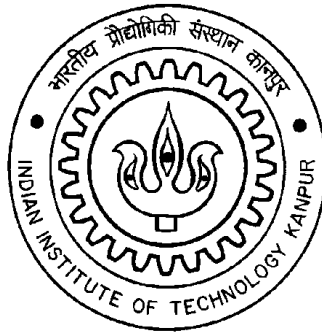


TA-101A

Engineering Graphics

2019 – 20 II

COURSE MANUAL



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Course Objective

To learn the language of engineering communication through Technical Drawing in theory and practice using free hand sketching, drafting -with the help of hand-held drafting tools, and computer-aided drafting (CAD).

Course Content (2-0-4-4)

- Orthographic Projections: lines, planes, objects.
- Principles of Dimensioning
- Pictorial Presentation: isometric drawing and projection, axonometric projection, and perspective projection
- Sectional views, machine part assemblies, auxiliary views.
- Space Geometry: Lines and planes, true lengths and shapes, principles of parallelism, perpendicularity, and intersections of lines and planes.
- Simple intersections of solids and development of lateral surfaces of simple solids.
- Introduction to computer aided design/drafting.

Learning Objectives

Having done this course one should be able to draw engineering drawings, read and understand the drawings created by others and relate the drawings to field objects and processes.

Text/Reference Books

1. French, T. E., Vierck, C. J., & Foster, R. J. *Engineering Drawing and Graphic Design*. Tata McGraw-Hill Edition, Fourteenth Edition, 2012. (Original edition: McGraw-Hill Book Company New York, Fourth Edition, 1984: Available in Library).
2. Luzadder, W. J., & Duff, J. M. *Fundamentals of Engineering Drawing*. Prentice-Hall India, New Delhi, Eleventh Edition, 1983.
3. Bhatt, N. D. *Elementary Engineering Drawing*. Charoter Publishing, Anand, Thirty First Edition, 1990.

Grading Policy

- | | |
|-----------------------------|-----|
| • Home assignment: | 15% |
| • Lab assignment: | 25% |
| • Mid-semester examination: | 25% |
| • End-semester examination: | 35% |

General Instructions

1. Engineering Graphics is a practice-oriented course. Each exercise requires planning and thinking. Sketch free-hand solution to the problems (using graph sheet/sketch book) before coming to the Laboratory Session. There is credit for this preparation. Feel free to discuss the solution with your Tutor or TA during the laboratory session.
2. Plan the layout (placing and arrangement of various problems and their parts) carefully on the drawing sheets before starting the drawing, lest you realize later that the drawing you are making will go out of the sheet.
3. The 'third angle' projection is to be used in this course unless specifically stated otherwise in the problem. Though the third angle and first angle methods will be discussed later, you will realize that they are essentially conventions in the 'language' of drawing.
4. Choosing an appropriate scale for a problem is an important part of the exercise of drawing. Basically, the scale should be such that all the details of the object are clearly visible in the views. The scale used for any problem should be clearly indicated (e.g. Scale = 1:5). Obviously, this scale can be different for different problems in the same assignment.
5. If all the problems of an assignment cannot be accommodated on a single side of the drawing sheet, feel free to use the reverse side.
6. Neatness in the work is a key element – for neat drawing work, the use of H or HB pencil for object line, HB pencil for lettering and 2H pencil for dimension lines, construction lines and hatching is recommended. Please note that the use of popular mechanical pencils (with 0.5 mm lead) is discouraged in the course.
7. You have to be careful to keep the drawing sheet clean. Use a good quality eraser, sharpen the pencil(s) away from the sheet and always use a soft cotton cloth to clean the drawing sheet.
8. Students must have their own instruments, and bring the same to the class and examinations. Borrowing and exchanging drawing instruments and materials are strongly discouraged.
9. Use a black back-up sheet/paper under the drawing sheet. This will help in drawing straight lines without kinks which may be caused by holes or irregularities on the drawing board.
10. Ensure all assignment sheets have a title block with your details as following:

IIT Kanpur		
TA-101A : Engineering Graphics		
Home Assignment Number: 1		
Lettering and construction		
<Name>	<Roll Number>	<Group>
<Date>	<Signature >	

Assignment Submission

Lab Assignment

On the same day of Lab Assignment after the class in Drawing Hall to the respective Tutor, i.e., LA:1 is to be submitted on the same day when it is done.

Home Assignment

On the day of the next Lab Assignment before the class in Drawing Hall to the respective Tutor, i.e., HA:1 is to be submitted on the day of LA:2.

Prior to approaching Course Instructor for any queries regarding assignment submissions and grades obtained, students are advised to meet their respective Tutors.

List of Drawing Instruments and Materials

1. Instrument box containing the following minimum items:
 - A large compass (150 mm)
 - A bow compass with adjusting screws (100 mm)
 - A large divider
 - A bow divider with adjusting screws (100 mm)
2. A good quality drafter
3. A pair of set squares: 45°-45°, 30°-60° (250 mm, 2.5 mm thick)
4. A protractor
5. A good quality scale, 300 mm (steel or hard plastic)
6. Good quality drawing pencils (2H, H, HB)
7. A sharpener, good quality eraser and a clean soft cloth
8. A sticking tape
9. Drawing board (optional for your room-the same will be provided during Laboratory Exercises)
11. Drawing sheets
12. Grid sheets and pad for Home work

Note: The above materials are available at the book stores in the Shopping Centre, and may otherwise be obtained from any other convenient place. Please ensure you are procuring these at the earliest as you MUST have these starting the first laboratory exercise.

Tutors and Contact Details

Sec.	Day	Tutor Name	Dep	Email	Tel.	Office Location
B1	Tuesday	Mr. Mithun K K V	CE	mithunkv@	9400407607	Nat. Aero. Facility
B2	Tuesday	Dr. Basant Lal Sharma	ME	bls@	259-6173	FB-356
B3	Tuesday	Mr. Vishnu H	AE	vishnuh@	8891722978	Combustion Lab, AE
B4	Monday	Dr. S. Saderla	AE	saderlas@	259-2009	HSAL-05
B5	Monday	Mr. Imran Rasheed	AE	imranr@	974617676	Combustion Lab, AE
B6	Monday	Mr. Manoj Kumar Singh	AE	monojmsk@	9453087813	Structures lab, AE
B7	Wednesday	Ms. Dharashree Sahoo	CE	dharas@	9438661453	WLE 303C
B8	Wednesday	Dr. Anupam Saxena	ME	anupams@	259-7397	FB-369
B9	Wednesday	Mr. Prashant Kumar	AE	prash@	9450128179	Flight Lab, AE
B10	Thursday	Dr. Nachiketa Tiwari	ME	ntiwari@	259-6526	NL -201A
B11	Thursday	Mr. Arijit Saha	CE	arijitsa@	9830606355	FB-305, CE
B12	Thursday	Mr. Saurabh Gupta	CE	saurabg@	7000080538	Transportation Lab
B13	Monday	Dr. Pankaj Wahi	ME	wahi@	259-6092	FB-357
B14	Thursday	Dr. Bishakh Bhattacharya	ME	bishakh@	259-7824	NL-103

Lecture Schedule

Day	Venue	Time Slot
Tuesday	L20	15:00 to 16:00 hrs
Thursday	L20	14:00 to 15:00 hrs

January 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	L-1	3	4
5	6	L-2	8	L-3	10	11
12	13	L-4	15	L-5	17	18
19	20	L-6	22	L-7	24	25
26	27	L-8	29	L-9	31	

February 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	L-10	5	L-11	7	8
9	10	L-12	12	L-13	14	15
16	<i>Mid Semester Examination (Feb 17-22, 2020)</i>					
23	24	L-14	26	L-15	28	29

March 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	L-16	4	L-17	6	7
	<i>Mid Semester Recess (Mar 7-15, 2020)</i>					
15	16	L-18	18	L-19	20	21
22	23	L-20	25	L-21	27	28
29	30	L-22				

April 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	L-23	8	L-24	10	11
12	13	L-25	15	L-26	17	18
19	<i>End Semester Examination (Apr 20-29, 2020)</i>					
26	<i>End Semester Examination (Apr 20-29, 2020)</i>			30		

Examination Schedule

Mid Semester Examination

: February 17-22, 2020

CAD Practical Test#

: March 23 – April 3, 2020

End Semester Examination

: April 20-29, 2020

Detailed Scheduled will be announced

Any extra class or replacement class schedule will be announced in advance in classes.

