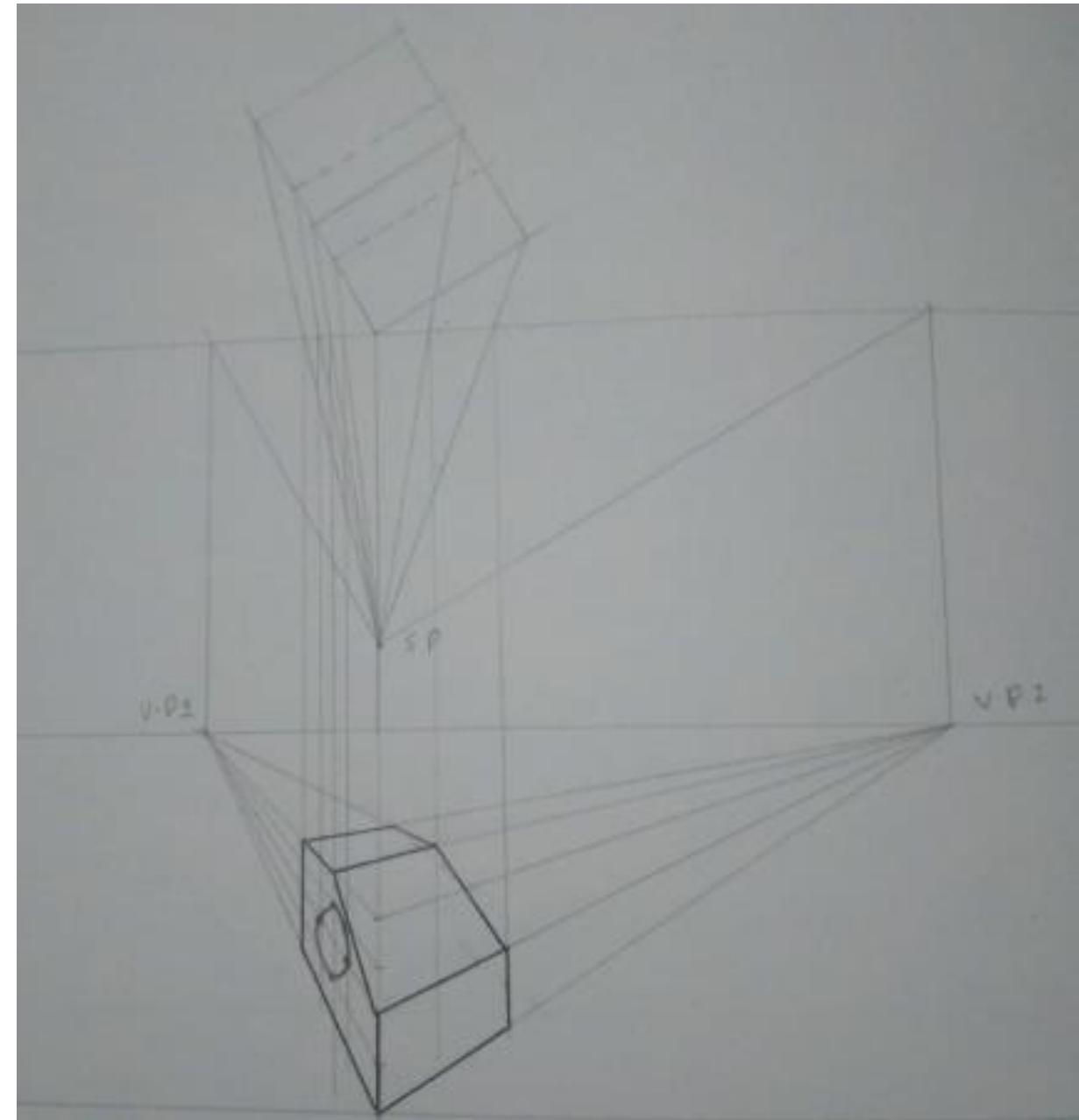
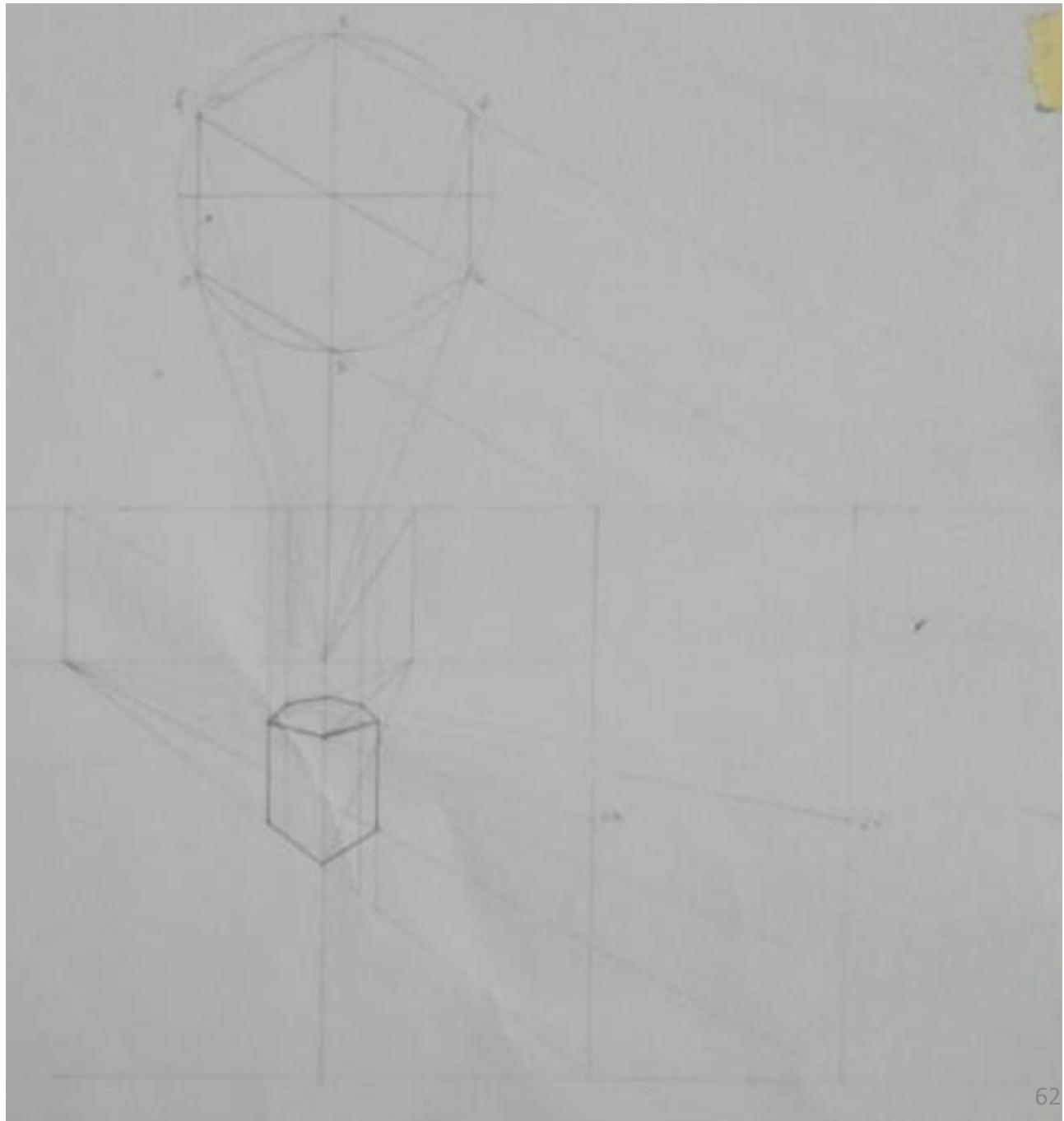
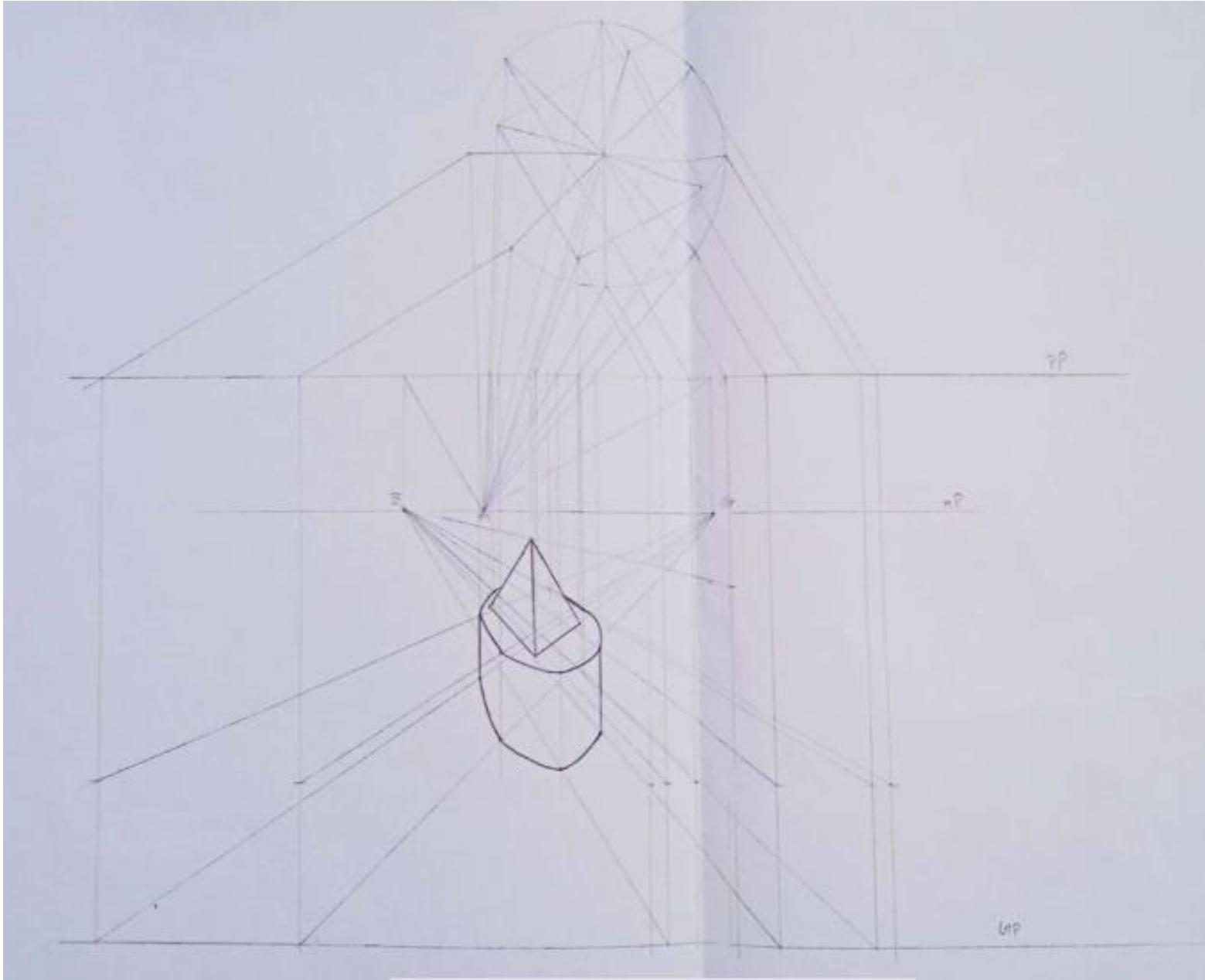


Figure 4.2c



5. A hexagonal prism, side of base 25 mm and height 50 mm with its base on the ground plane such that one of its rectangular faces is inclined at  $30^{\circ}$  to the picture plane and the vertical edge nearer to PP is 15 mm behind it. The station point is 45 mm in front of the picture plane. 70 mm above the ground plane and lies in a central plane, which is 15 mm left to the vertical edge nearer to the picture plane. Draw the perspective projection of the prism.





# MACHINE DRAWING- SOLUTIONS

1. Make a complete set of detail drawings for a V-block Clamp shown in Figure P8.1.

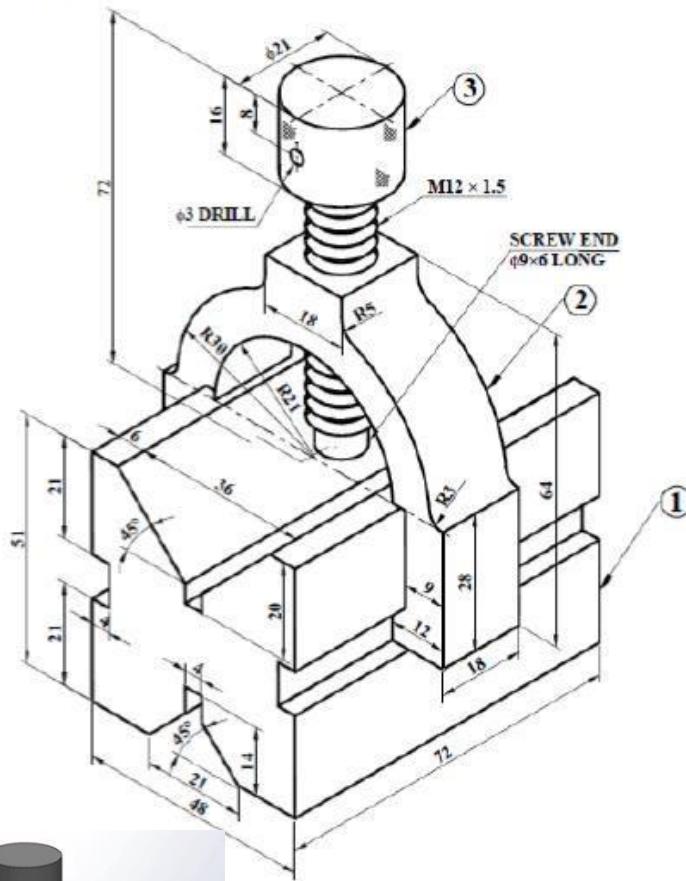
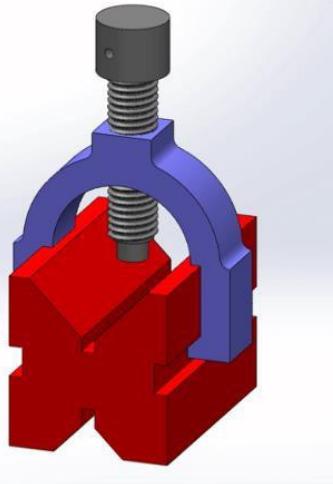
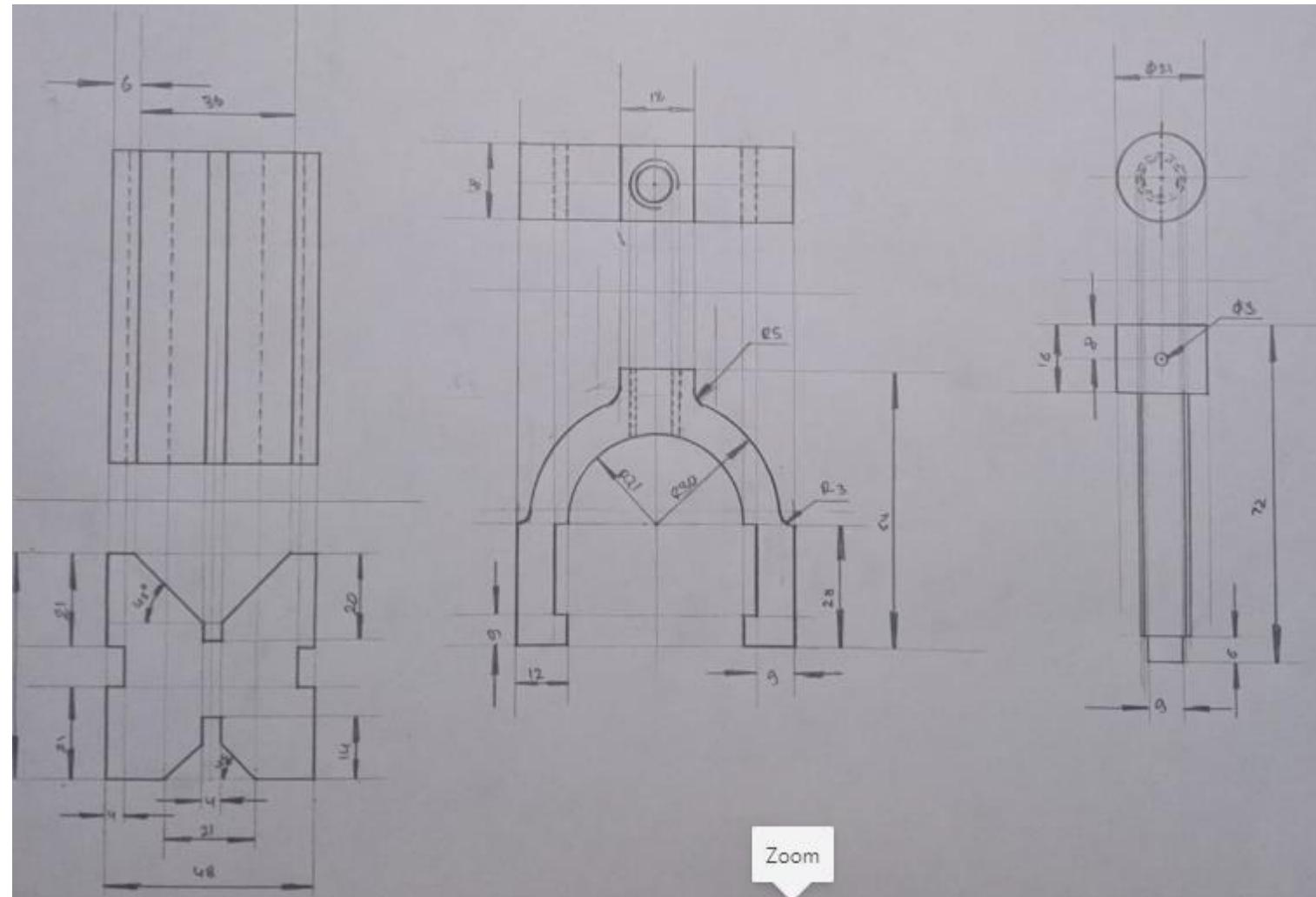
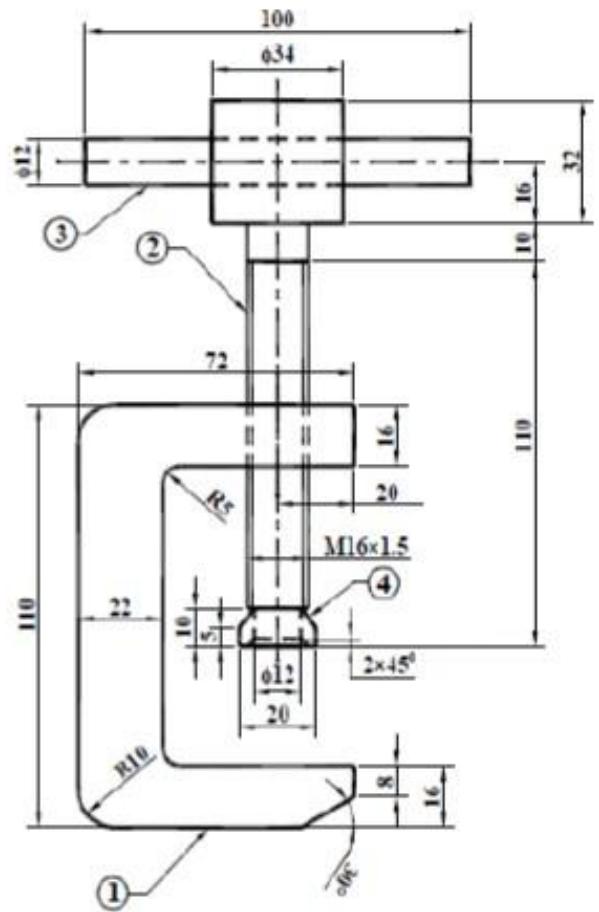