Schedule of Laboratory Exercises

Day	Section	Venue	Time Slot
Monday		Northern Lab, Drawing hall (except for AutoCAD assignments)	10:00 to 13:00 hrs
Tuesday			
Wednesday			
Thursday			

January 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5			Laboratory Exercise 1			11
12			Laboratory Exercise 2			18
19			Laboratory Exercise 3			25
26			Laboratory Exercise 4			

February 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2			Laboratory Exercise 5			8
9			Laboratory Exercise 6			15
16			<i>Mid Semester Examination (Feb 17-22, 2020)</i>			
23			Laboratory Exercise 7			29

March 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1			Laboratory Exercise 8			7
			<i>Mid Semester Recess (Mar 7-15, 2020)</i>			
15			Laboratory Exercise 9			21
22			Laboratory Exercise 10			28
29			Laboratory Exercise 11			

April 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			Laboratory Exercise 11			4
5			Laboratory Exercise 12			11
12			Laboratory Exercise 13			18
19			<i>End Semester Examination (Apr 20-29, 2020)</i>			
26	27	28	29	30		

The laboratory exercises of April 2 and 6, 2020 will happen on extra slots due to holiday on these days. Slot for extra classes will be announced later.

Section Schedule	Monday	Tuesday	Wednesday	Thursday
	B4, B5, B6, B13	B1, B2, B3	B7, B8, B9	B10, B11, B12, B14

Tentative Schedule of Lectures and Assignments

Week	Lecture	Lab Assignments	Home Assignments
1	Lettering and construction	None	None
2	Orthographic projection	Lettering and construction	None
3	Orthographic projection with dimensioning	Orthographic projection	Lettering and construction
4	Isometric view and projection	Orthographic projection with dimensioning	Orthographic projection
5	Pictorial view/Oblique view	Isometric view and projection	Orthographic projection with dimensioning
6	Missing line and view	Pictorial view/Oblique view	Isometric view and projection
7	Sectional view	Missing line and view	Pictorial view/Oblique view
8	Perspective view	Sectional view	Missing line and view
9	Line and plane	Perspective view	Sectional view
10	Relation between line and plane	Line and plane	Perspective view
11	Auxiliary view	Relation between line and plane	Line and plane
12	Intersection of line, plane and solid	Auxiliary view	Relation between line and plane
13	Development of surface	Intersection of line, plane and solid	Auxiliary view
14	Review	Development of surface	Intersection of line, plane and solid

Total	26	13	12
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Acknowledgement

For preparing this document I have been highly dependent upon the material developed by the Instructors, Tutors, TAs and others in the past and several text books and internet resources. All these sources are gratefully acknowledged.

Laboratory Exercises

TA101A-Laboratory Exercise 1

3x10 = 30

Lettering and Construction Geometry

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question-LA:1.1

Reproduce the letters of the alphabet and numbers as shown in Figure LA:1.1, following the pencil strokes as indicated. First draw guidelines so that the letters and numbers are properly aligned. Height of capital letters and numbers should be 10 mm (base to cap line). The body of small letters should be 7 mm (waist to base line) and 3 mm (cap to waist and base to drop lines) for upper and lower parts.



Figure LA:1.1 (a)



Figure LA:1.1(b)

Question- LA:1.2

Draw an ellipse using the parallelogram method having conjugate diameters of 140 mm and 75 mm with an angle of 75° between them.

Question- LA:1.3

Draw the machine part as shown in Figure LA:1.2. Carefully note the various geometrical features contained (e.g., hexagon, tangent curve) \varnothing =diameter of circle and R=radius of circle.

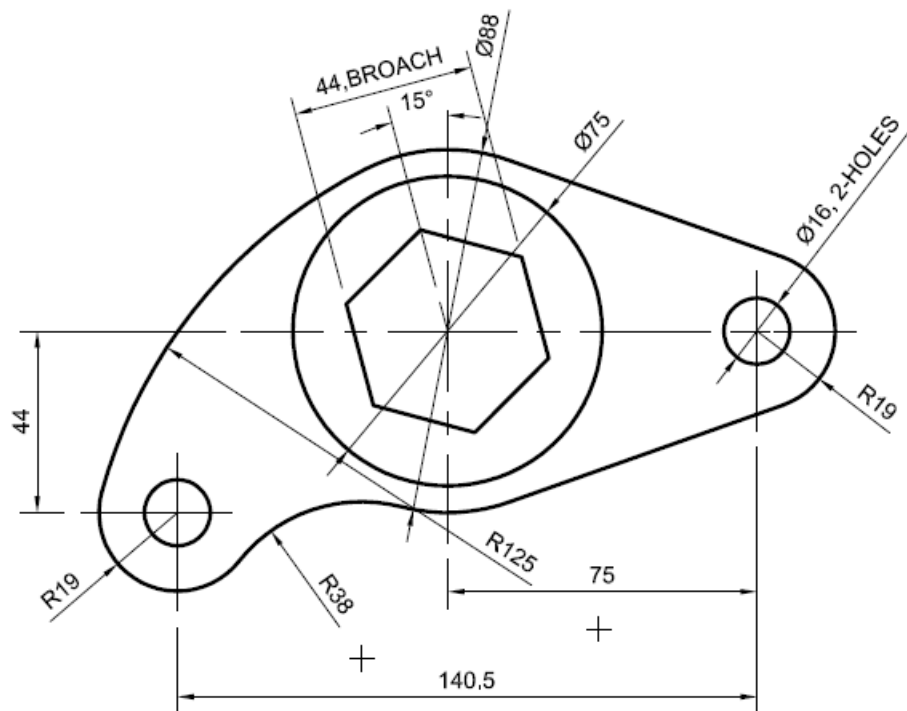


Figure LA:1.2

TA101A-Laboratory Exercise 2

3x10 = 30

Orthographic Projection

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- LA:2.1

Show the THREE respective orthographic projections of the solids shown below in the THIRD ANGLE scheme. Do not dimension. Note the direction of viewing and observe the features carefully.

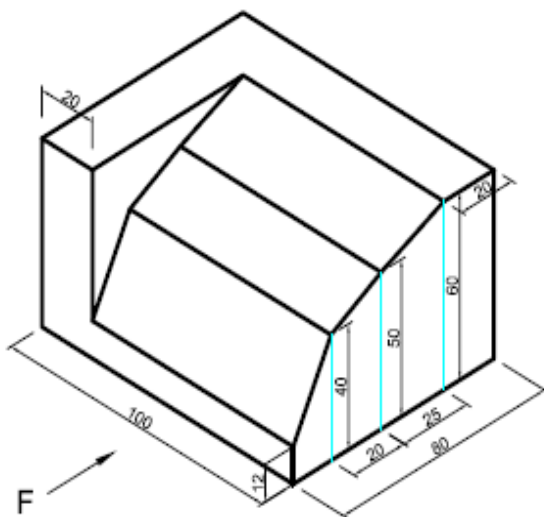


Figure LA2.1: Solid 1

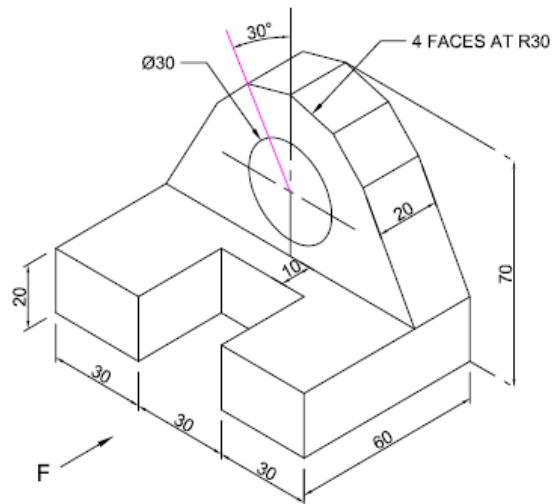


Figure LA2.2: Solid 2

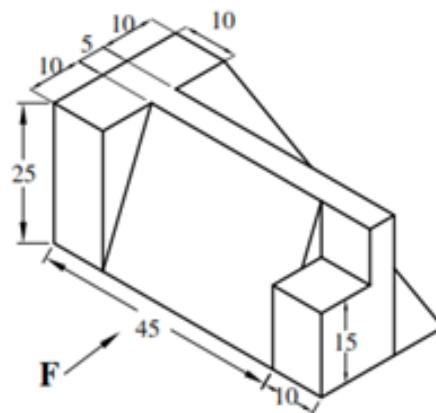


Figure LA2.3: Solid 3

TA101A-Laboratory Exercise 3

2x15 = 30

Orthographic Projection with Dimension

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question – LA:3.1

Show the three respective orthographic projections of the solid-1 shown below in Figure LA:3.1 in the third angle scheme. Use aligned dimensioning.

Question - LA:3.2

Show the three orthographic views of solid-2 in Figure LA:3.2 in the FIRST angle scheme. Use center line dimensioning. Use LHS view as profile view.