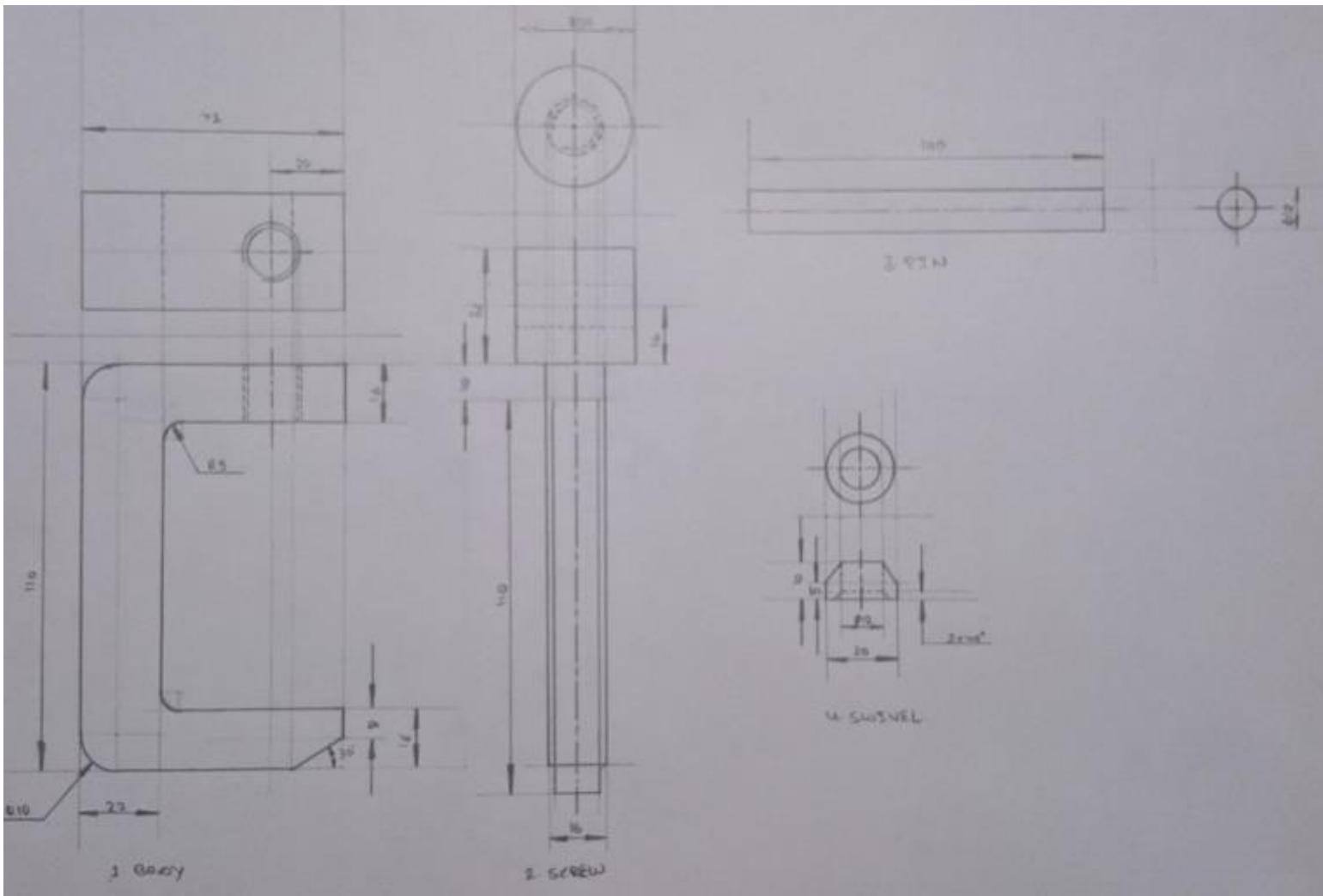
Figure E8.1

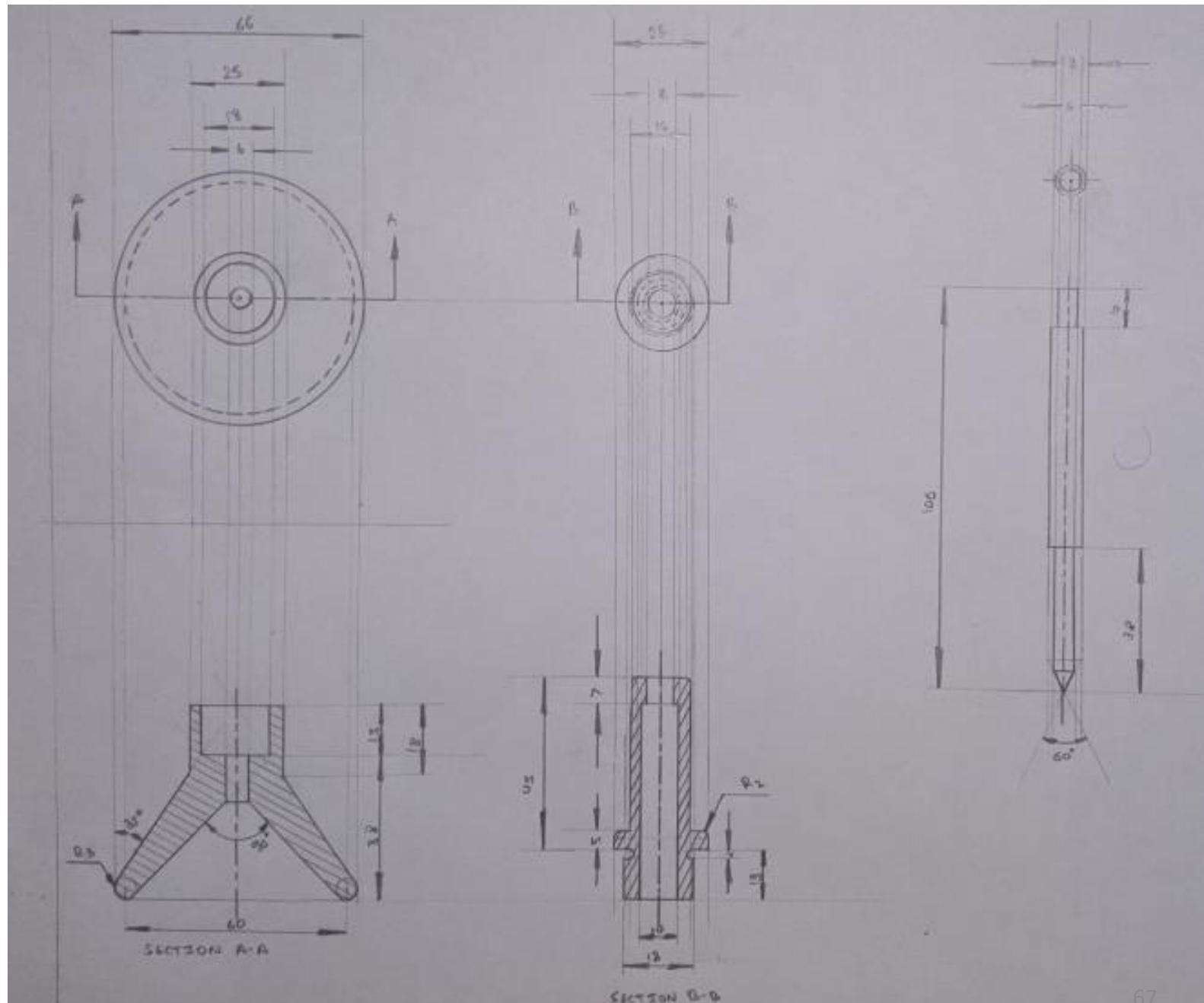
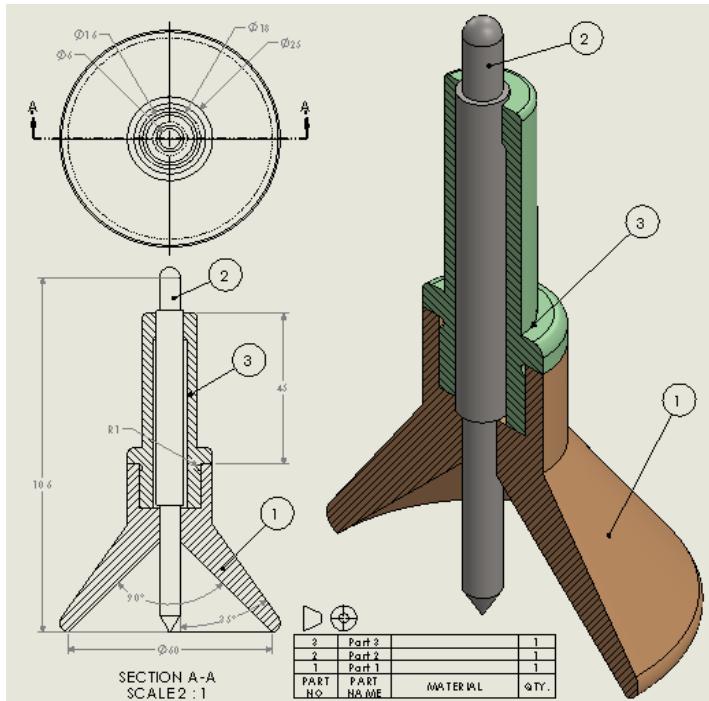
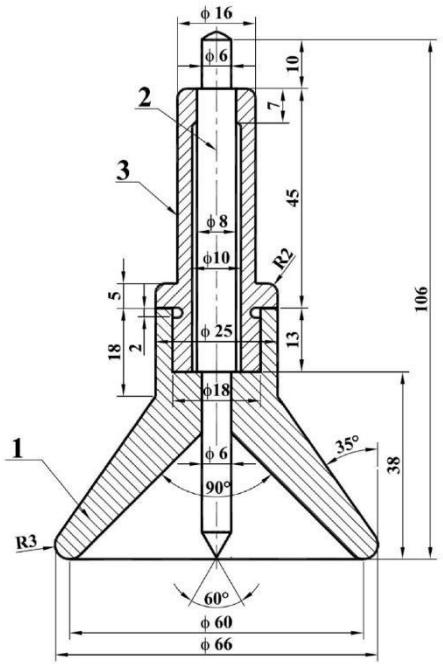




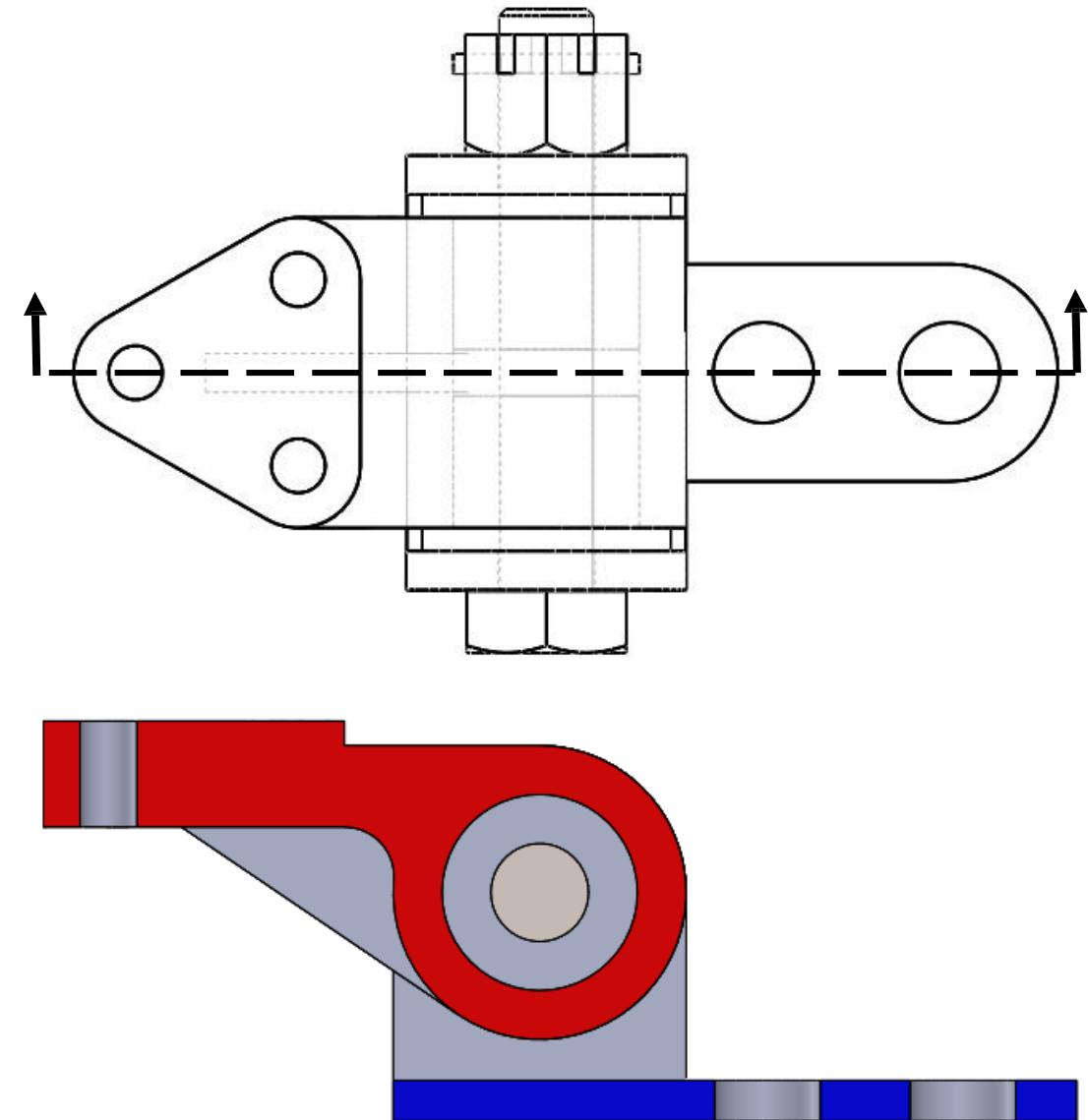
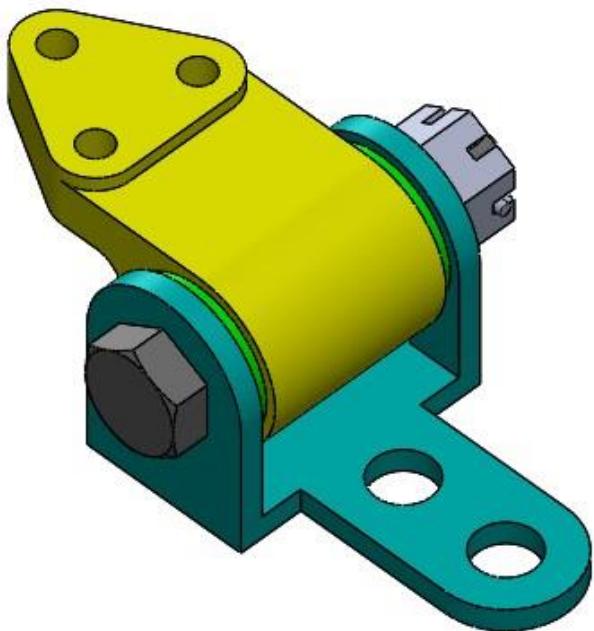
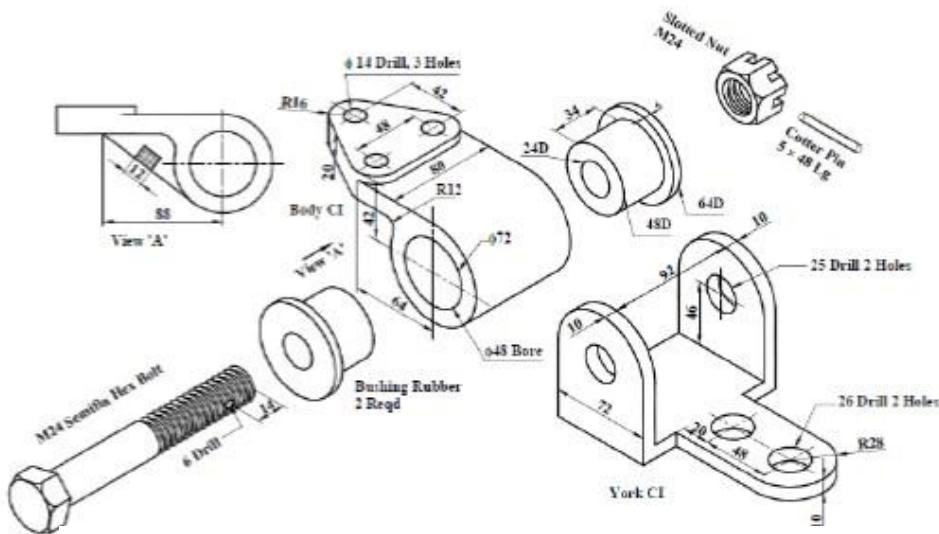
S.N.	DESCRIPTION	QTY.	MATERIAL	REMARK
4.	Swivel	1	MS	
3.	Pin	1	MS	
2.	Screw	1	MS	
1.	Body 32 mm Wid*	1	C1	

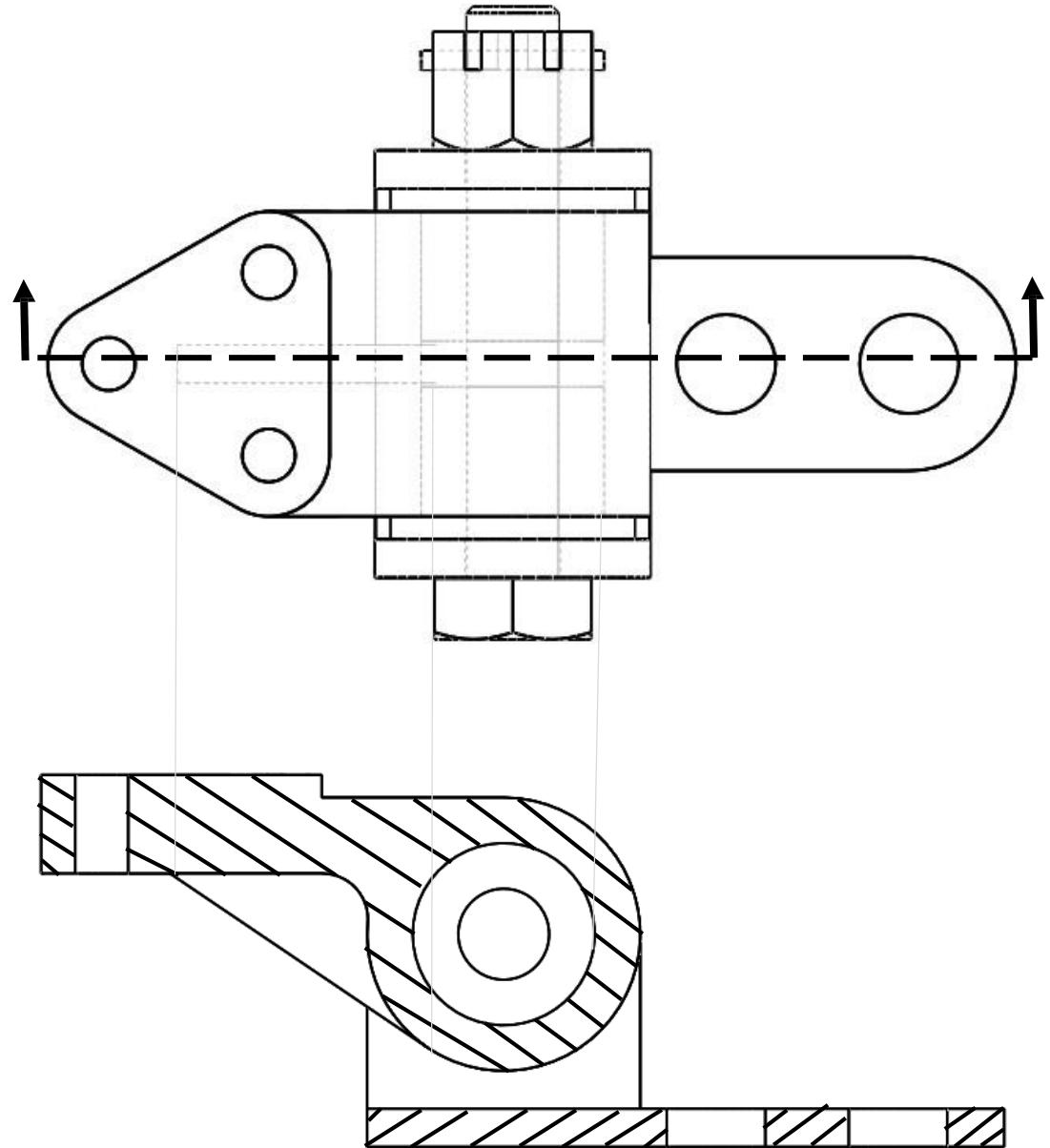
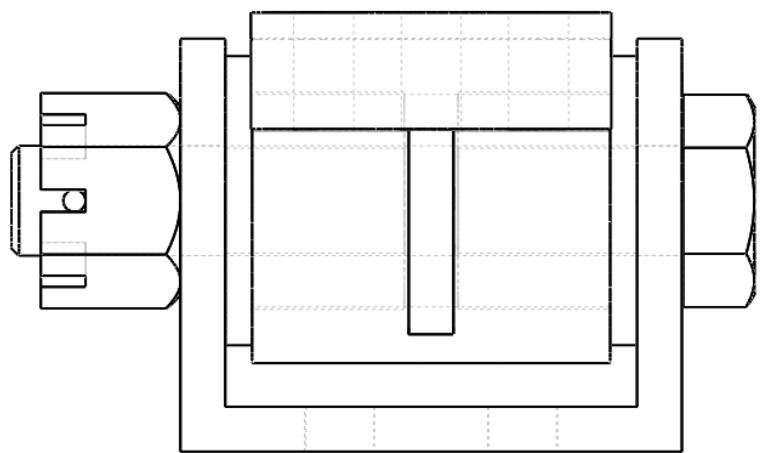
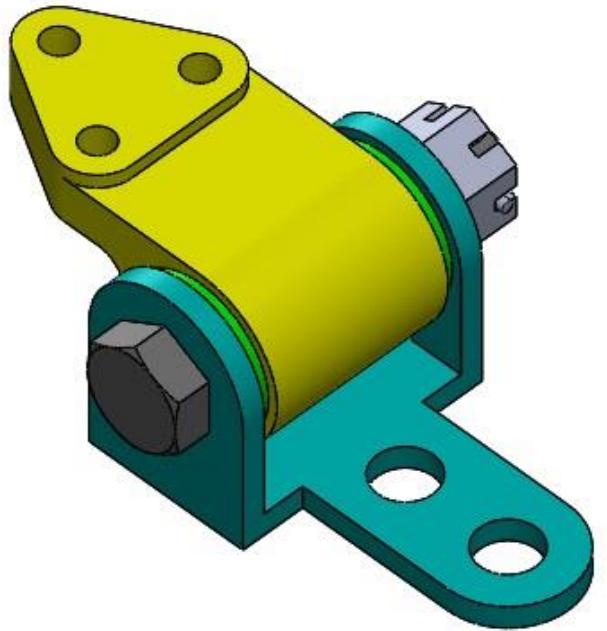
Figure P8.2





1. Figure P9.1 shows the details of an anti-vibration mount. Draw the front view with section and top view of the assembly.





2. Figure P9.2 shows the details of a universal coupling. Draw the front view with section and side view of the assembly.

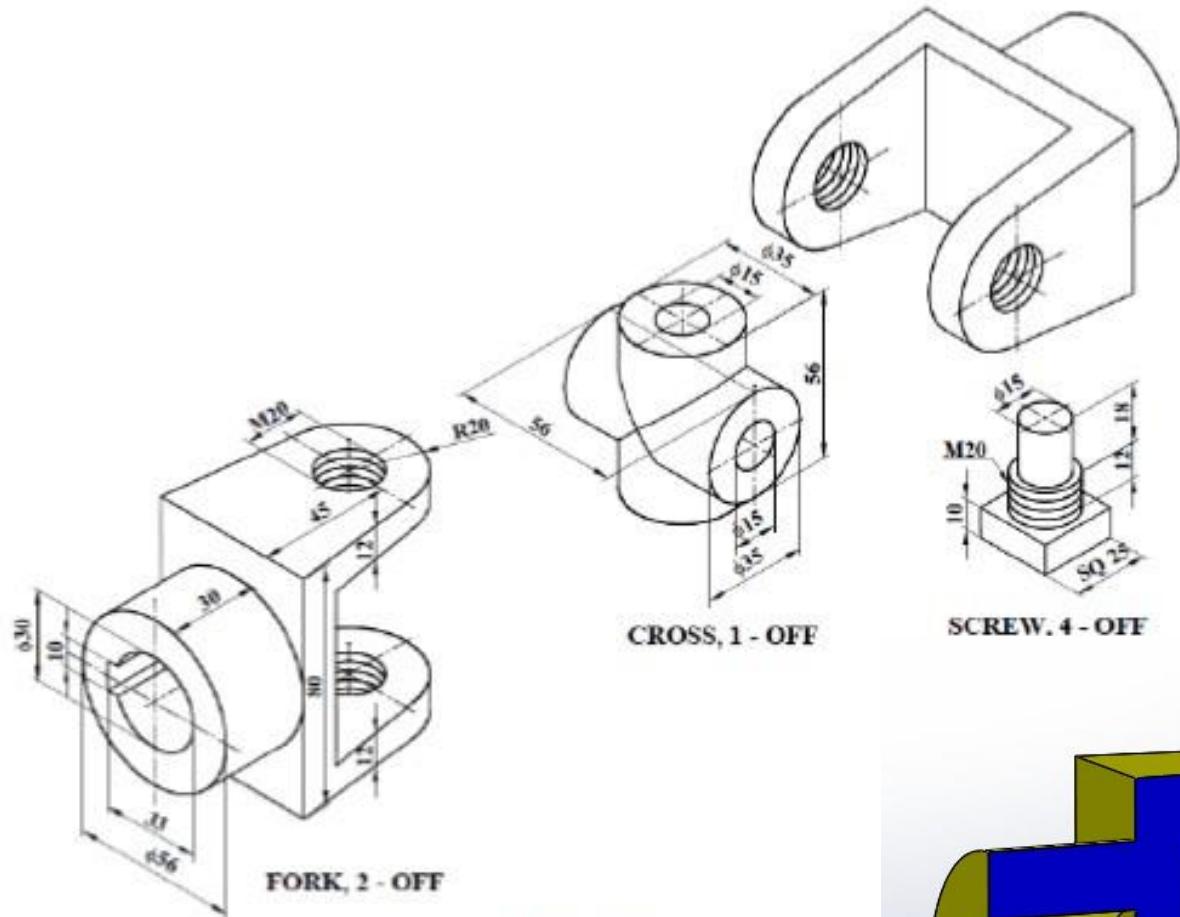
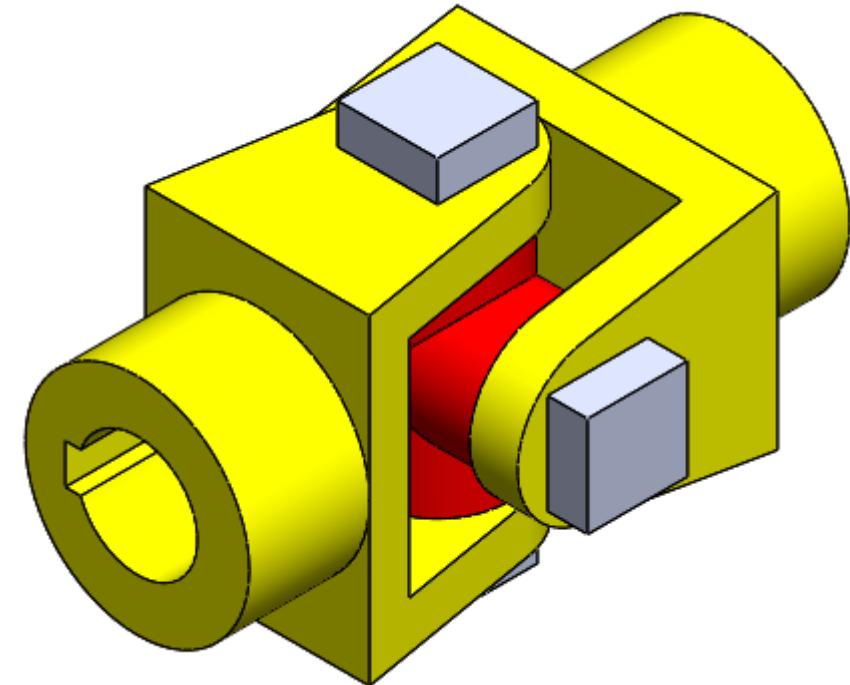
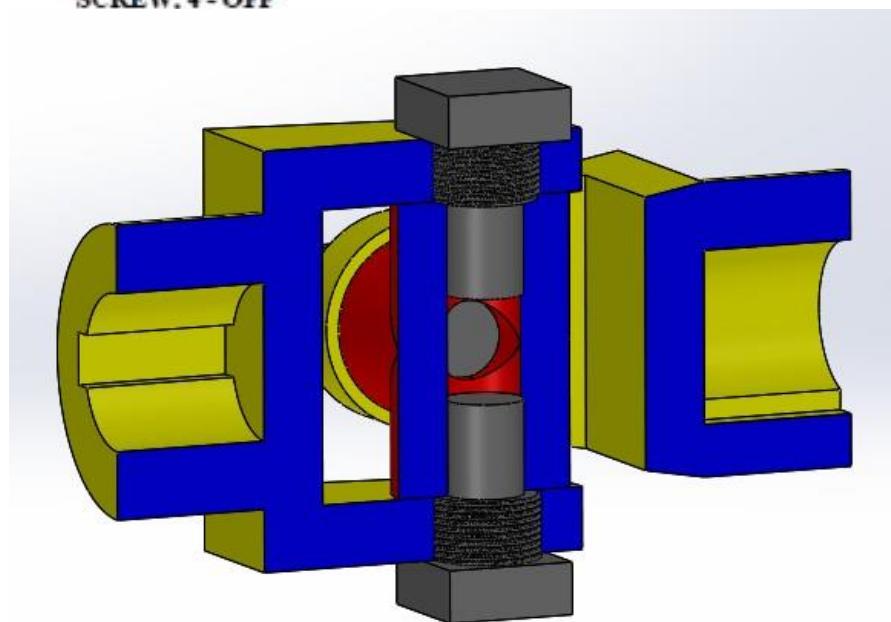
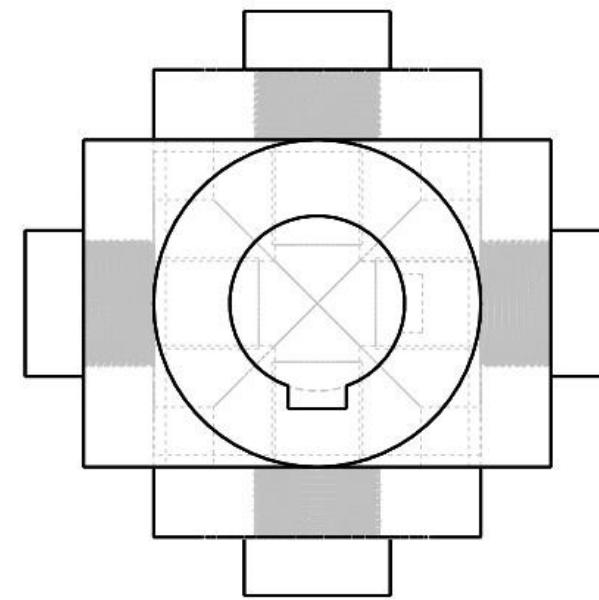
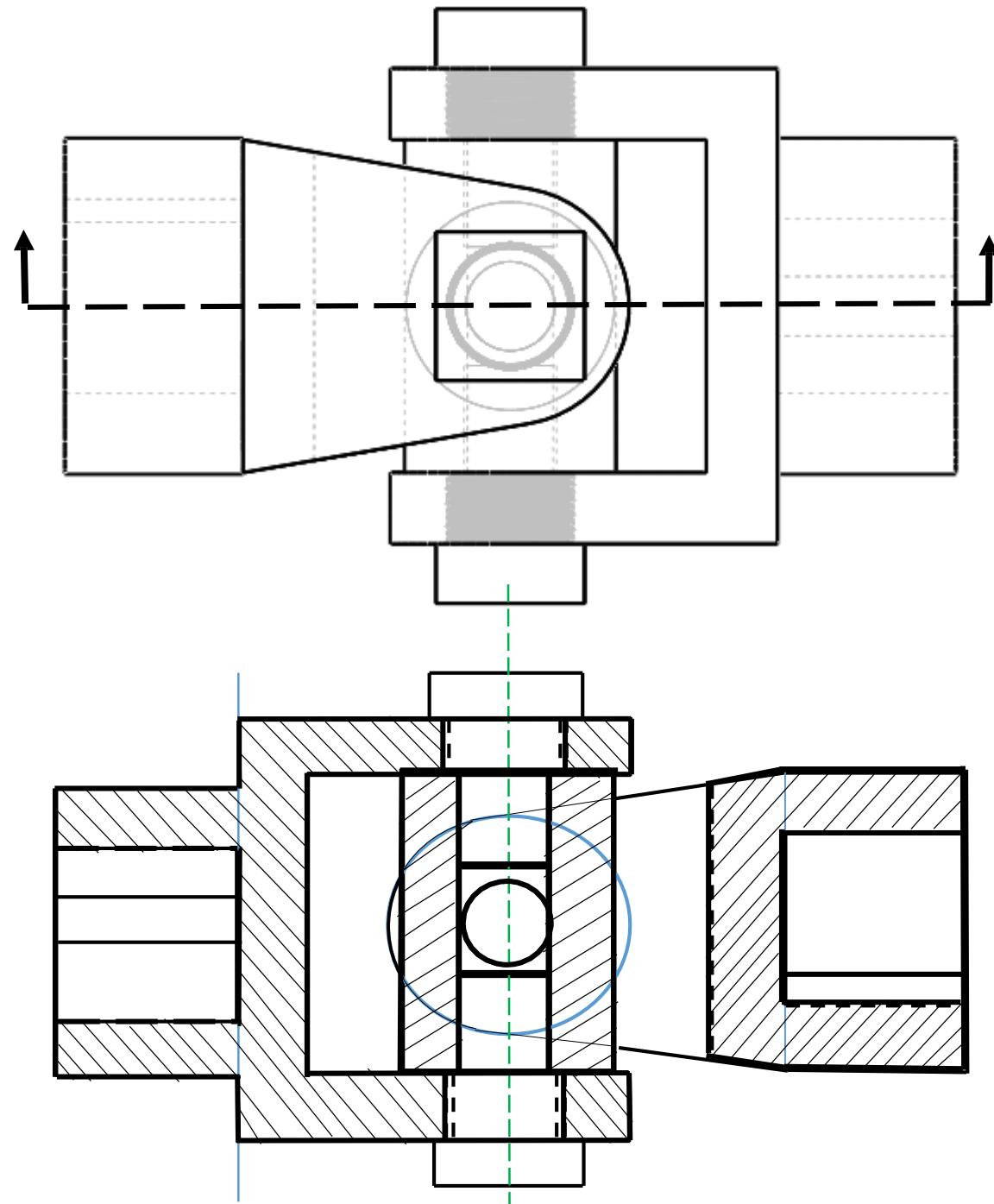