Figure LA3.1: Solid

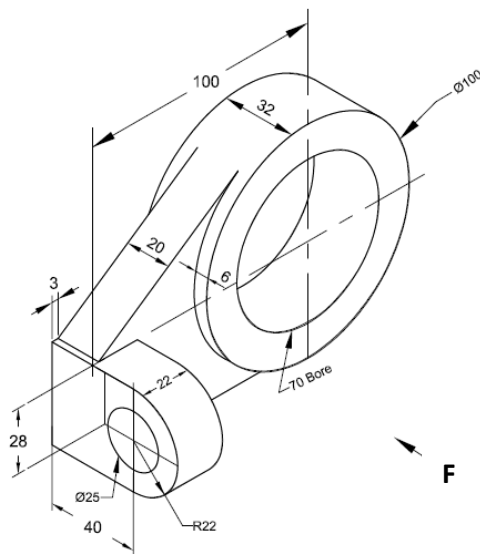
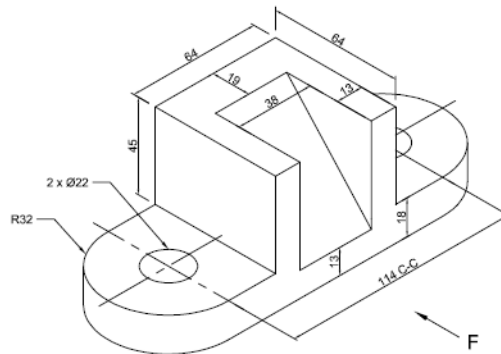


Figure LA3.2: Solid 2

TA101A-Laboratory Exercise 4

5+15+10 = 30

Isometric View and Projection

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- LA:4.1

Draw the isometric scale equivalent to 100 mm of true length. Subdivide the first 10 mm in 1 mm divisions, next 40 mm in 5 mm divisions, and the remaining in 10 mm divisions. Also project these subdivisions onto the isometric scale.

Question- LA:4.2

The orthographic views of a solid are shown below in Figure LA:4.1. Draw the isometric projection. Use aligned dimensioning.

Question- LA:4.3

Draw the isometric drawing of the solid of which the orthographic views are shown below in Figure LA:4.2. Do not dimension.

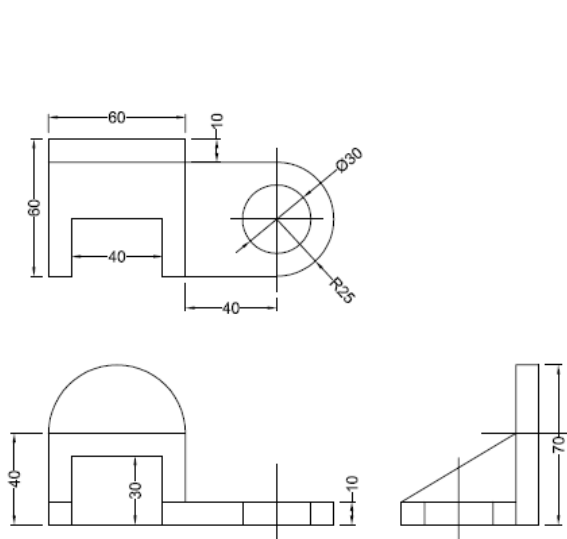


Figure LA:4.1

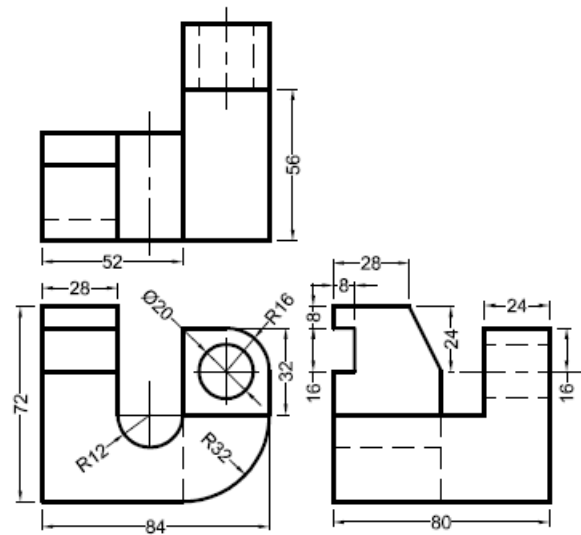


Figure LA:4.2

$$3 \times 10 = 30$$

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Make cavalier oblique view of the object shown in Figure LA:5.1. Choose a suitable face as the front and the depth direction as 40° to the right above the horizontal. Dimension the view.

Make a cabinet oblique view drawing of the object shown in Figure LA:5.2. Take the depth direction as 45° from the horizontal. Dimension the view so longest dimension is parallel to picture plane.

Make a cabinet oblique view drawing of the object shown in Figure LA:5.3. Take the depth direction as 30° from the horizontal. Dimension the view.