Figure P9.2





3. Draw the front view with section and top view of the assembly with the detail drawing shown in Figure P9.3.

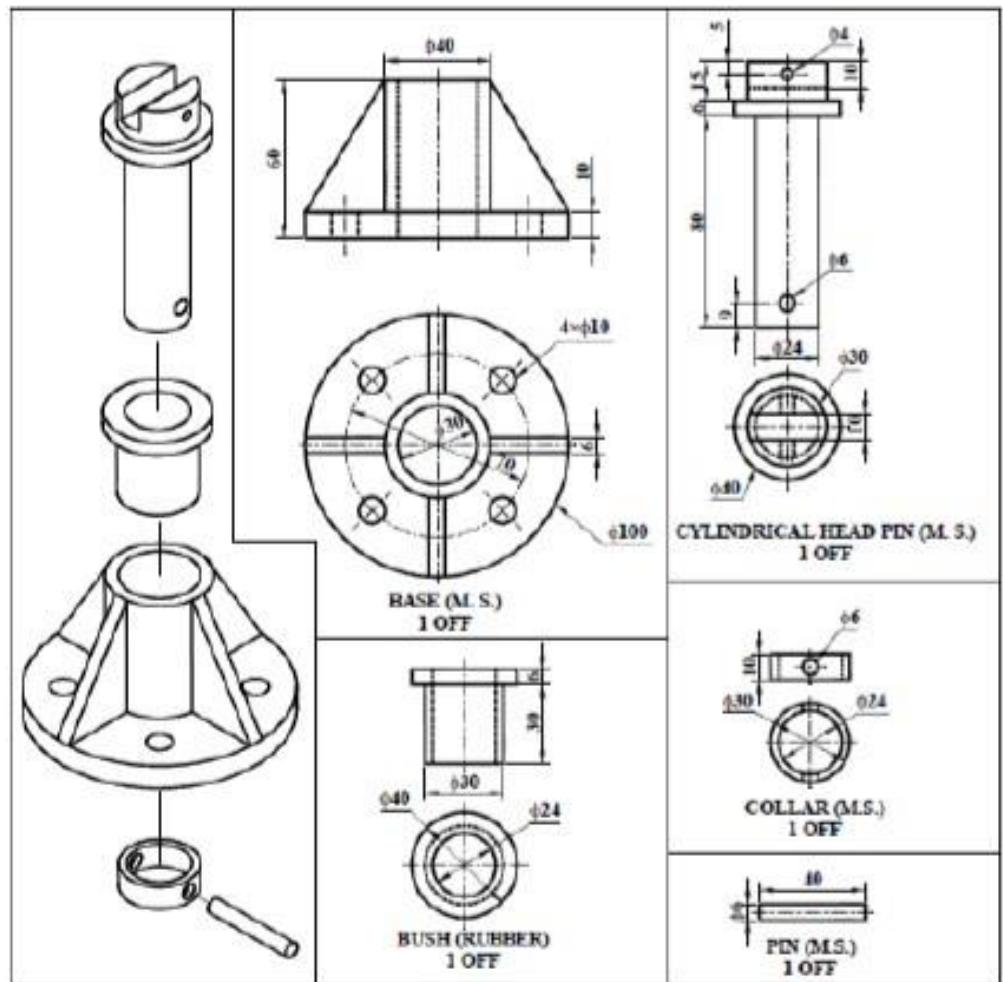
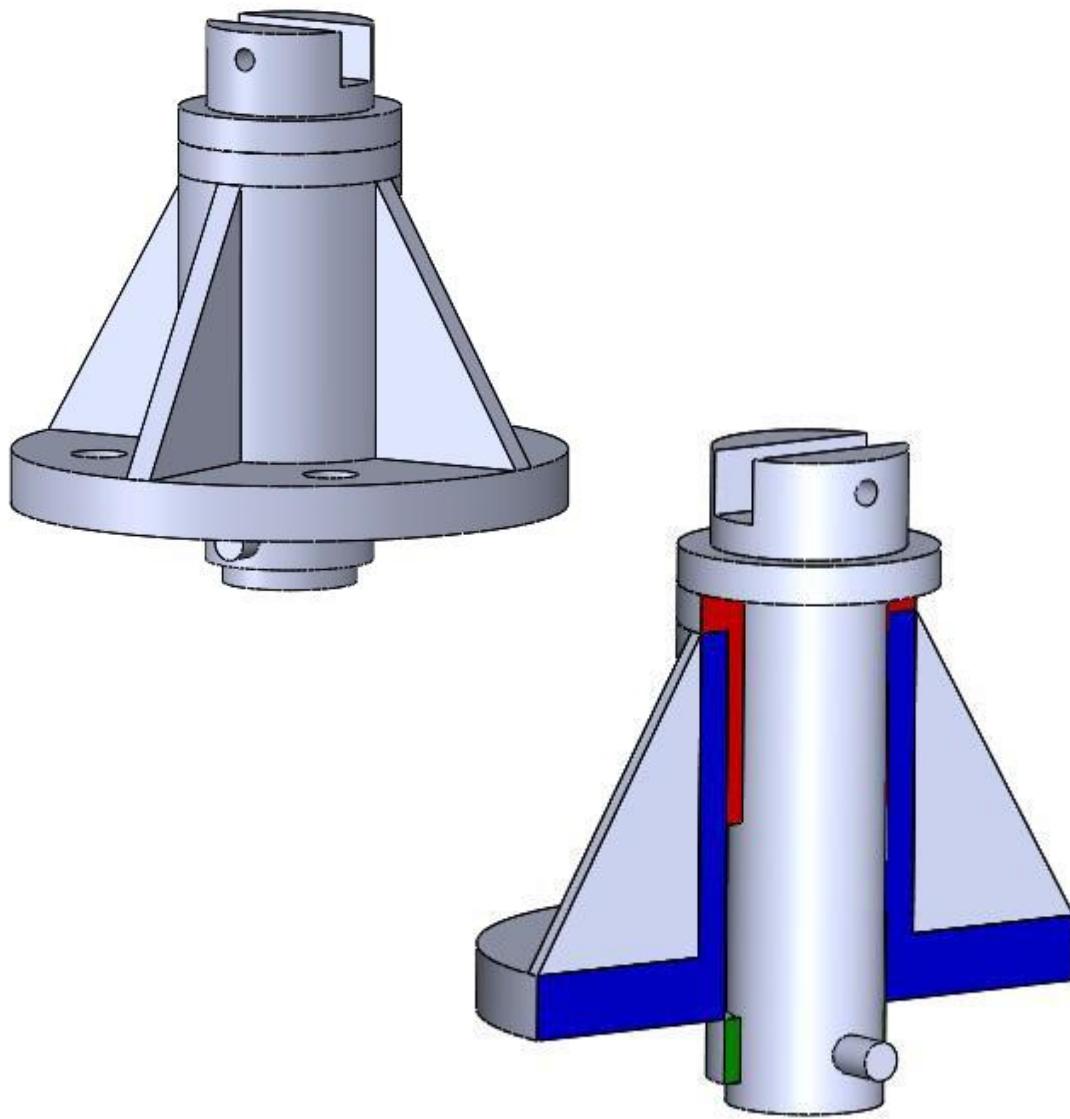
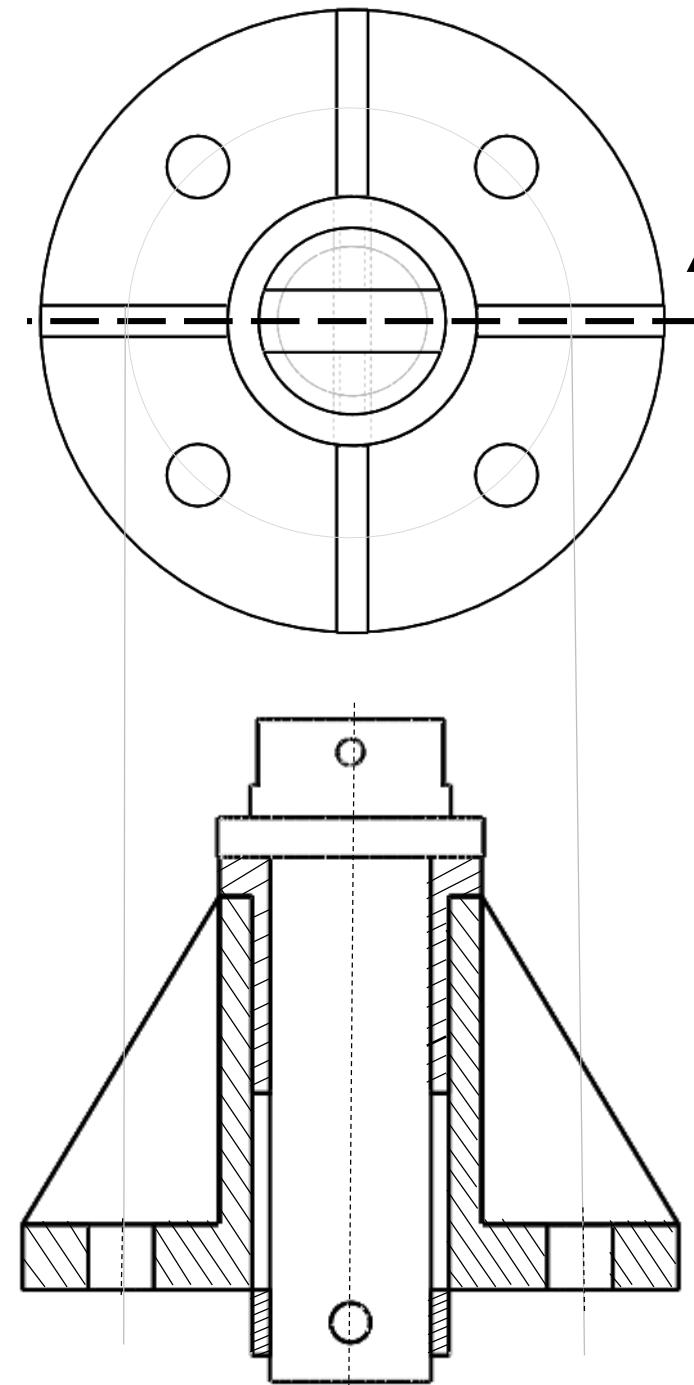
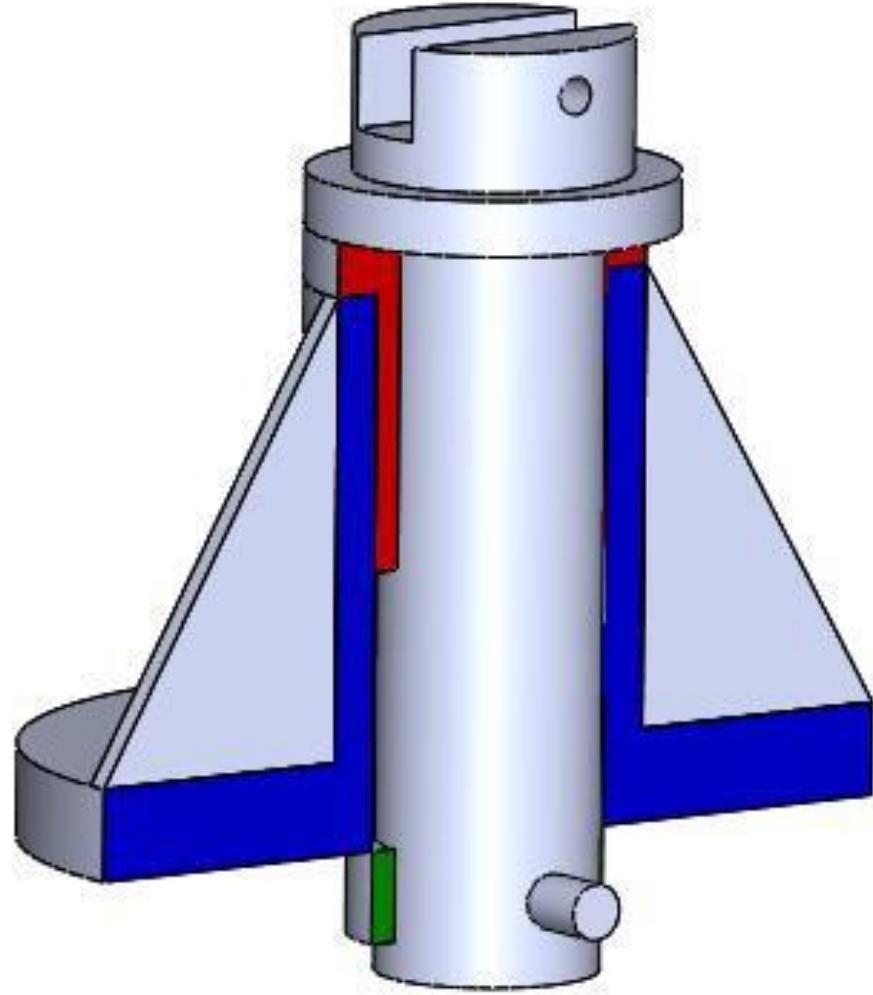


Figure P9.3





Always remember to use aligned-section method for radially arranged holes

4. Figure P9.4 shows the details of a wheel support. Draw the front view with section and top view of the assembly. Refer the exploded view shown in Figure P9.4(b).

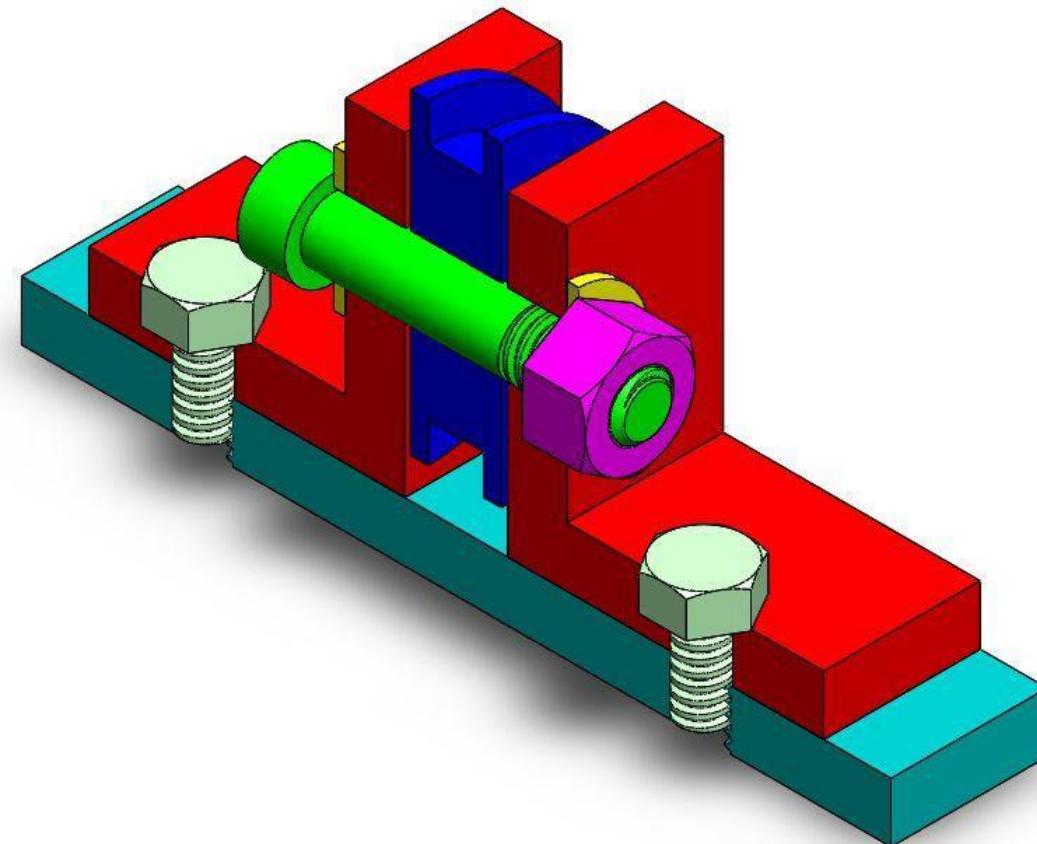
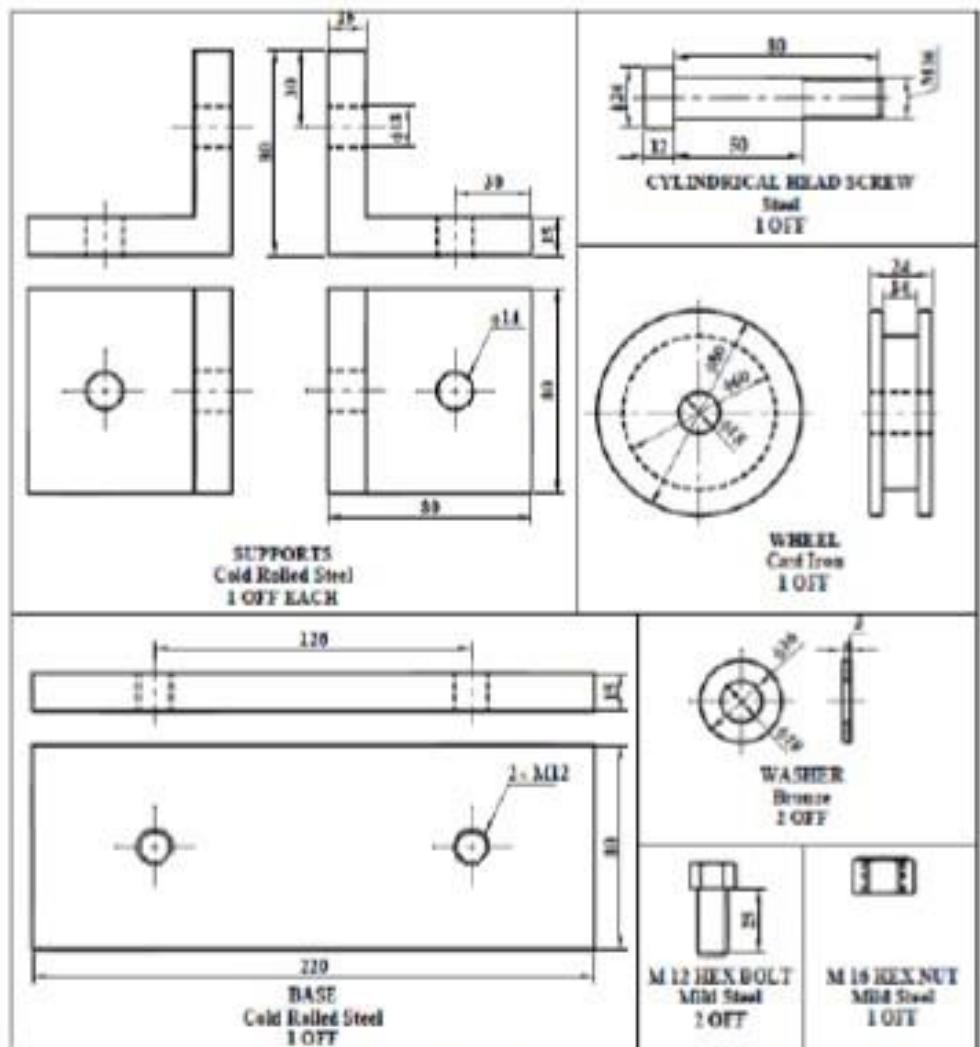
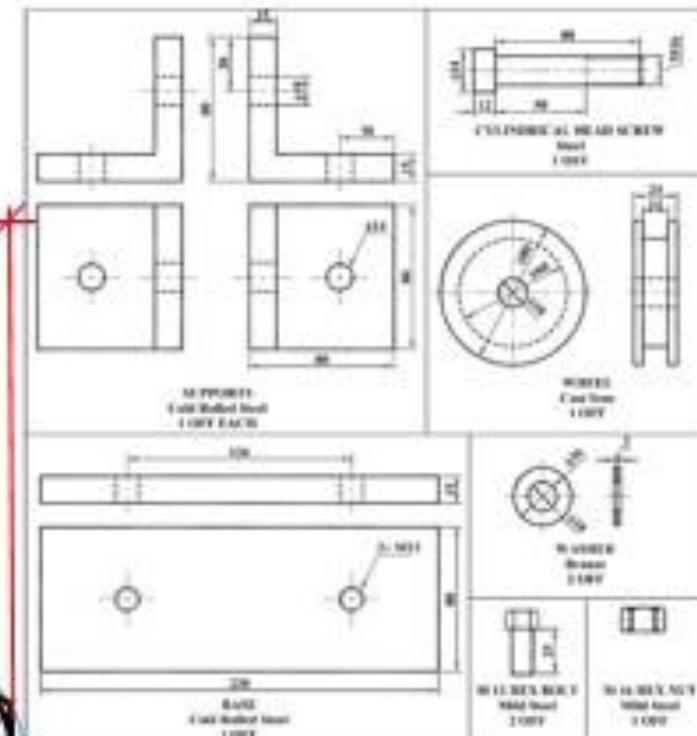
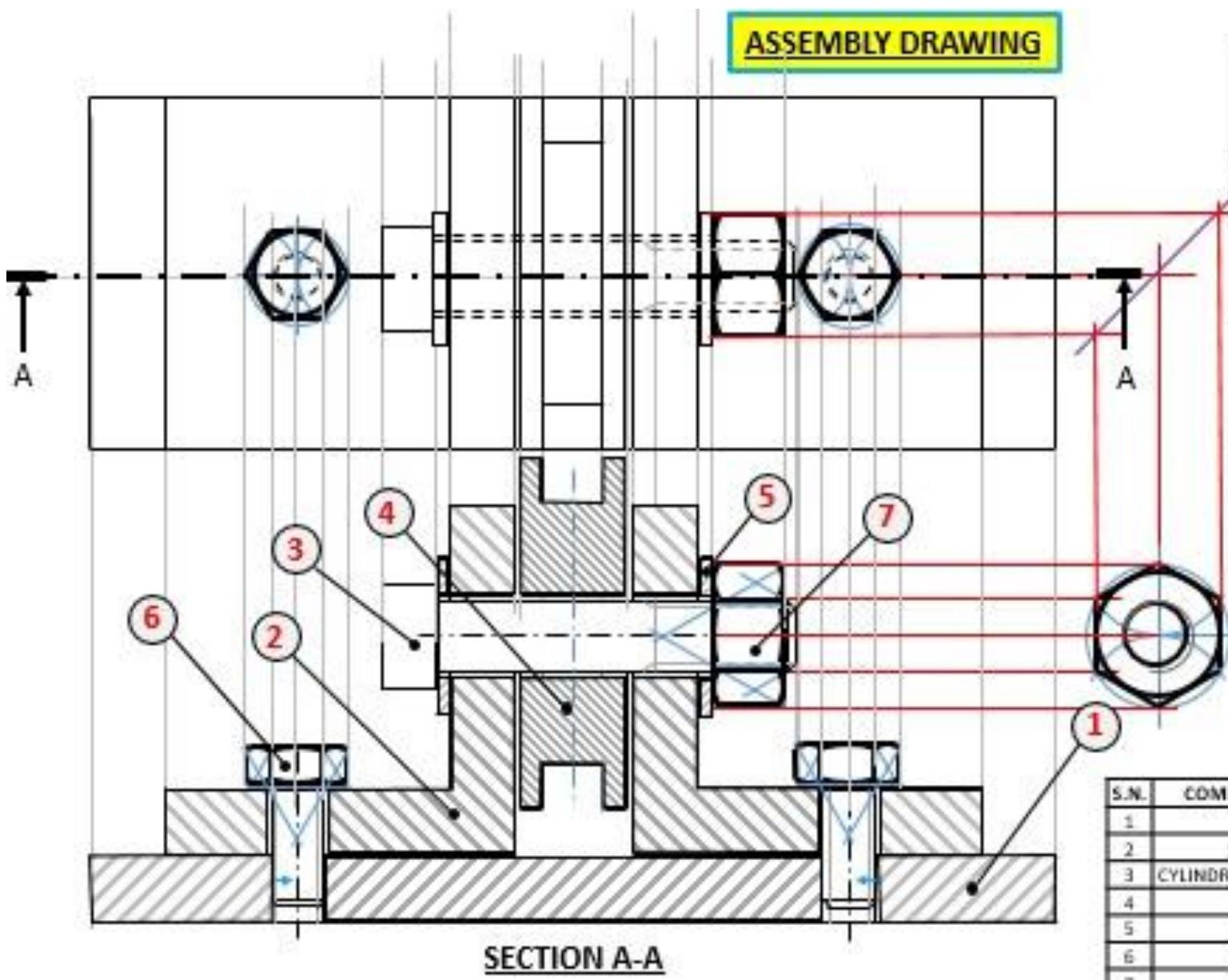


Figure P9.4(a)

### ASSEMBLY DRAWING



S.N.	COMPONENT NAME	MATERIAL	QUANTITY	REMARKS
1	BASE	COLD ROLLED STEEL	1 OFF	.....
2	SUPPORTS	COLD ROLLED STEEL	1 OFF EACH	.....
3	CYLINDRICAL HEAD SCREW	STEEL	1 OFF	M16
4	WHEEL	CAST IRON	1 OFF	.....
5	WASHER	BRASS	2 OFF	.....
6	HEX BOLT	MILD STEEL	2 OFF	M12
7	HEX NUT	MILD STEEL	1 OFF	M16

1. Figure P10.1 shows the details of a bearing. Draw the front view with section and side view of the assembly.

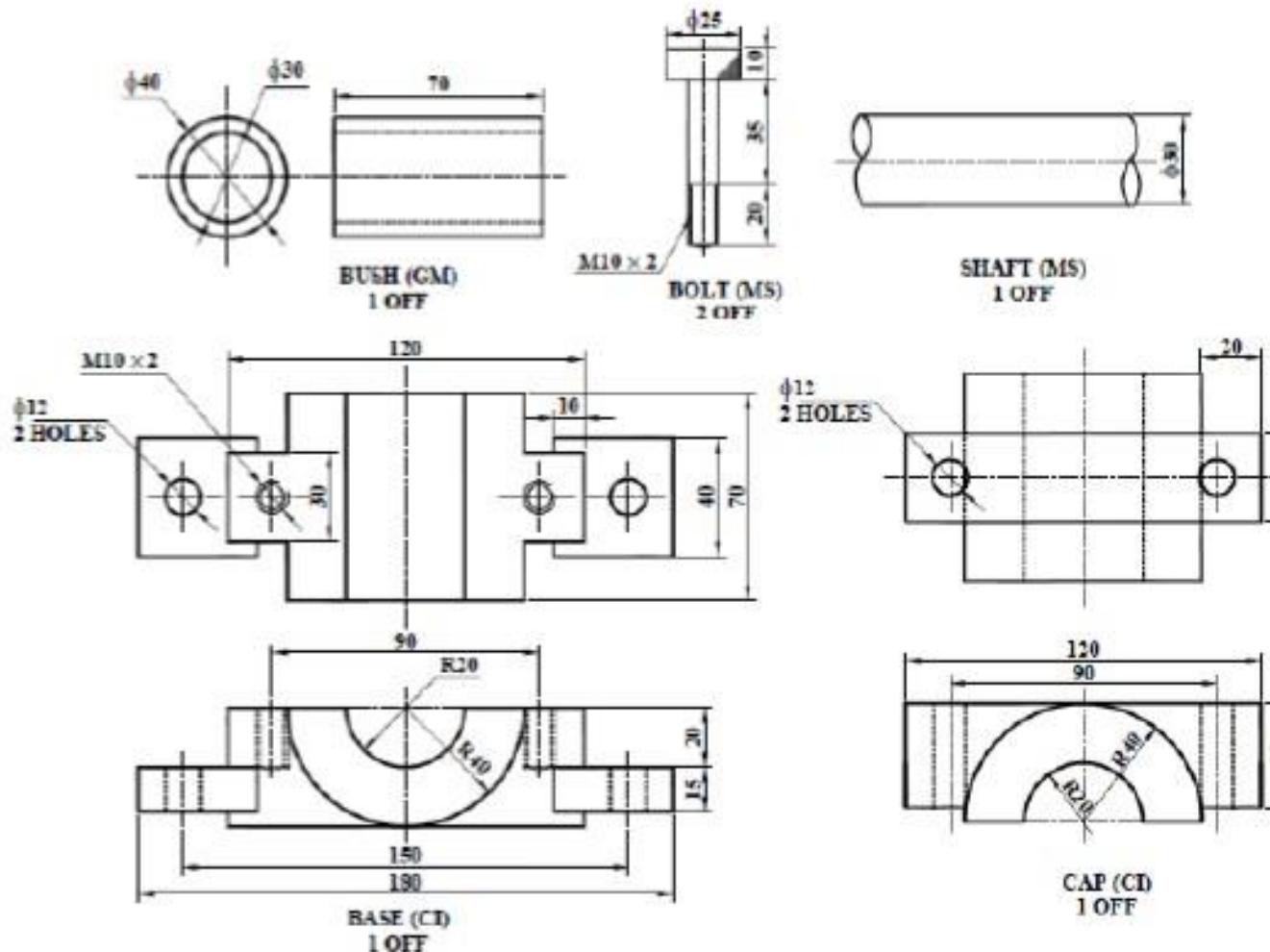
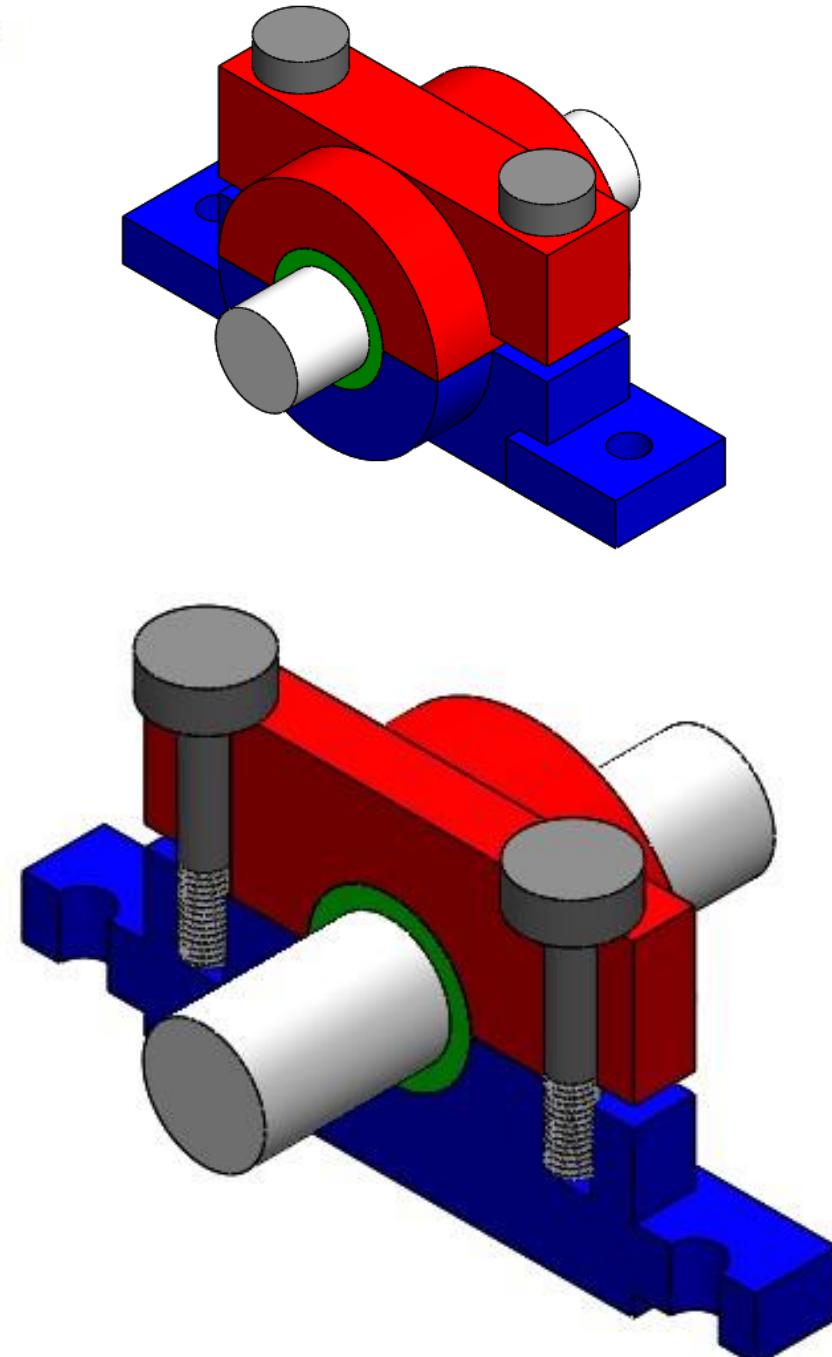
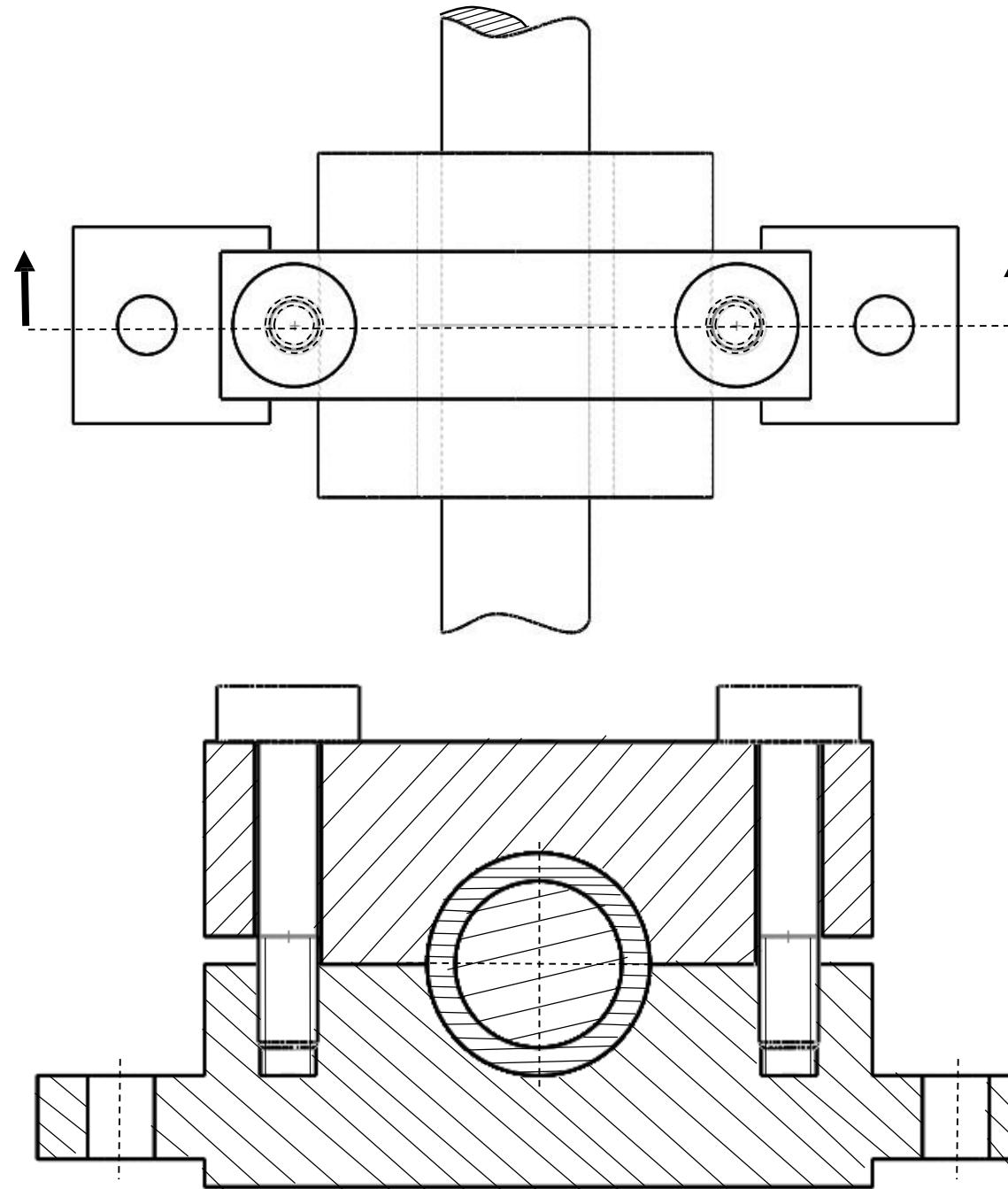