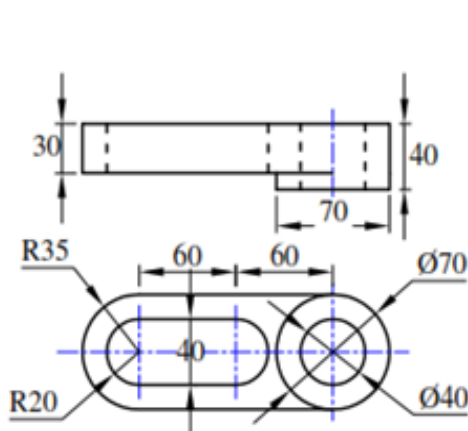


Figure LA:5.1

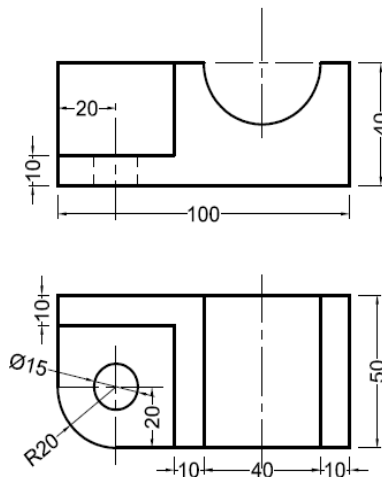


Figure LA:5.2

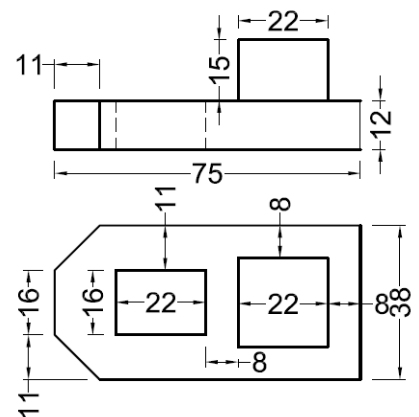


Figure LA:5.3

TA101A-Laboratory Exercise 6

6x3+3x4= 30

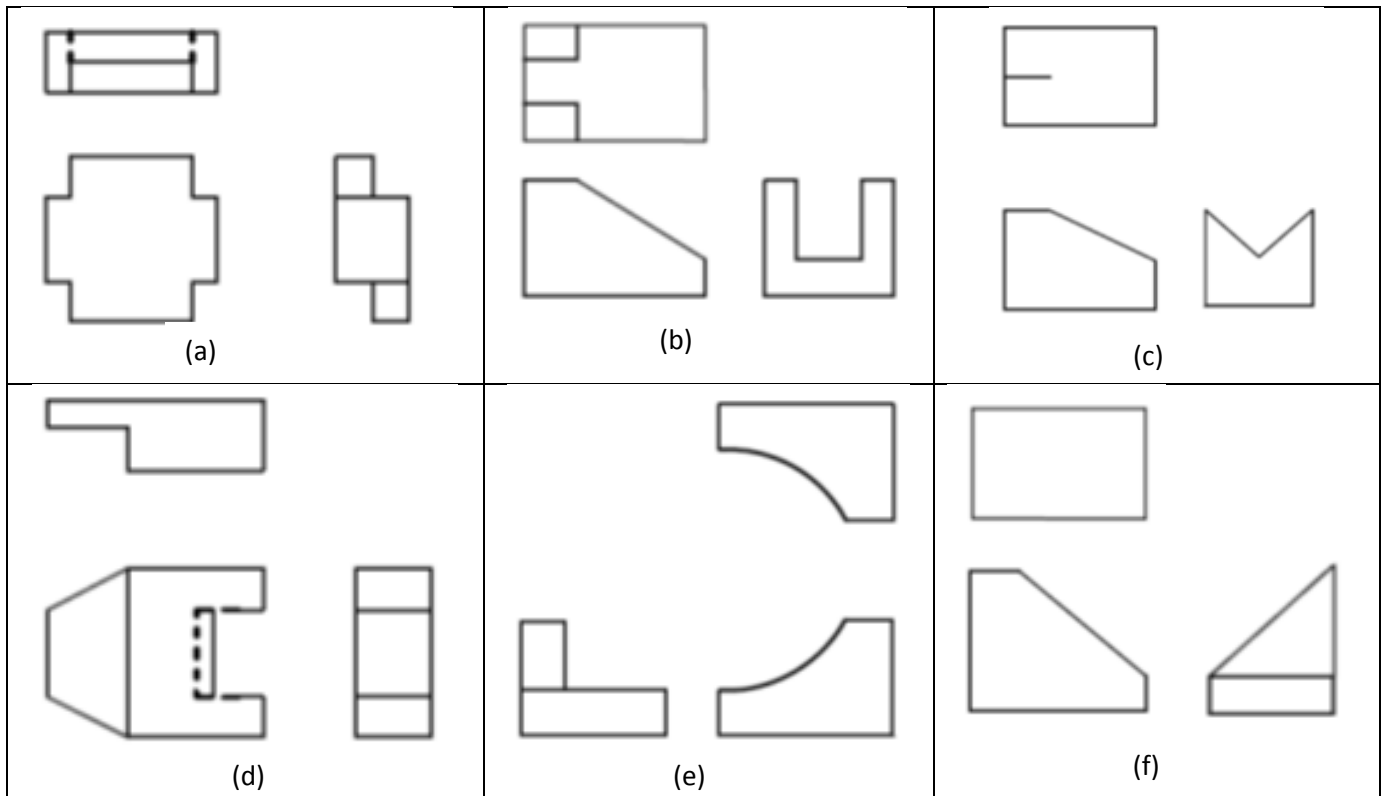
Missing Line and View

Instructions

- All problems are to be done on A4 size TA101 graph papers. One problem on one sheet.
- All sketches are to be drawn free hand. Use blue colour felt pen to draw the missing lines or views. Do not forget to bring felt pen to laboratory class.
- Write your name, roll number etc. in the title block using 10 mm letters.

Question- LA:6.1

Figures (LA:6.1 a-i) show incomplete orthographic projection of various objects. There are missing lines and or views. Complete the projections by adding lines or views, as required, and also draw the pictorial view of each object.



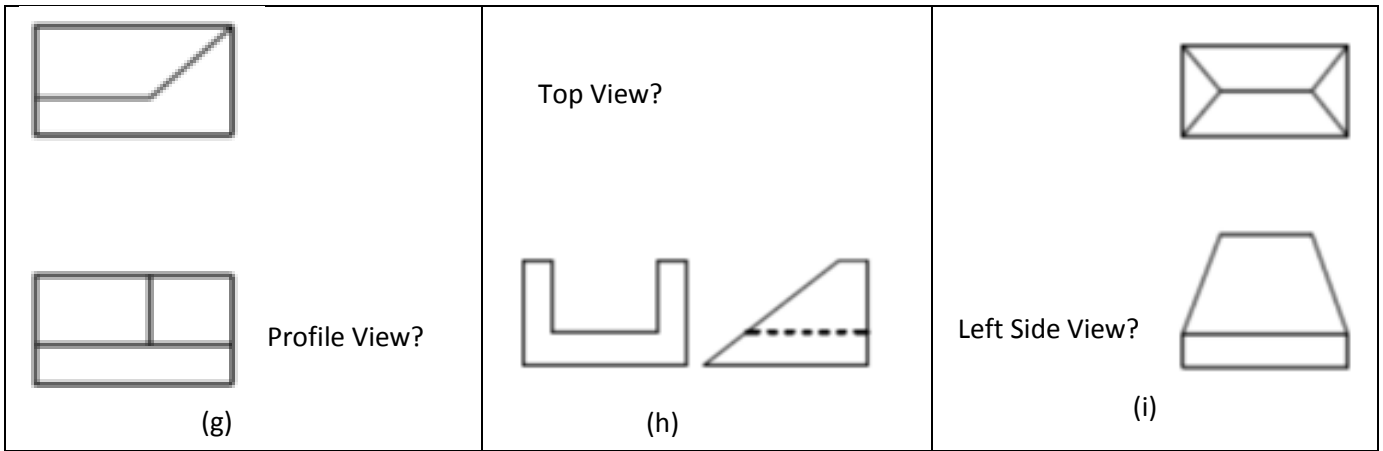


Figure LA:6.1

TA101A-Laboratory Exercise 7

3x10 = 30

Sectional View

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm
- The hatching lines should be thinner and lighter than the object lines.

Question- LA:7.1

Reproduce the two orthographic views of the Flanged Cap shown in Figure LA:7.1 and change the right-side view to half-section. Show the location of the cutting plane in the front view. Dimension the view.

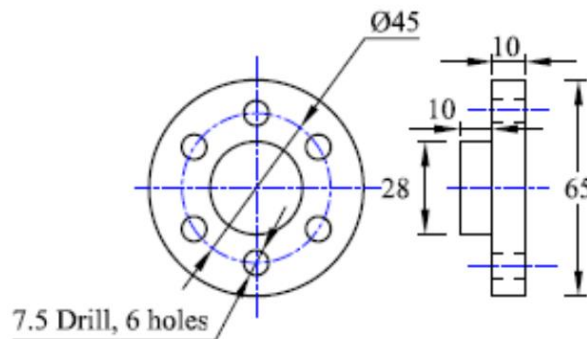


Figure LA:7.1

Question- LA:7.2

Draw the top view and sectional view to best describe the column collar as shown in Figure LA:7.2.

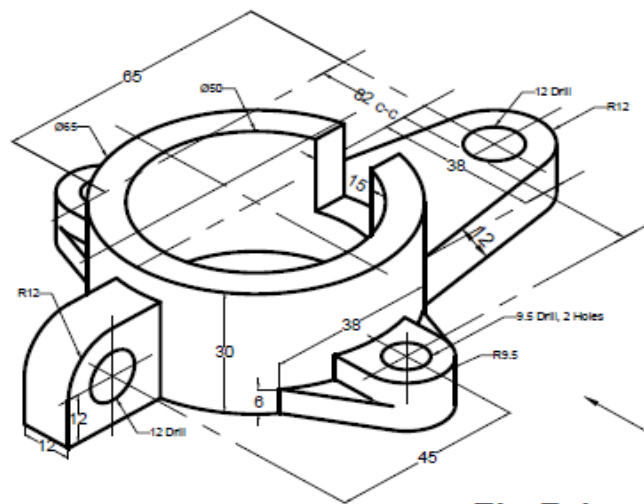


Figure LA:7.2

Question- LA:7.3

Draw a view and assembly sectional view to best describe the actuator link as shown in Figure LA:7.3.

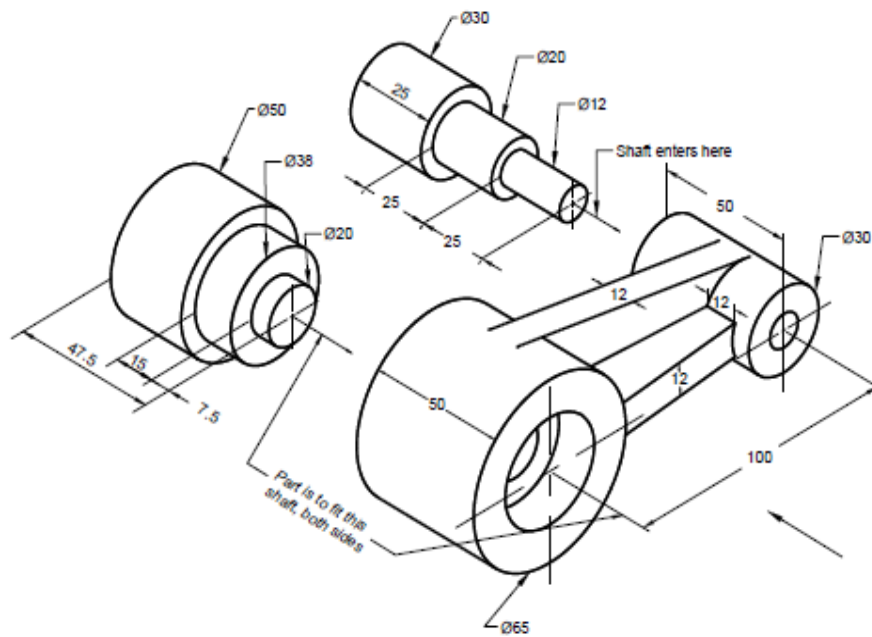


Figure LA:7.3

TA101A-Laboratory Exercise 8

30

Perspective View

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- LA:8.1

Draw the perspective view of the object given in Figure LA:8.1 with corresponding dimensions.