Figure P10.1





2. Figure P10.2 shows the details of a tool post. Draw the front view with section and top view of the assembly.

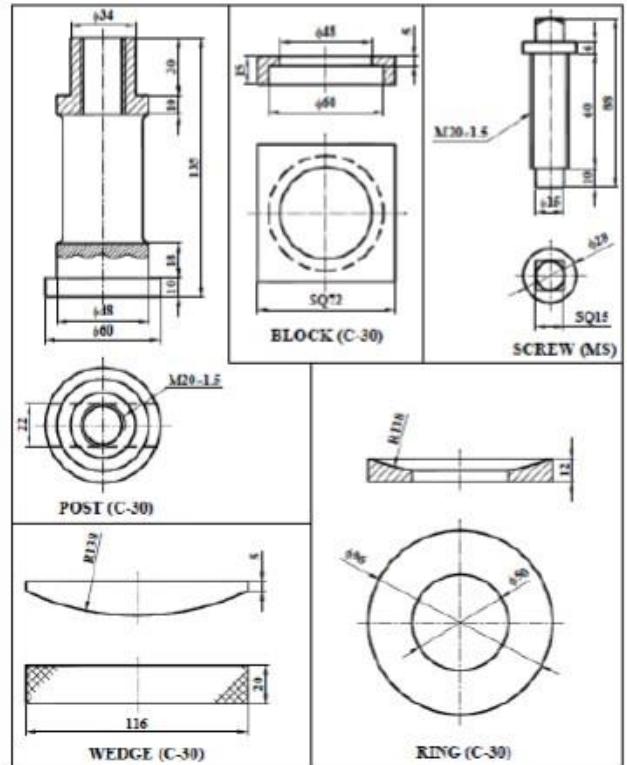
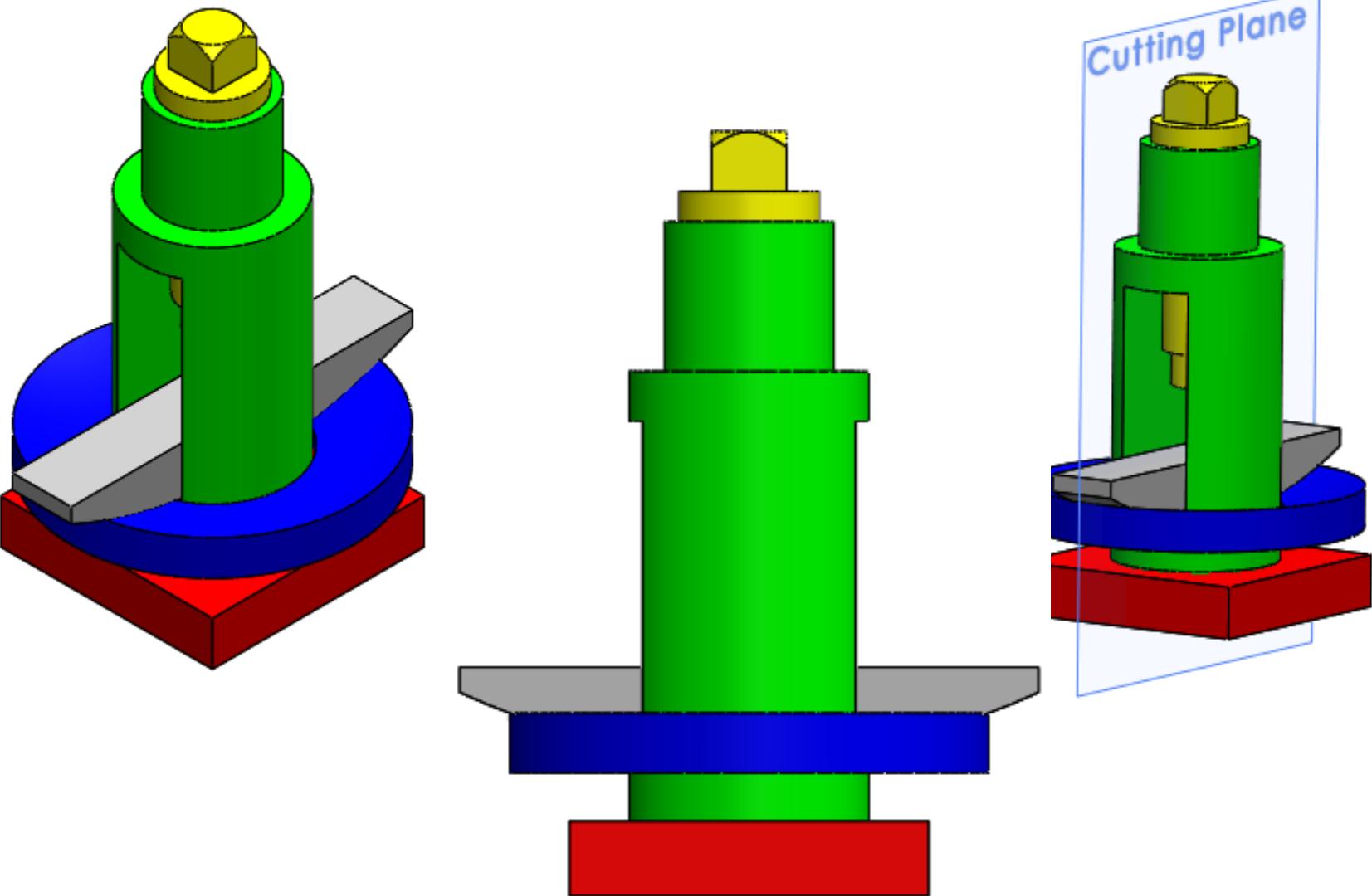
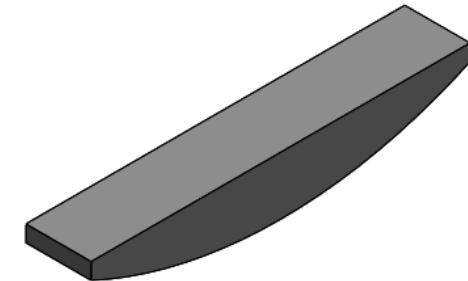
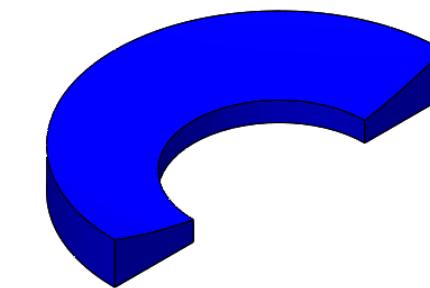
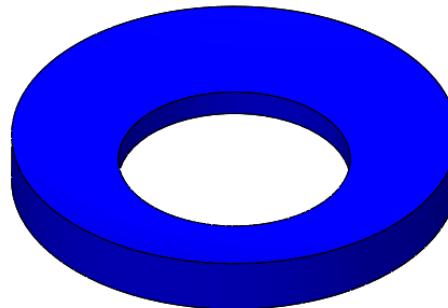
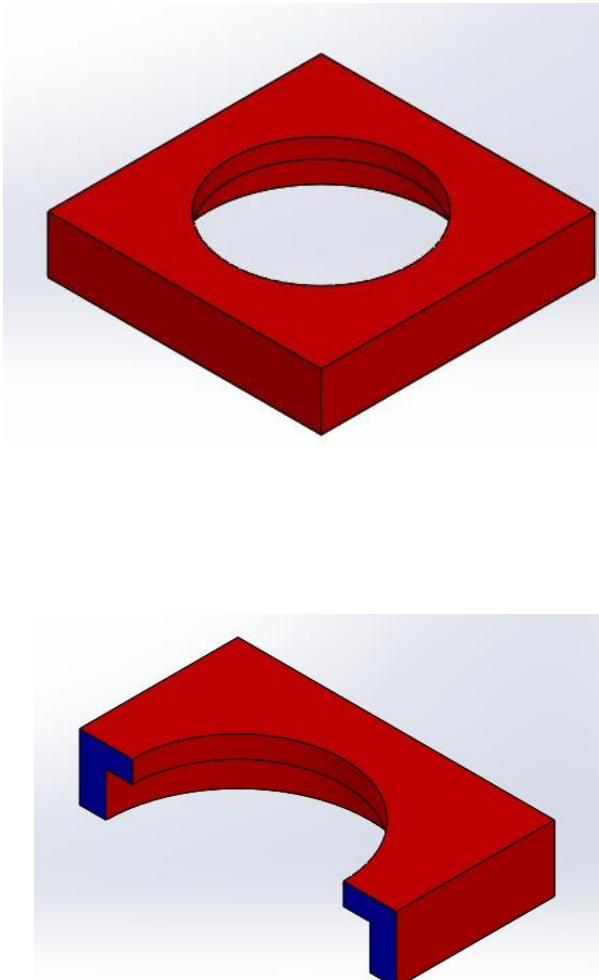
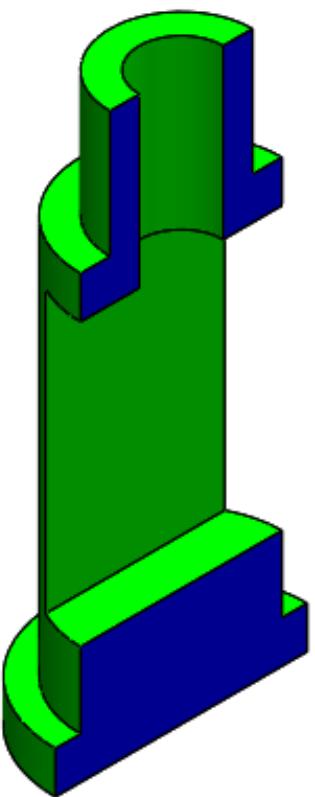
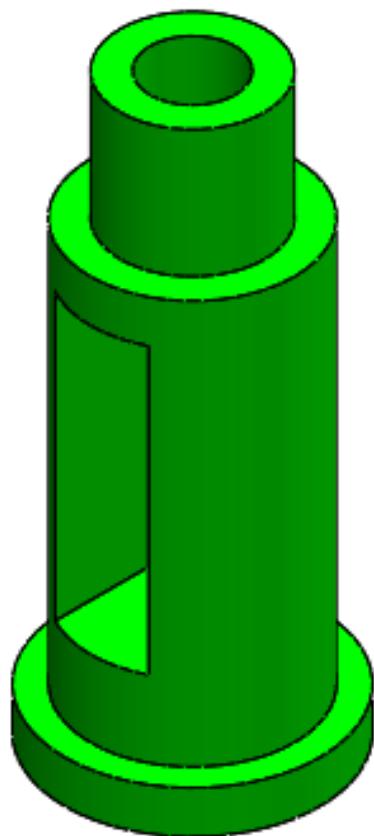
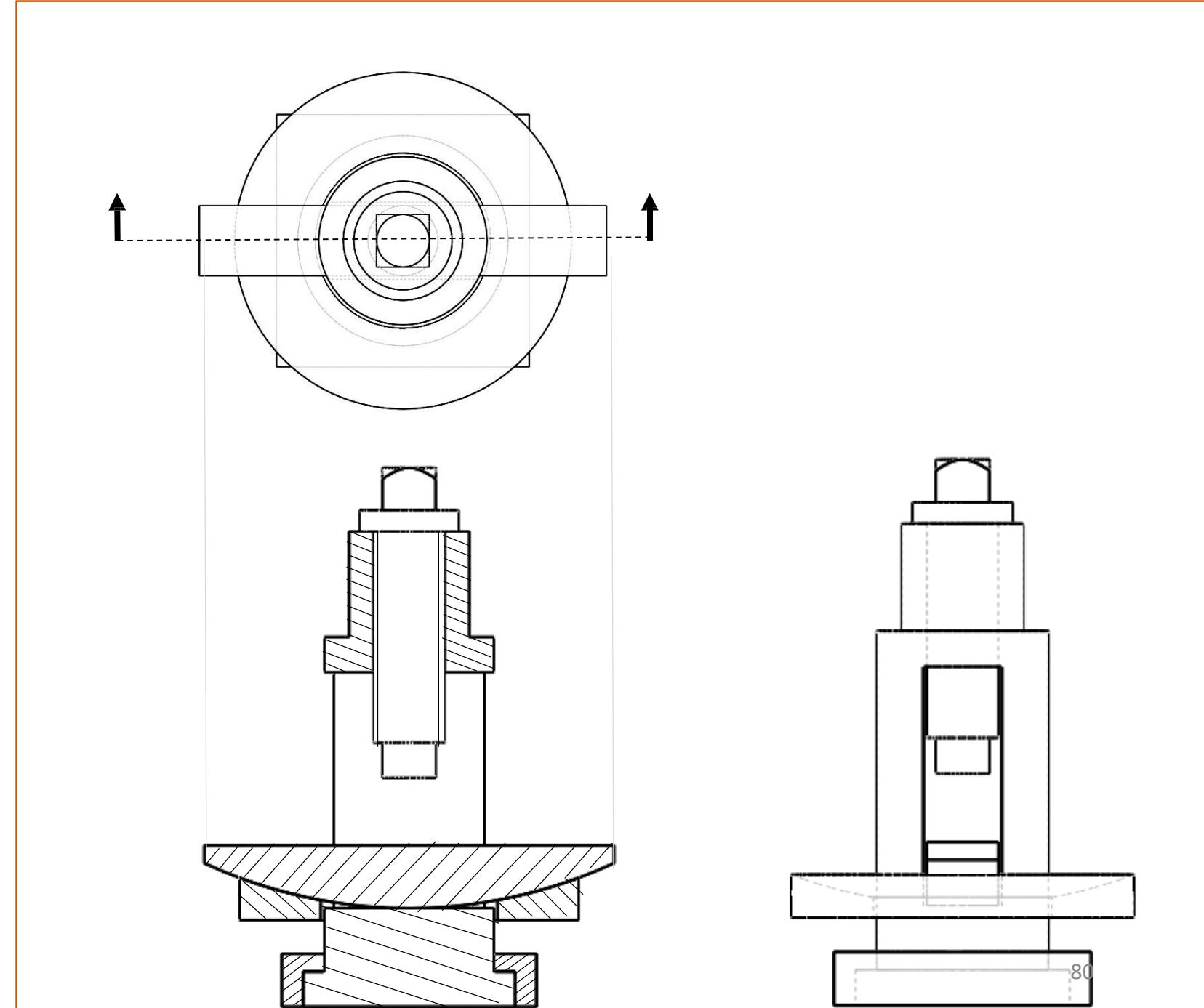
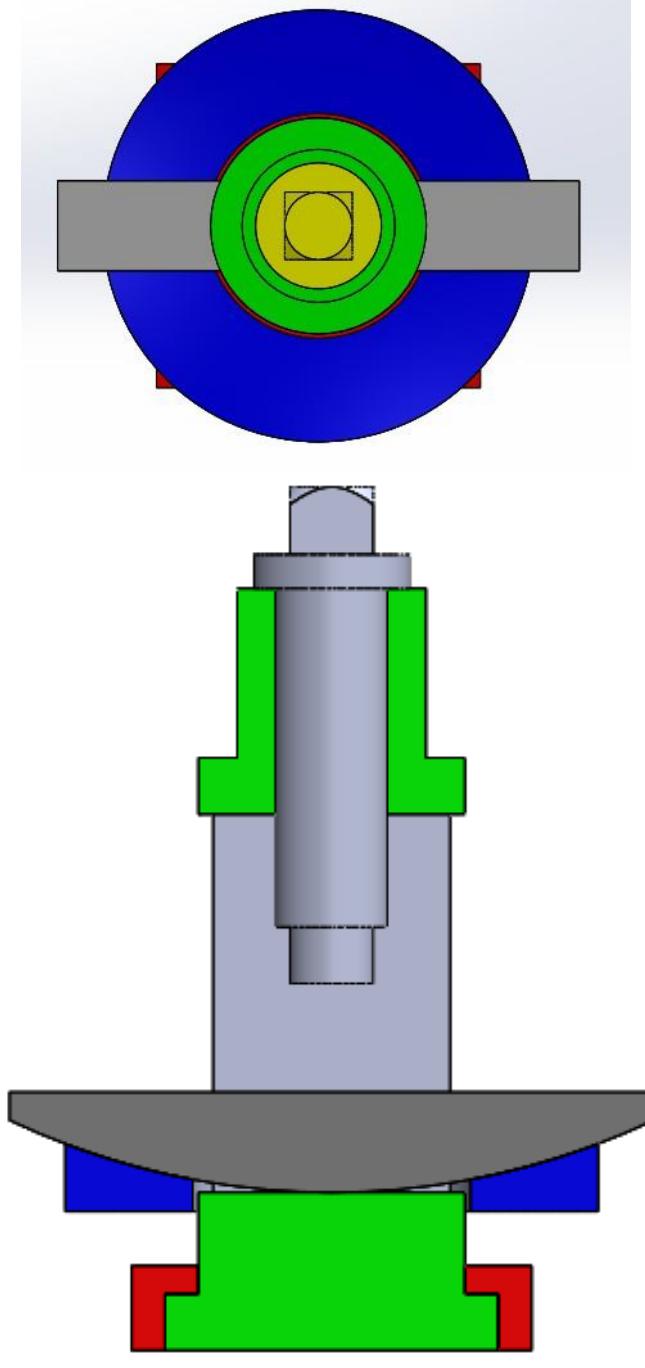


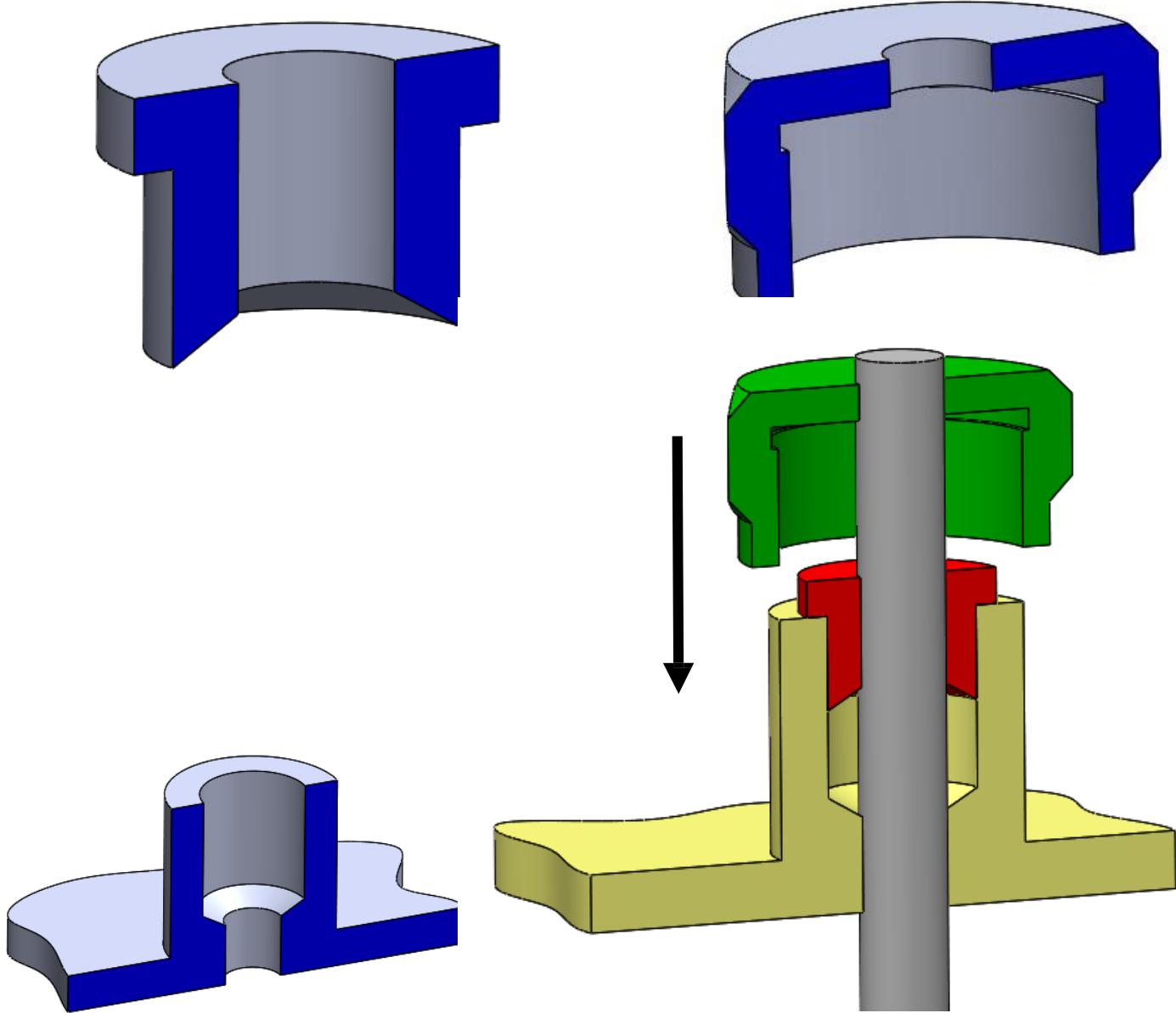
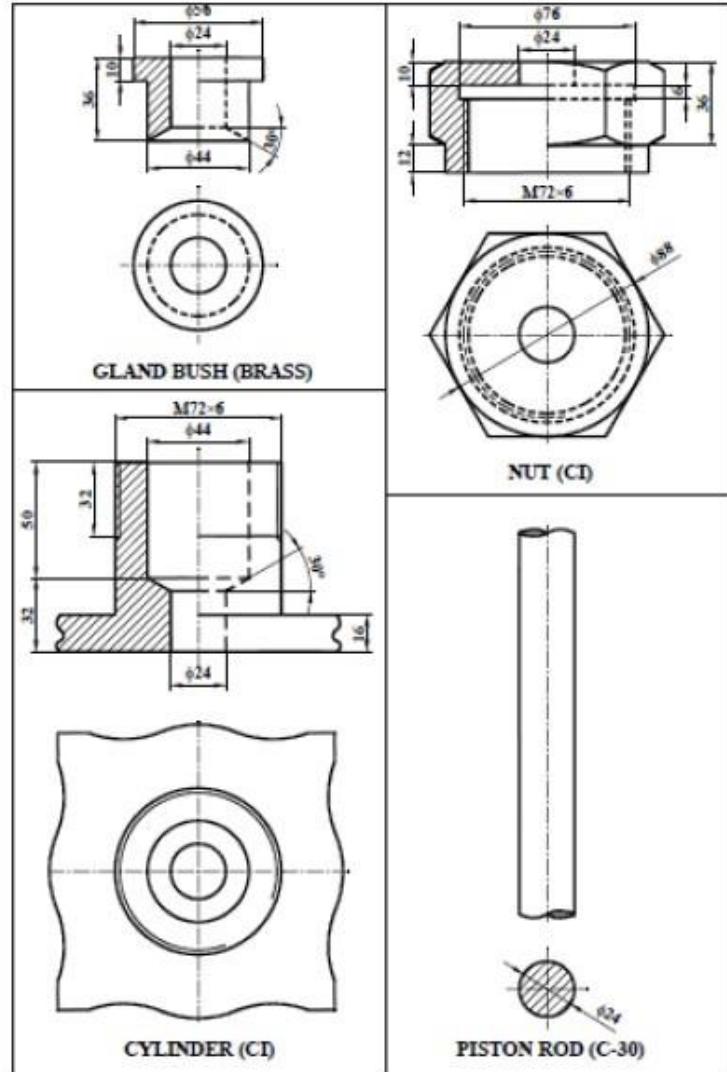
Figure P10.2