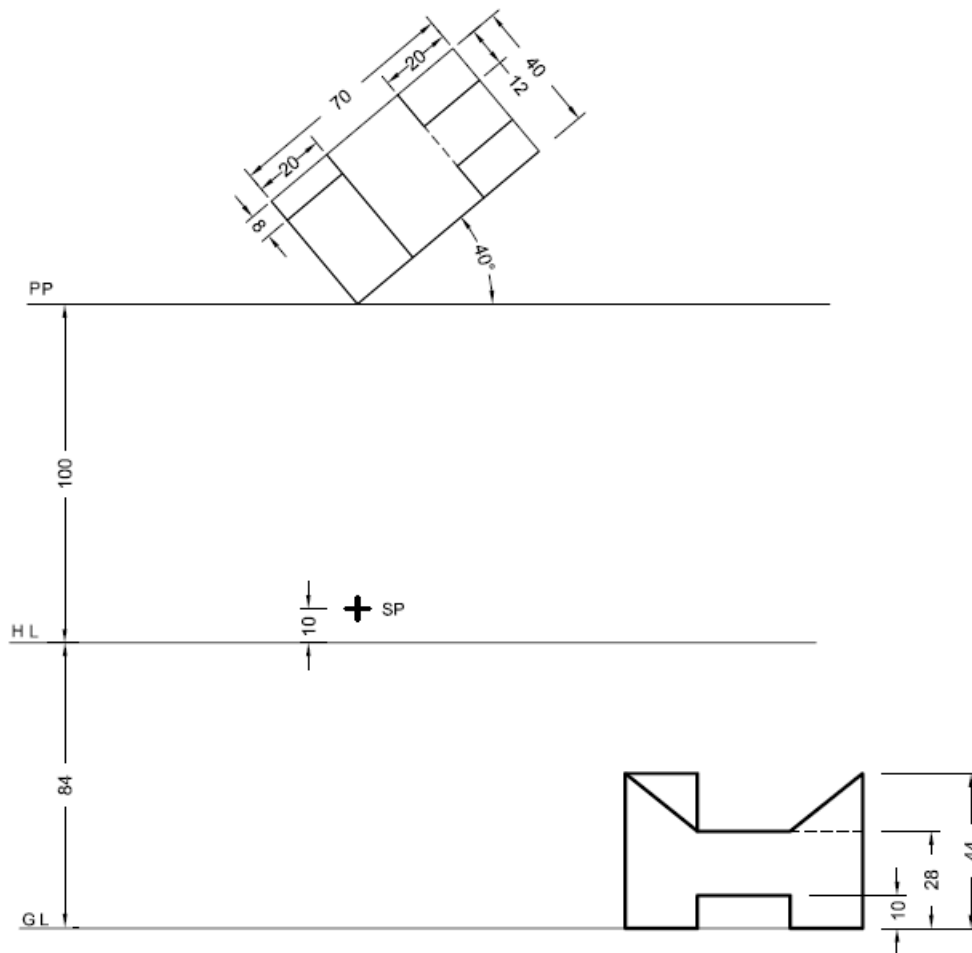


Figure LA:8.1

TA101A-Laboratory Exercise 9

6+12+12 = 30

Line and Plane

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- LA:9.1

Given the projection of a line in the horizontal and vertical planes in Figure LA:9.1 below, find its true length by (i) method of rotation applied to both horizontal and vertical projections and (ii) by creating auxiliary planes from the horizontal and vertical planes. Compare the true length in all four cases. Each square unit is 5 mm by 5 mm. Implement all four schemes in a single figure. Also determine the point views of the lines from two cases in (ii).

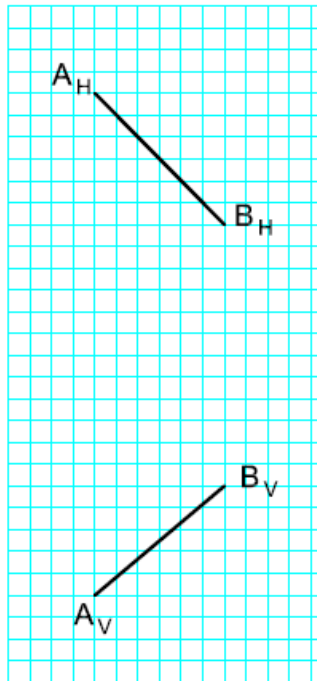


Figure LA:9.1

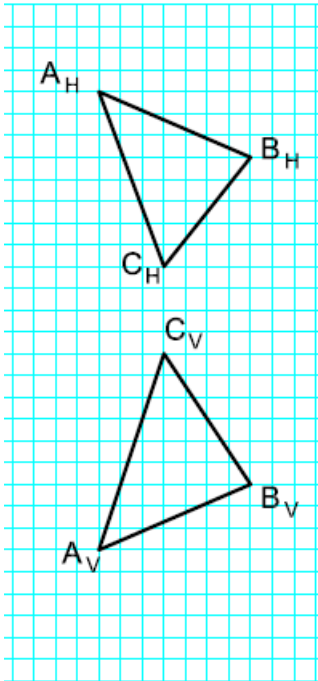


Figure LA:9.2

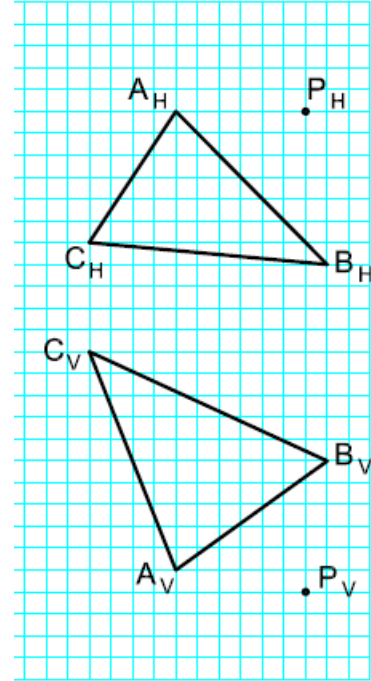


Figure LA:9.3

Question- LA:9.2

Given the horizontal and vertical projections of a plane ABC as in Figure LA:9.2, determine its edge view and true shape from both the vertical and horizontal planes. Draw different figures. Use compass and superimpose one true shape onto the other and determine whether the two true shapes coincide perfectly.

Question- LA:9.3

Given are the projections of the plane ABC and a point P in vertical and horizontal planes as in Figure LA:9.3. How should the plane ABC be extended so that the perpendicular from P barely falls on it? Also show the true shape of the extended plane.

TA101A-Laboratory Exercise 10

5x6 = 30

Relation between Line and Plane

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in cm

Question- LA:10.1

Planes ABC and RST are parallel. Complete the top and front view of ABC.

$R_H (1, 8)$; $S_H (2, 9.5)$; $T_H (3.5, 7.5)$; $A_H (5.5, 8)$; $B_H (4, 8.5)$; $C_H (6, 9.5)$

$R_F (1, 4)$; $S_F (2, 2.5)$; $T_F (3.5, 5.5)$; $A_F (5.5, 3)$

Question- LA:10.2

Plane XYZ is perpendicular to Plane ABC. Complete the front view of the plane XYZ.

$A_H (4.5, 8)$; $B_H (6, 9)$; $C_H (7, 6.5)$; $X_H (1, 8)$; $Y_H (2.5, 9.5)$; $Z_H (3.5, 8.5)$

$A_F (4.5, 3)$; $B_F (6, 5.5)$; $C_F (7, 2.5)$; $X_F (1, 4)$; $Y_F (2.5, 3.5)$

Question- LA:10.3

Find the angle between planes RSTU and STVW.

$R_H (0.5, 9)$; $S_H (1.5, 9)$; $T_H (3, 7.5)$; $U_H (2, 7.5)$; $V_H (2.5, 9.5)$; $W_H (4, 8)$

$R_F (0.5, 4.5)$; $S_F (1.5, 4)$; $T_F (3, 2)$; $U_F (2, 2.5)$; $V_F (2.5, 5)$; $W_F (4, 3)$

Question- LA:10.4

Draw the front, top and any other necessary views of the shortest horizontal line between the lines AB and CD.

$A_H (0.5, 8)$; $B_H (2.5, 8.5)$; $C_H (0.5, 9)$; $D_H (2.5, 7)$

$A_F (0.5, 1)$; $B_F (2.5, 2)$; $C_F (0.5, 3)$; $D_F (2.5, 1)$

Question- LA:10.5

Locate the top and the front views of P, the point where the line JK pierces the plane EFG. Show the visibility of the line JK.

$J_H (2.5, 8.5)$; $K_H (5.5, 6)$; $E_H (2, 7)$; $F_H (4, 9)$; $G_H (5.5, 6.5)$

$J_F (2.5, 2)$; $K_F (5.5, 5)$; $E_F (2, 3)$; $F_F (4, 5.5)$; $G_F (5.5, 1.5)$

TA101A-Laboratory Exercise 11

2x15 = 30

Auxiliary View

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- LA:11.1

For the solids given in Figures LA:11.1 and LA:11.2, draw the front, top, any one side and a normal view of the inclined surface showing its true shape.

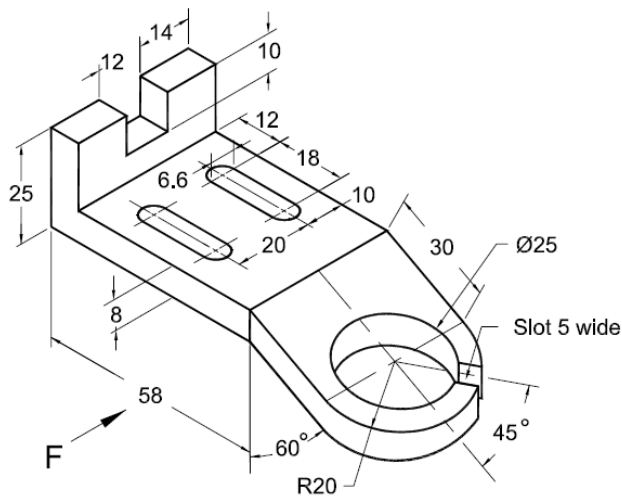


Figure LA:11.1

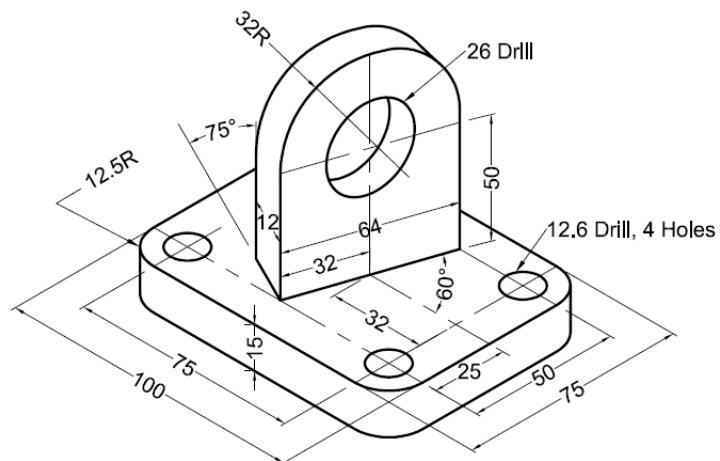


Figure LA:11.2

TA101A-Laboratory Exercise 12

5+5+10+10 = 30

Intersection of Line, Plane and Solid

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- LA:12.1

Find the line of intersection between the plane ABC and DEF. Show the visibility.

$A_H(1.5, 7)$; $B_H(5.5, 9)$; $C_H(6.5, 6.5)$; $D_H(2, 9)$; $E_H(6, 8.5)$; $F_H(3.5, 6)$

$A_F(1.5, 3)$; $B_F(5.5, 5)$; $C_F(6.5, 1.5)$; $D_F(2, 4.5)$; $E_F(6, 1)$; $F_F(3.5, 5.5)$

Question- LA:12.2

Find the points X and Z, where the line AB pierces the cone VO (Figure LA:12.1). Show the visibility of line AB. Each square is 5 mm by 5 mm.

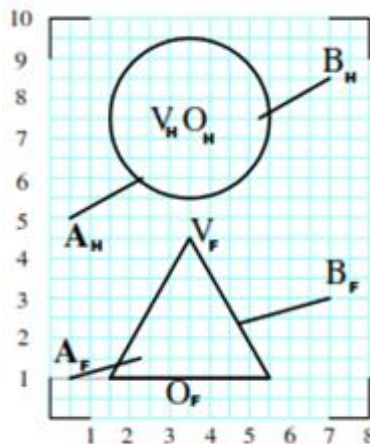


Figure LA:12.1

Question- LA:12.3

A hexagonal pyramid with base side 30 mm is resting on its base on the horizontal plane with two edges parallel to the frontal plane. It is cut by a section plane, perpendicular to the frontal plane and inclined at 45° to the axis at 25 mm above the base. Draw the front view, sectional top view, sectional side view and the true shape of the section.

Question- LA:12.4

A vertical cone, diameter of base 75 mm and 100 mm height, is completely penetrated by a cylinder of 45 mm diameter. The axis of the cylinder is parallel to both the horizontal and vertical planes and it intersects the axis of the cone at a point 28 mm above the base. Draw the projections of the solids showing the curves of intersection.

TA101A-Laboratory Exercise 13

7+7+8+8 = 30

Development of Surface

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- LA:13.1

Develop the lateral surface of the truncated cone shown in Figure LA:13.1.

Question- LA:13.2

Develop the lateral surface of the hopper shown in Figure LA:13.2

Question- LA:13.3

Develop the lateral surface of the regular hexagon prism shown in Figure LA:13.3.

Question- LA:13.4

Develop the lateral surface of the transition section shown in Figure LA:13.4.

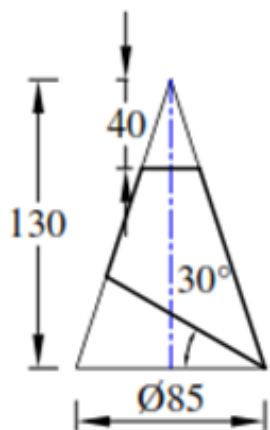


Figure LA:13.1

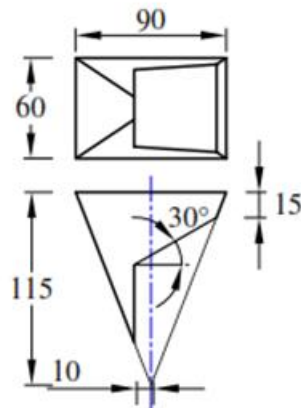


Figure LA:13.2

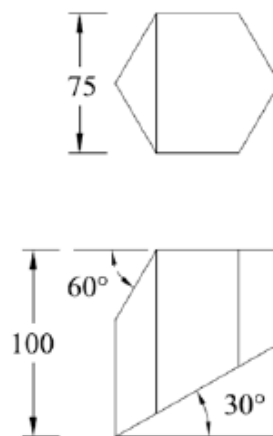


Figure LA:13.3

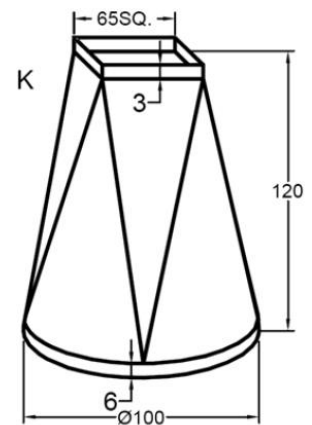


Figure LA:13.4

Home Assignments

TA101A-Home Assignment 1

7+8+15 = 30

Lettering and Construction

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question-HA:1.1

Reproduce the paragraph as shown in Figure HA:1.1, following the standard pencil strokes. First draw guidelines so that the letters and numbers are properly aligned. Height of capital letters and numbers should be 10 mm (base to cap line). The body of small letters should be 7 mm (waist to base line) and 3 mm (cap to waist and base to drop lines) for upper and lower parts.

PEOPLE HAVE EXPRESSED THEIR THOUGHTS AND CONCEPTS FOR MANY CENTURIES BY THE USE OF DRAWINGS. SOME DRAWINGS ARE PURE ART, AS IS THE PAINTING OF A VASE OF FLOWERS OR SEASCAPE. A MUSIC SCORE ON A SHEET OF PAPER IS A FORM OF DRAWING WHICH RELIES ON SYMBOLS TO CONVEY MEANING.

IN ENGINEERING AND TECHNOLOGY TECHNICAL DRAWINGS ARE WIDELY USED. WHETHER IT IS AN AIRCRAFT ENGINE OR A CHILD WAGON, THE PERSON RESPONSIBLE FOR MAKING IT NEED ACCURATE AND DEFINITIVE INFORMATION ON ALL PARTS AND ON HOW THEY FIT TO-GETHER.

Our object is to study the language of engineering graphics so that we can write it clearly for those familiar with it and read it readily when written by another. To do this, we must know the basic theory and be familiar with its accepted conventions and abbreviations.

Figure HA:1.1

Question- HA:1.2

Draw the ellipse on a major diameter of 100 mm. One point on the ellipse is 40 mm to the left of the minor diameter and 22 mm above the major diameter.