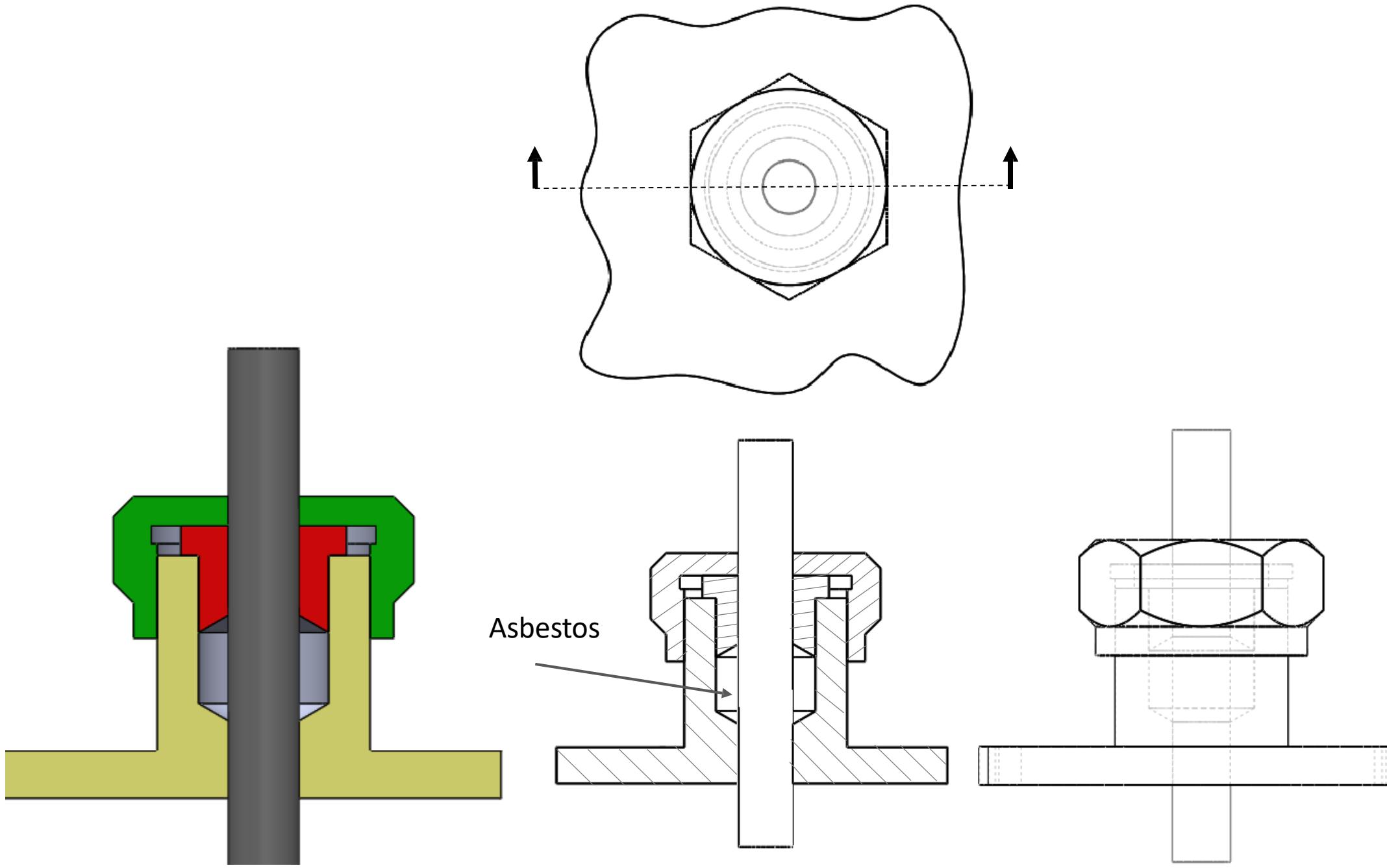




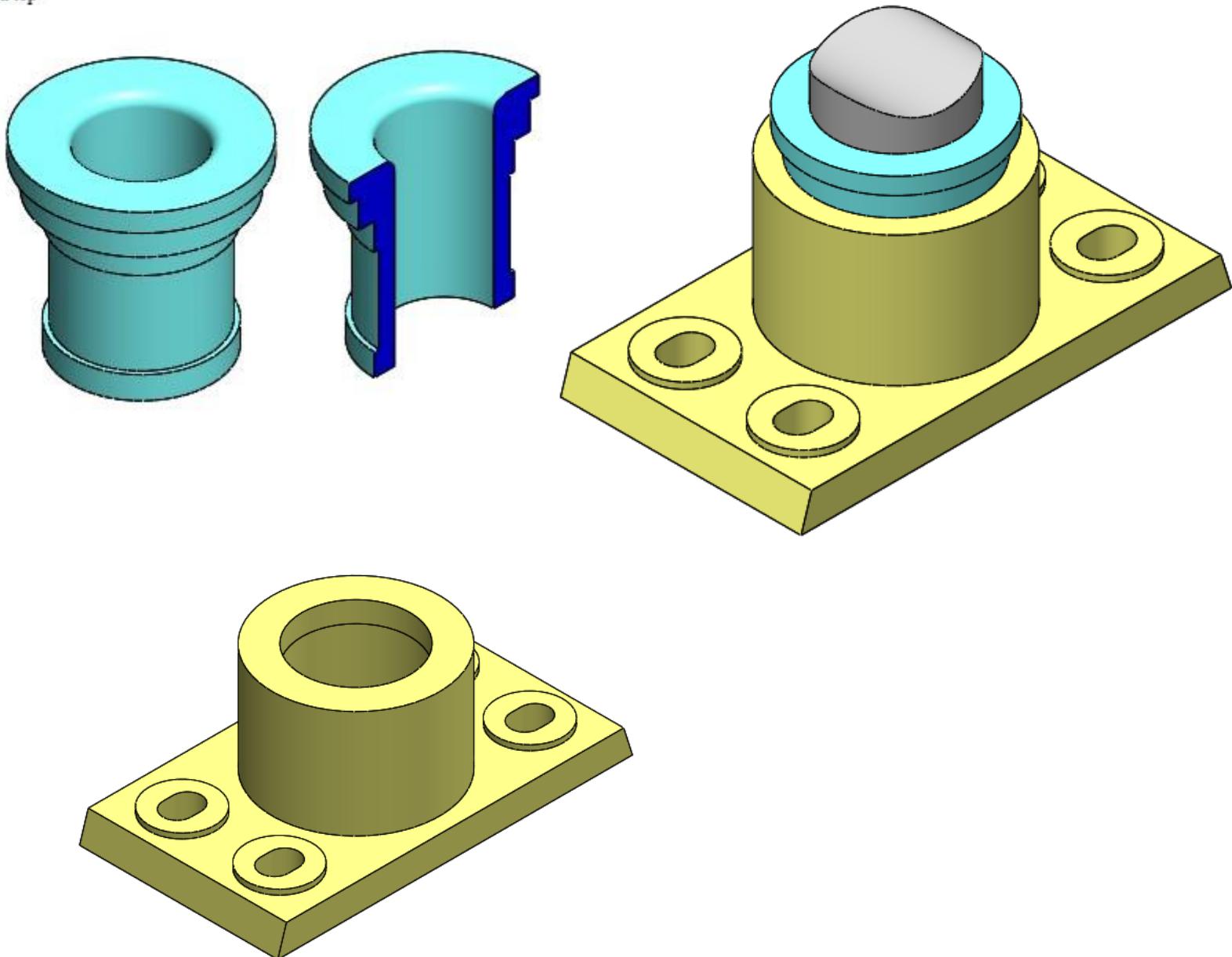
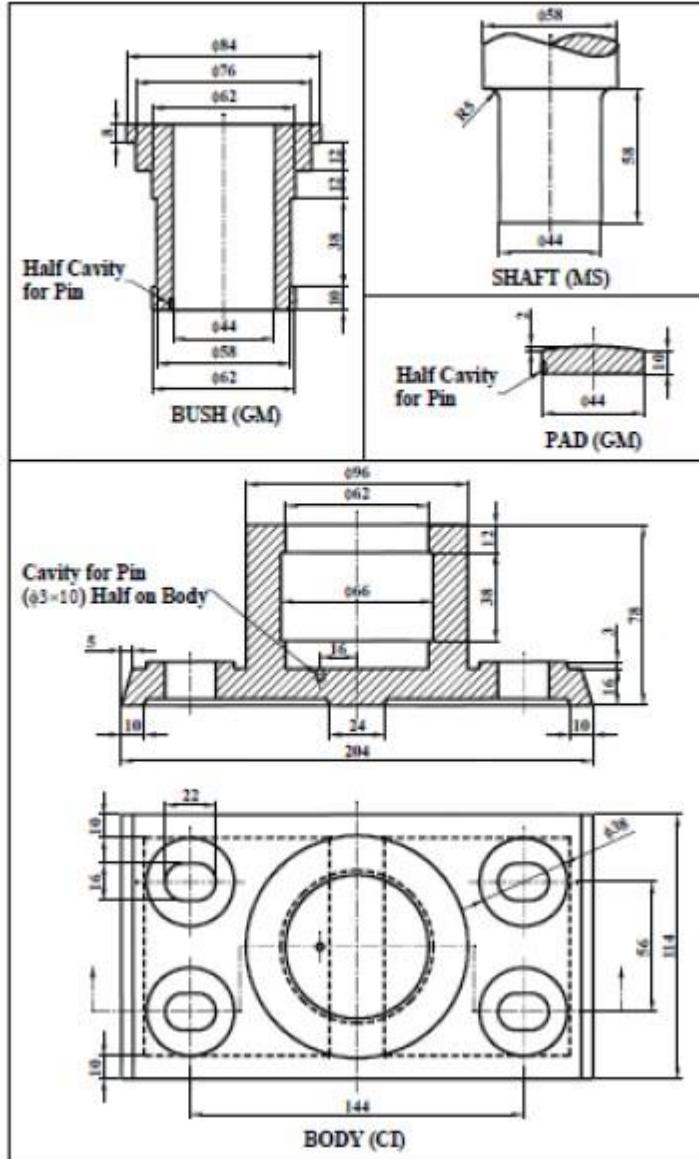


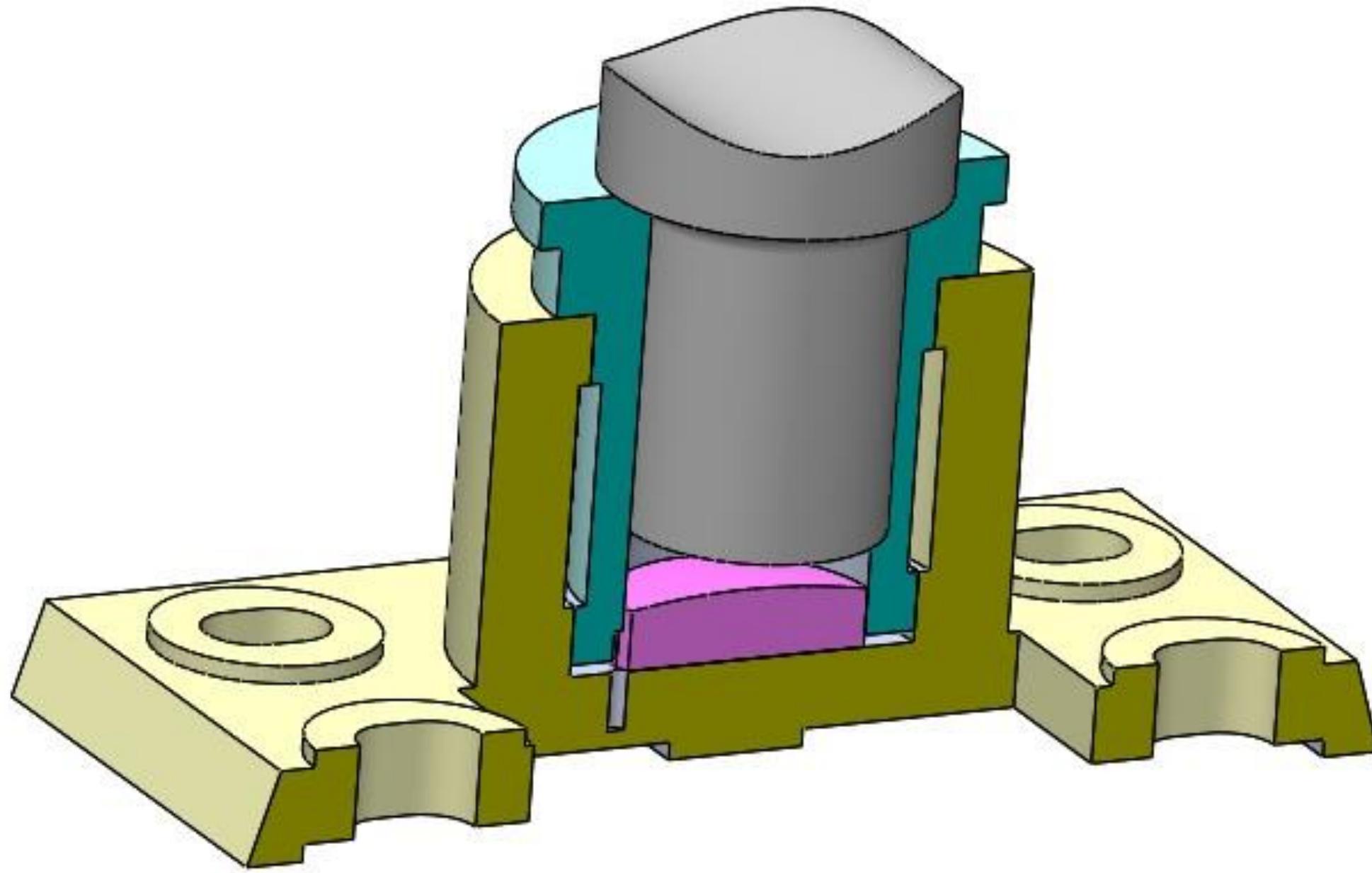
3. Figure P10.3 shows the details of a stuffing box of a small steam engine. Draw the front view section and top view of the assembly. Show asbestos as packing material as clearance space between the piston rod and the cylinder.

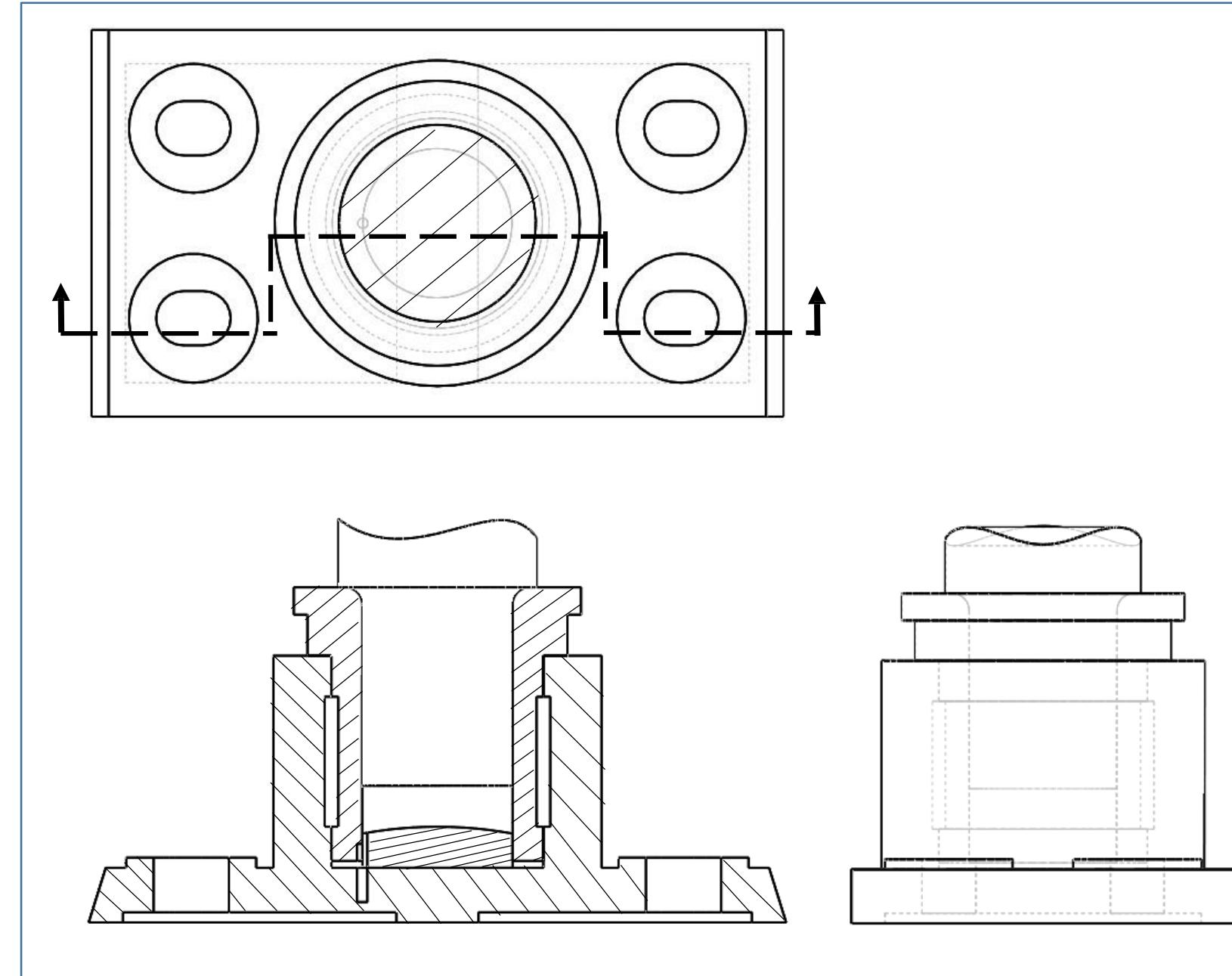
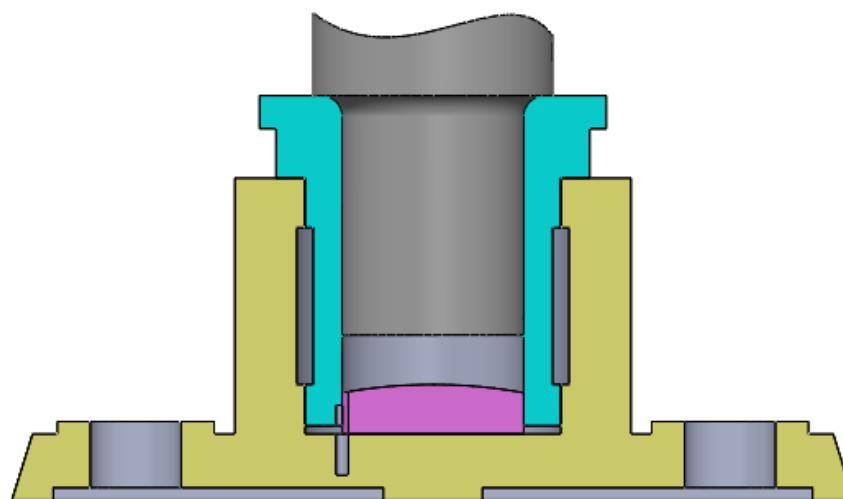
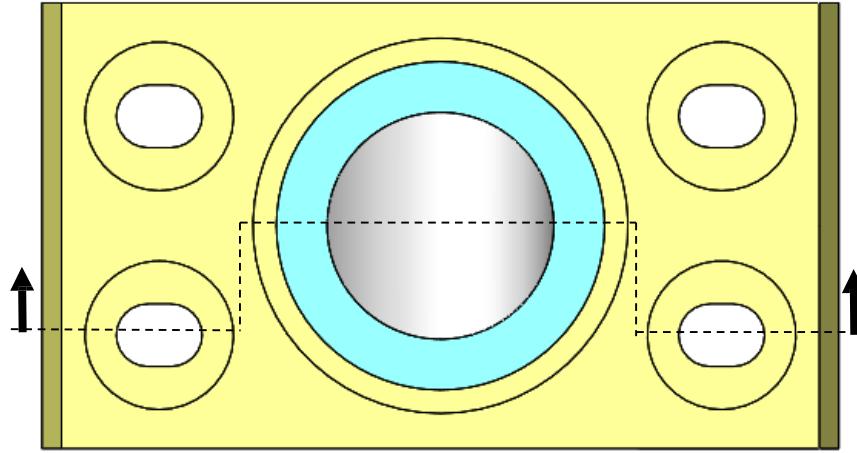