Question- HA:1.3

Using drawing instruments draw the Fixture Base shown in Figure HA:1.2

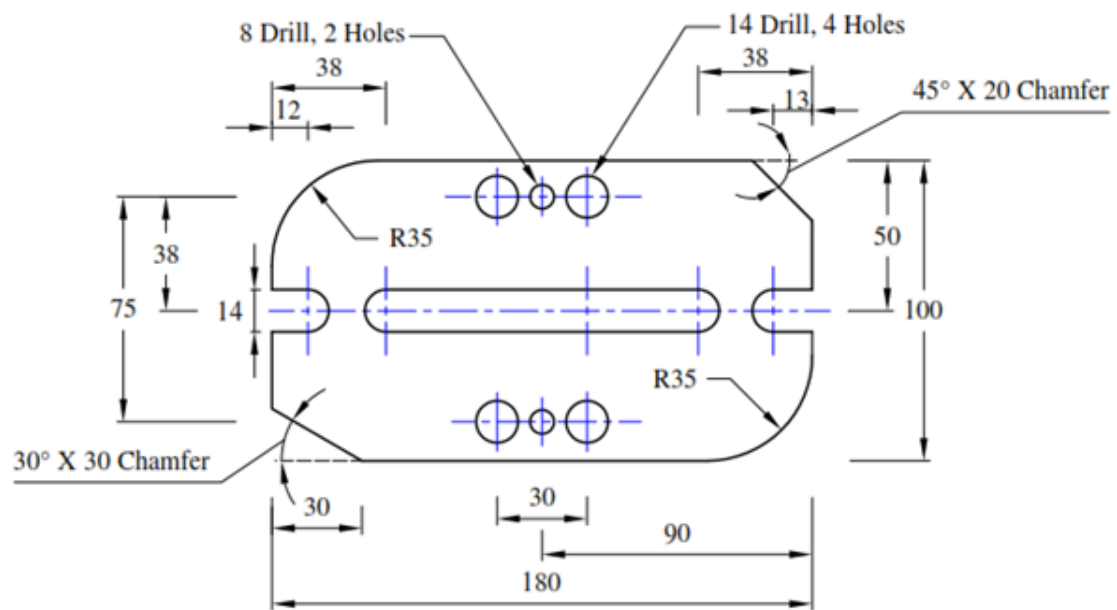


Figure HA:1.2

TA101A-Home Assignment 2

7+8+15 = 30

Orthographic Projection

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- HA:2.1

Draw three orthographic views of each of the two objects shown in Figure HA:2.1 in free-hand. The dimensions could be approximate but the three views should be representative of the objects. Use third angle projection.

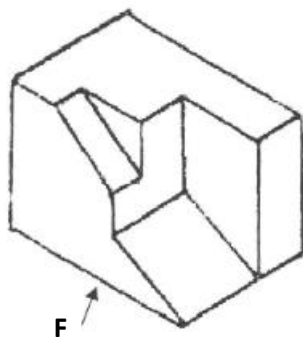


Figure HA:2.1 (a)

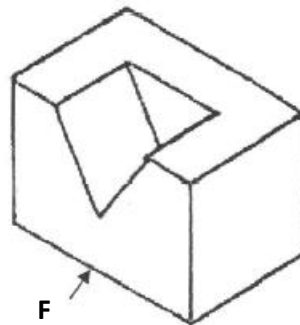


Figure HA:2.1(b)

Question- HA:2.2

For the object shown in Figure HA:2.2 draw three orthographic views using third angle projection scheme.

Question- HA:2.3

For the object shown in Figure HA:2.3 draw three orthographic views in third angle scheme. Do not dimension.

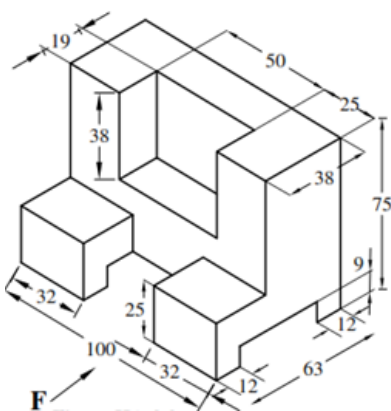


Figure HA:2.2

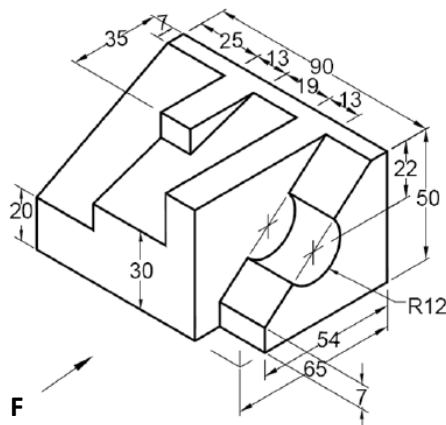


Figure HA:2.3

TA101A-Home Assignment 3

2x15 = 30

Orthographic Projection with Dimension

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question - HA:3.1

Show the three respective orthographic projections of the object in Figure HA:3.1. Dimension the drawing and use third angle projection.

Question - HA:3.2

Show the three orthographic views of object in Figure HA:3.2 in the first angle scheme. Dimension the drawing.

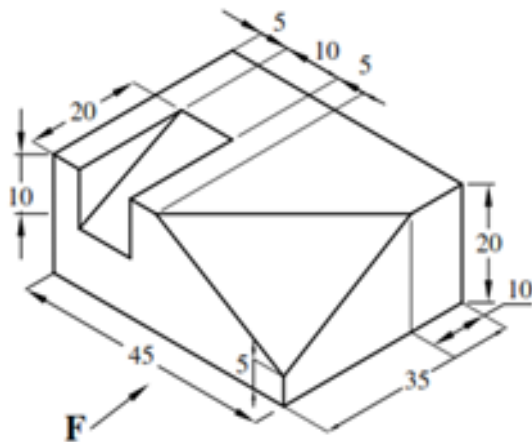


Figure HA:3.1

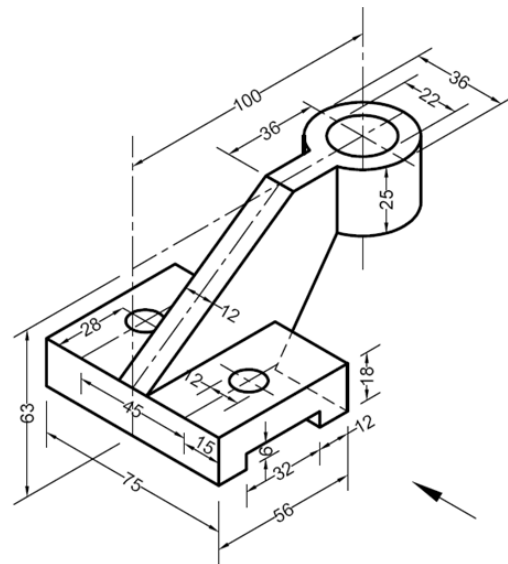


Figure HA:3.2

TA101A-Home Assignment 4

6+12+12 = 30

Isometric Views and Projection

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- HA:4.1

Prepare an isometric scale for 100 mm length. The least count of the scale should be 1 mm. Subdivide the next 40 mm into 5 mm divisions. Subdivide the last 50 mm into 10 mm divisions.

Question- HA:4.2

Draw an isometric view of the object shown in Figure HA:4.1. Dimension the view.

Question- HA:4.3

Draw isometric projection of the objects shown in Figures HA:4.2 and HA:4.3. Use the isometric scale drawn in solution to question HA:4.1. Dimension the view.

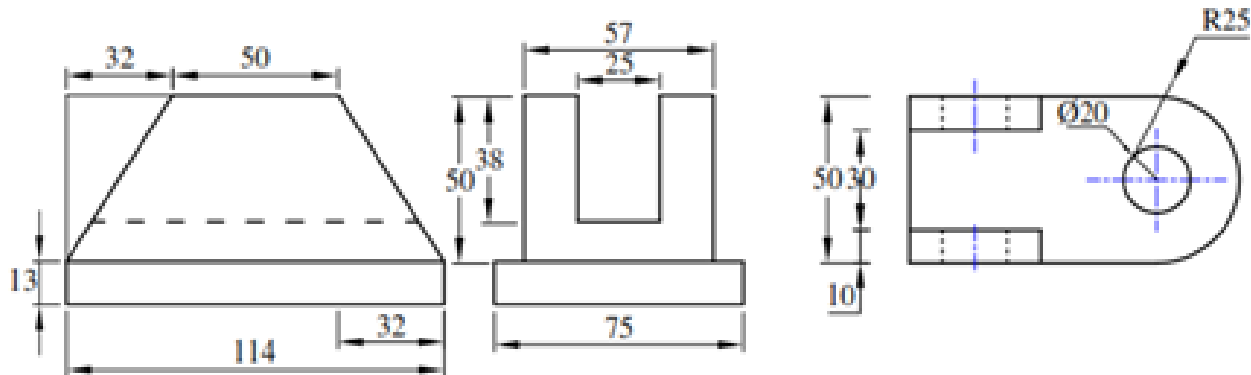


Figure HA:4.1

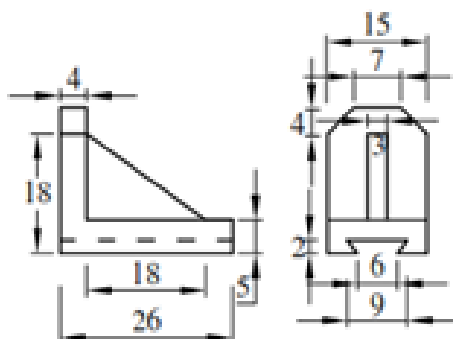


Figure HA:4.2

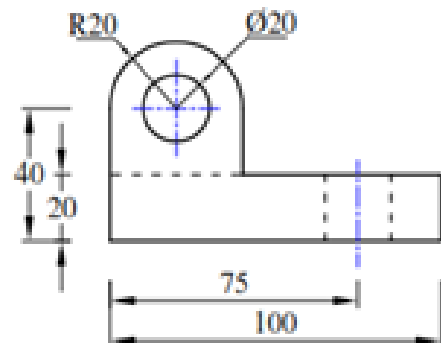


Figure HA:4.3

TA101A-Home Assignment 5

2x15 = 30

Pictorial View/Oblique View

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- HA:5.1

Make a cavalier oblique view drawing of the object shown in Figure HA:5.1. Take the depth direction as 45° from the horizontal. Dimension the view.