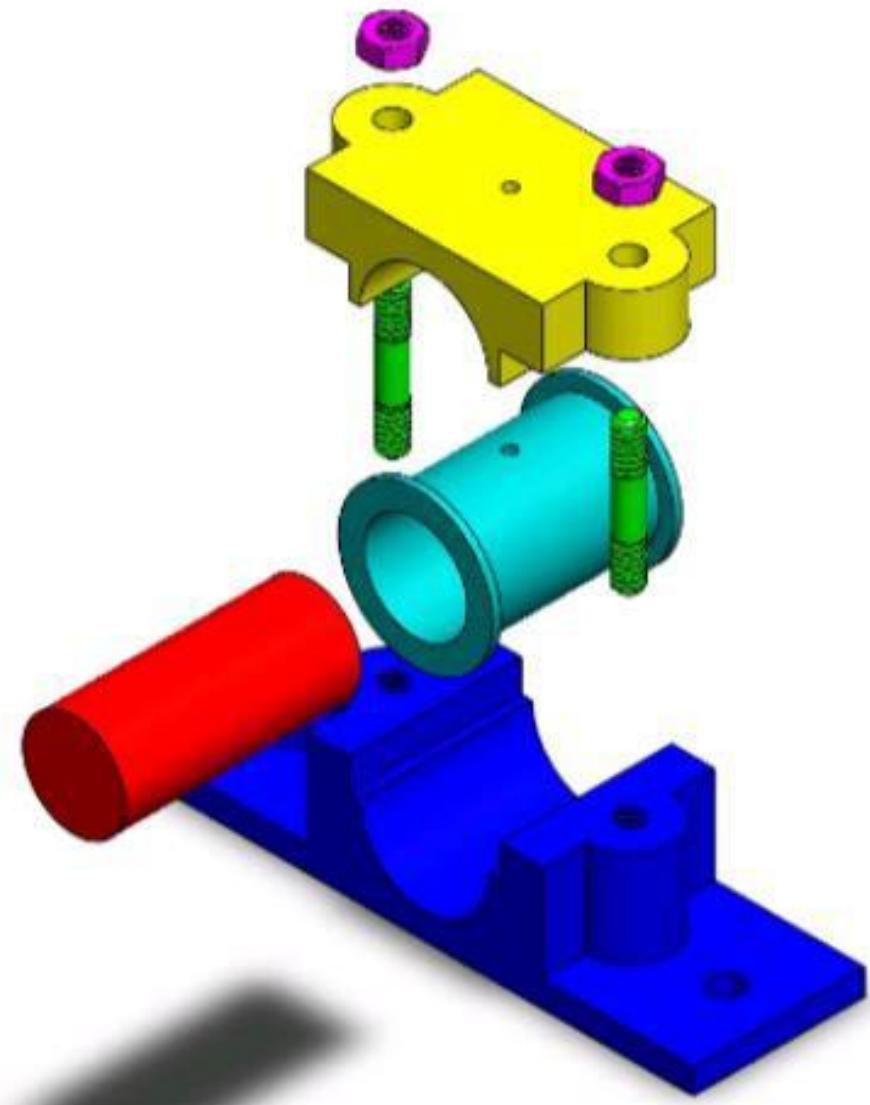
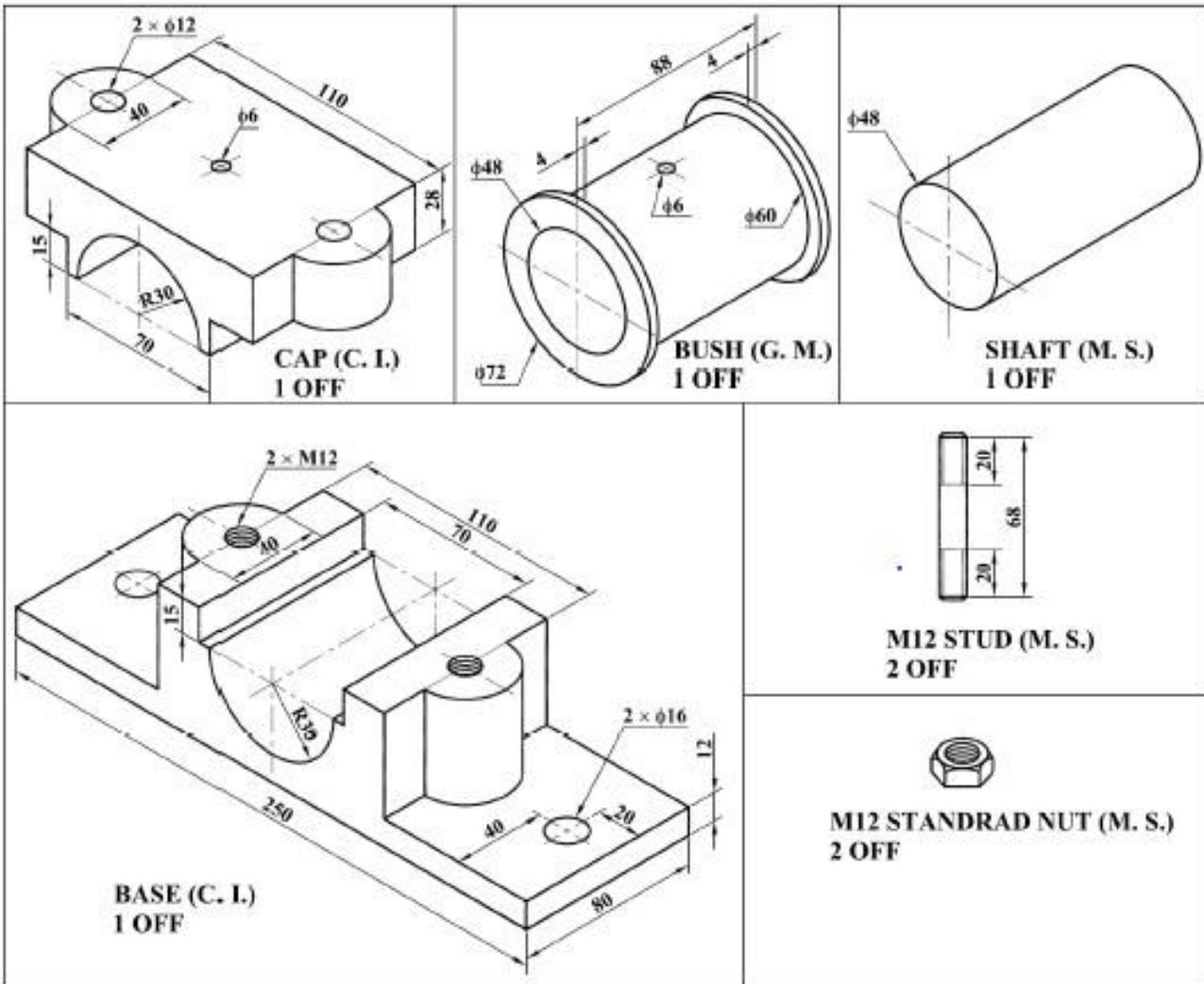
4. Figure P10.4 shows the details of a footstep bearing. Draw the front view with section and top view of the assembly.



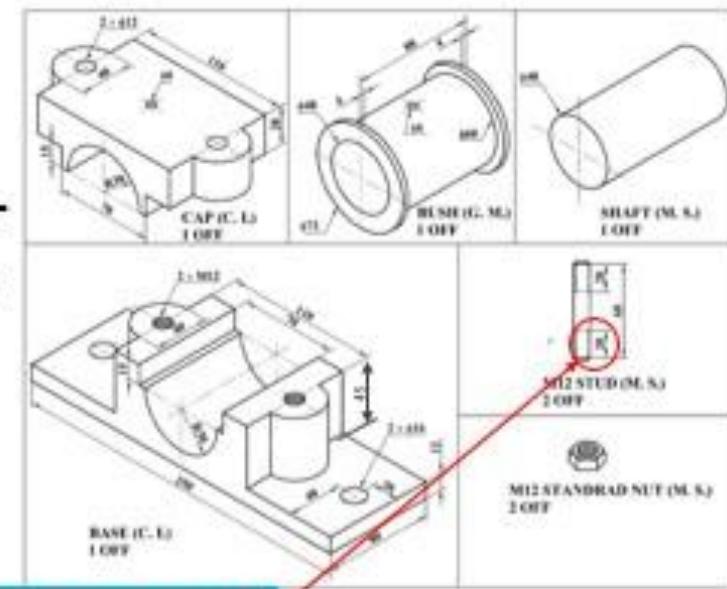
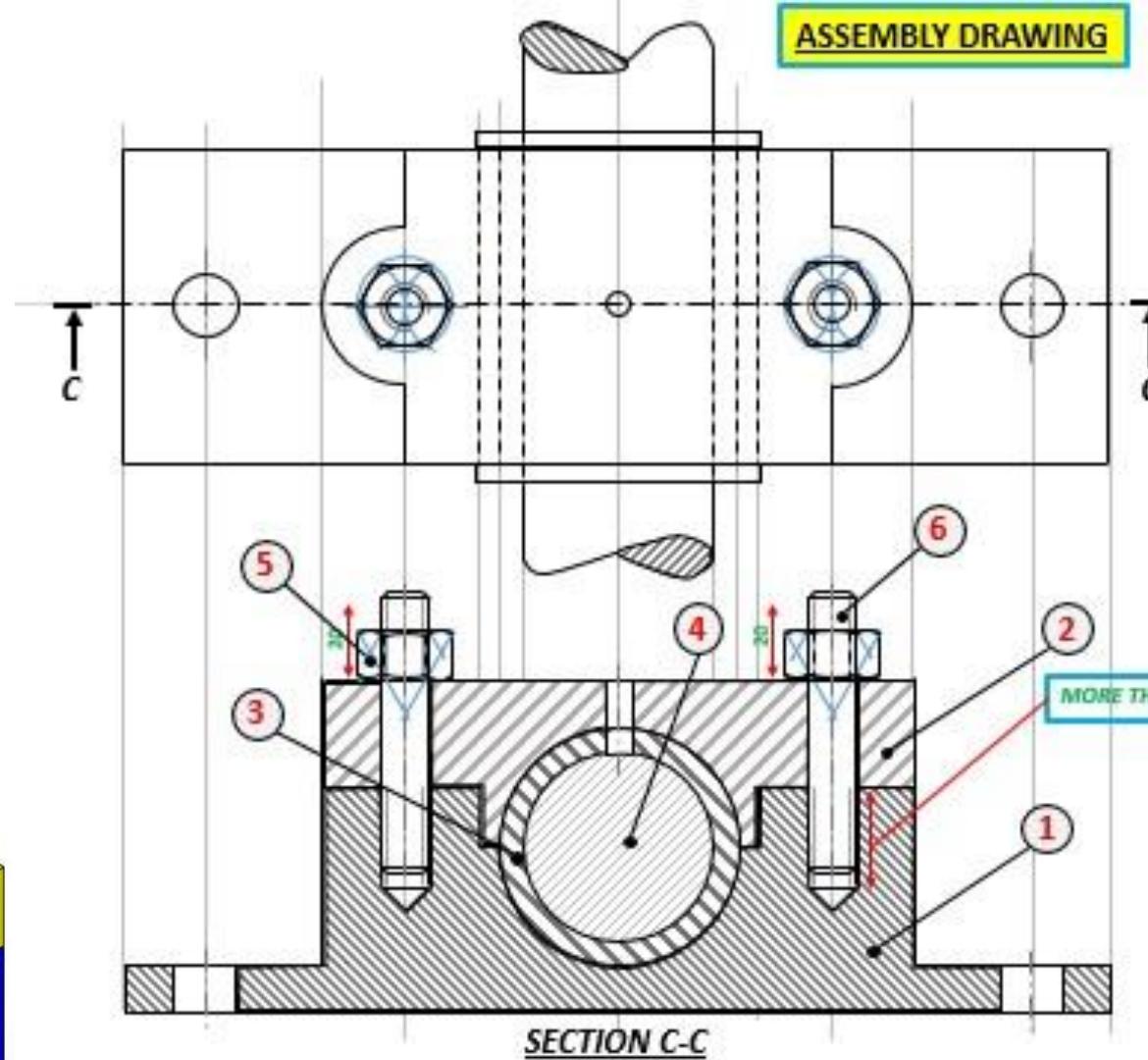




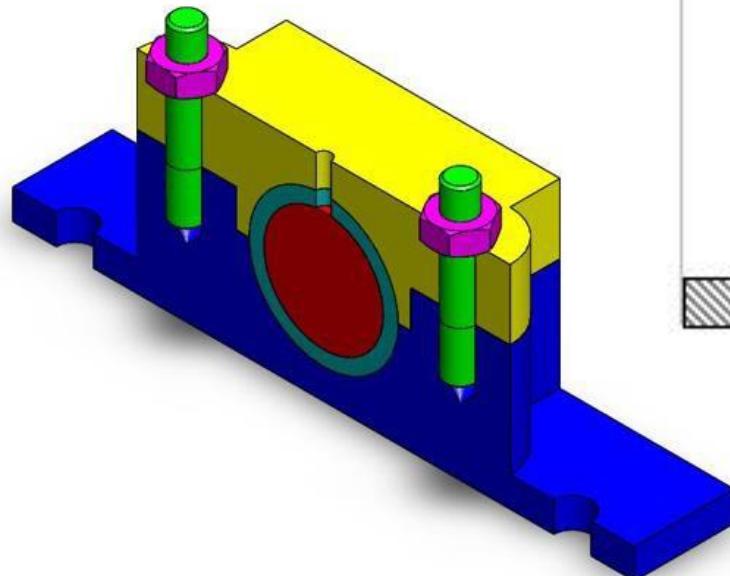
# From old tutorial



**ASSEMBLY DRAWING**

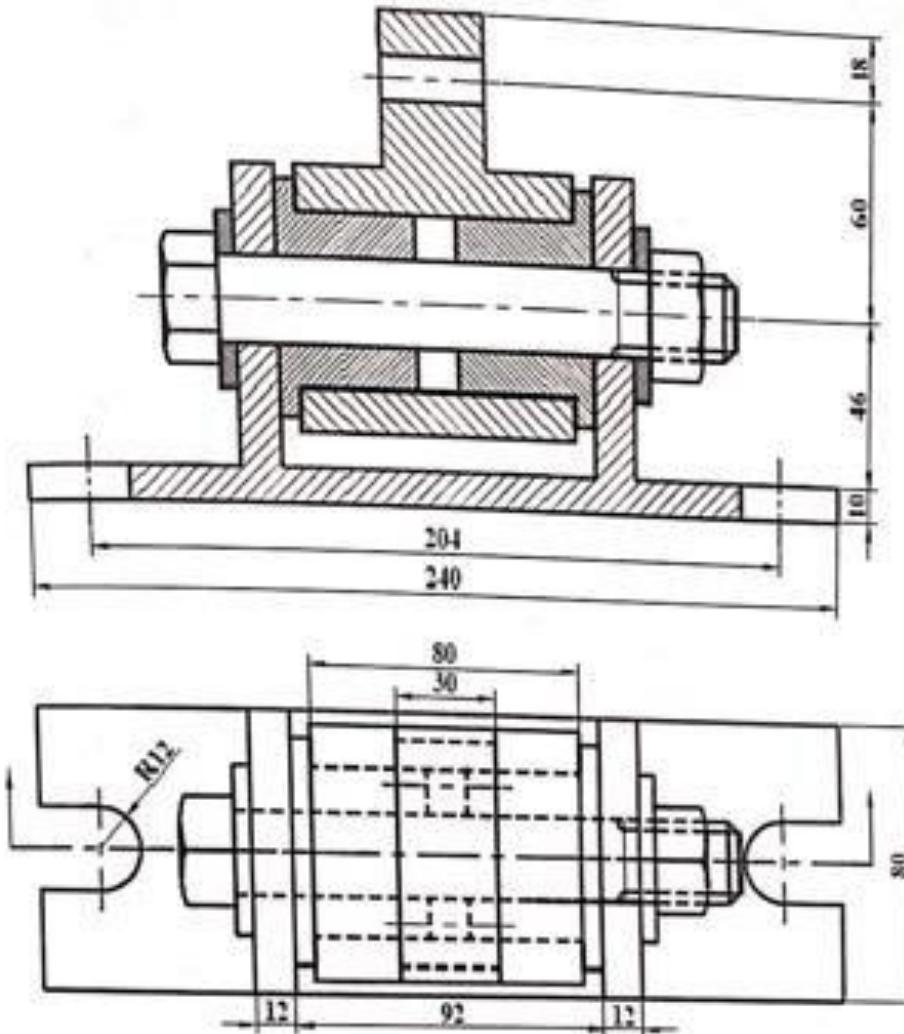
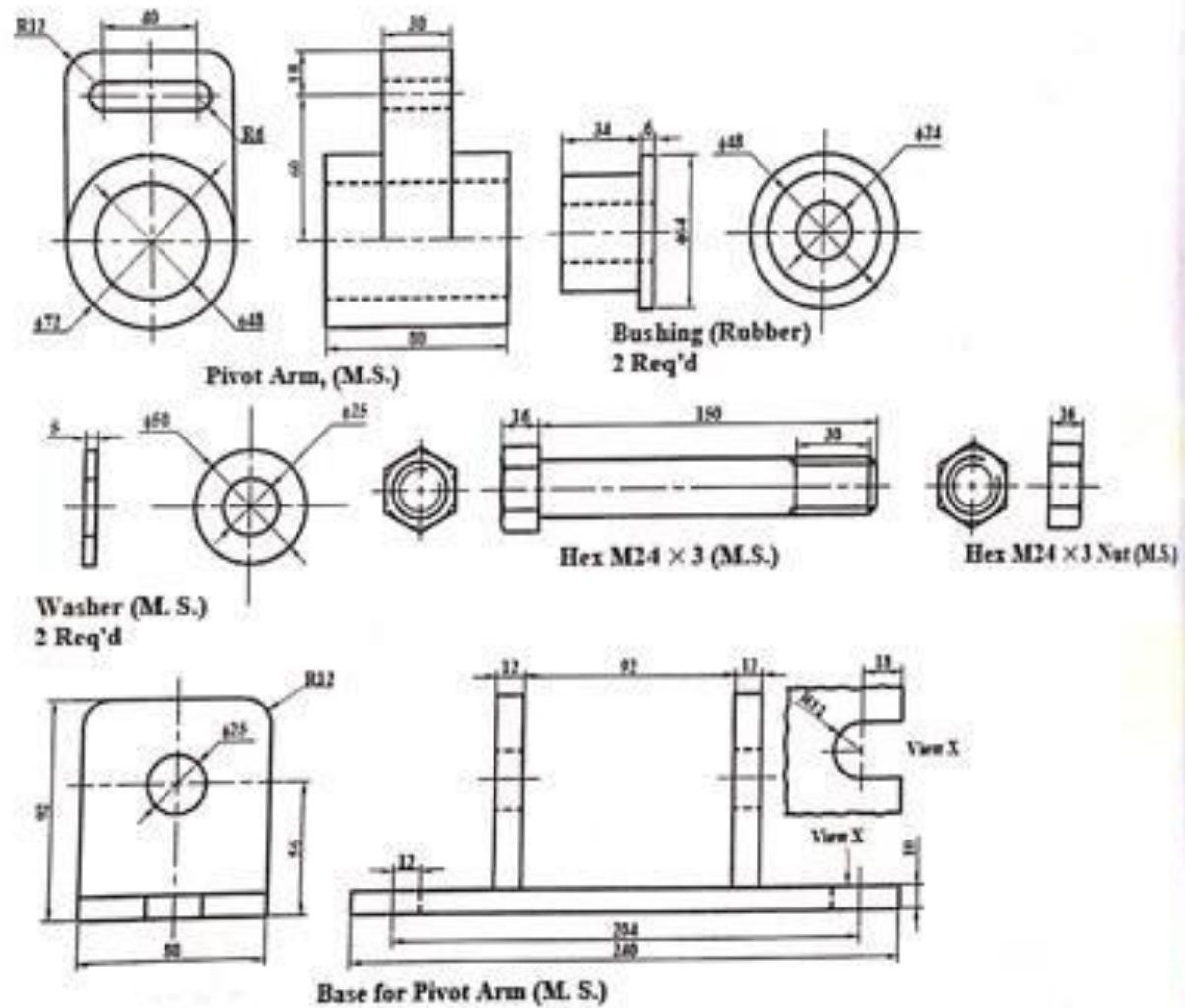


S.N.	COMPONENT NAME	MATERIAL	QUANTITY	REMARKS
1	BASE	CAST IRON (C.I.)	1 OFF	.....
2	CAP	CAST IRON (C.I.)	1 OFF	.....
3	BUSH	GUN METAL (G.M.)	1 OFF	.....
4	SHAFT	MILD STEEL (M.S.)	1 OFF	.....
5	HEX NUT	MILD STEEL (M.S.)	2 OFF	M12
6	STUD	MILD STEEL (M.S.)	2 OFF	M12



# From old tutorial

Figure E9.4 shows the detail drawing of an anti-vibration mount. Draw the sectional front view and top view of the assembly.



S.N.	DESCRIPTION	QTY.	MATERIAL	REMARK
6.	Hex Nut M24	1	MS	
5.	Hex Bolt M 24	1	MS	
4.	Washer	2	MS	
3.	Bushing	2	Rubber	
2.	Pivot Arm	1	MS	
1.	Base for Pivot Arm	1	MS	