Question- HA:5.2

Draw a cabinet oblique view of the object shown in Figure HA:5.2. Choose the depth direction as 30° to the right above the horizontal. Do not dimension the view.

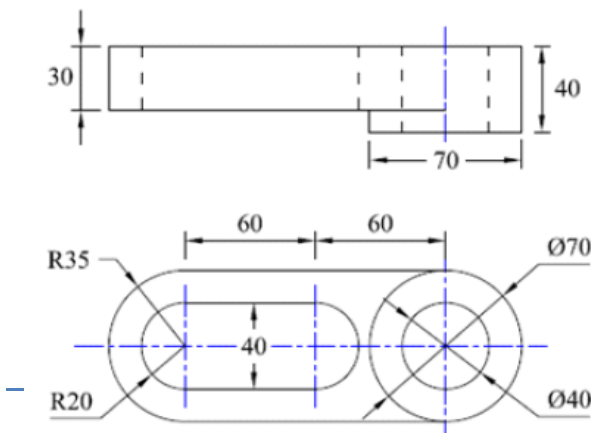


Figure HA:5.1

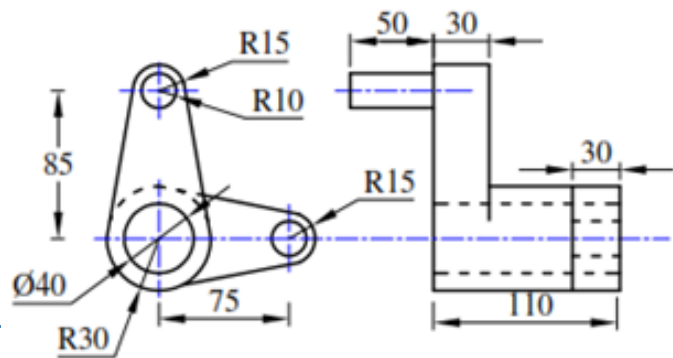


Figure HA:5.2

TA101A-Home Assignment 6

30

Missing Line and View

Instructions

- All problems are to be done on A4 size TA101 graph papers. One problem on one sheet.
- All sketches are to be drawn free hand. Use blue colour felt pen to draw the missing lines or views.
- Write your name, roll number etc. in the title block using 10 mm letters.
- Consider appropriate dimensions so views in answers are clear enough.

Question- HA:6.1

Figures (HA:6.1-a to l) show incomplete orthographic projection of various objects in third angle. There are missing lines and or views. Complete the projections by adding lines or views, as required, and also draw the pictorial view of each object in each case.

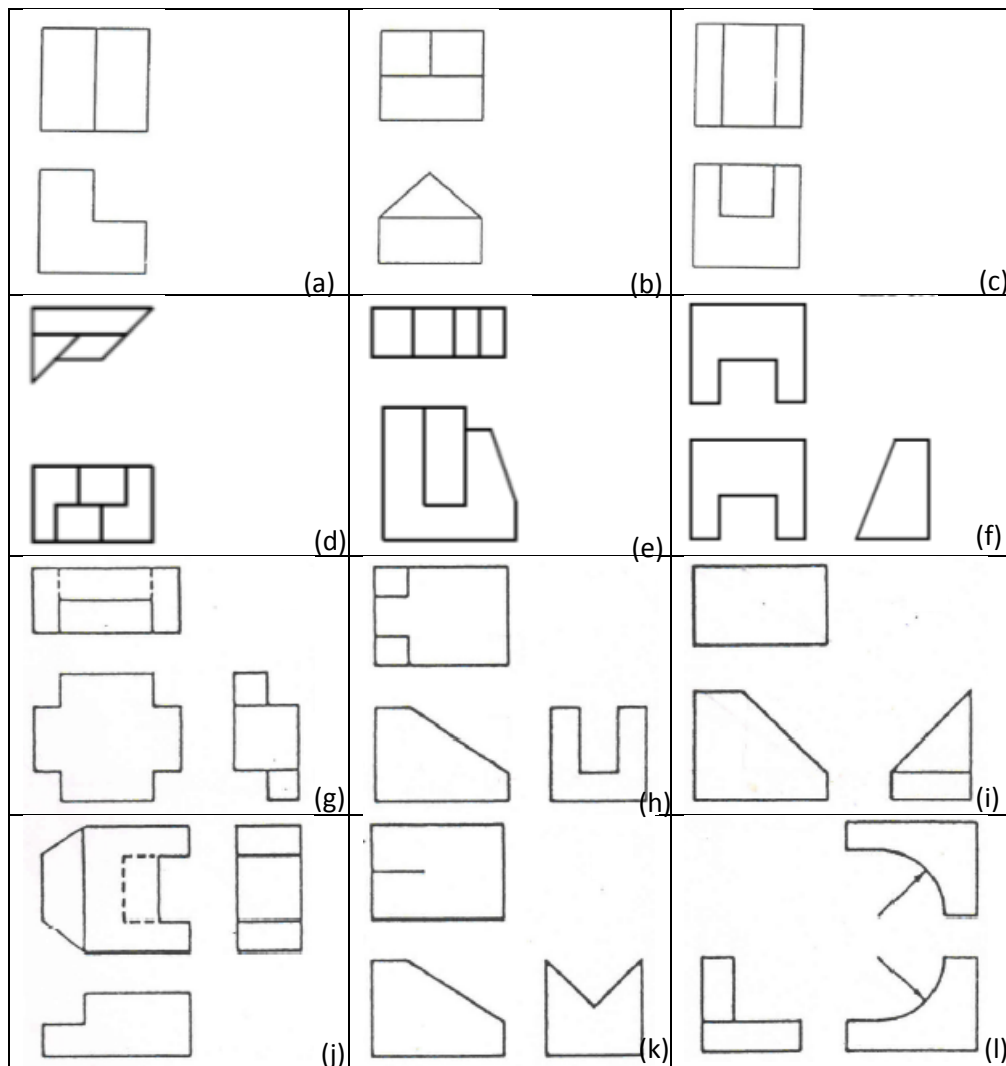


Figure HA:6.1

TA101A-Home Assignment 7

2x15 = 30

Sectional View

Instructions

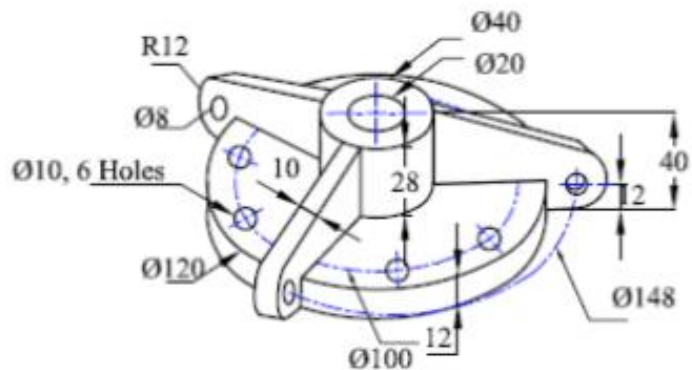
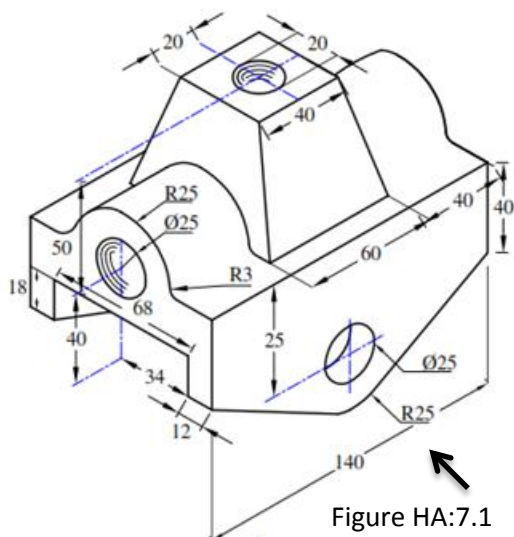
- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm
- The hatching lines should be thinner and lighter than the object lines.

Question- HA:7.1

Draw the front view in full section, and top view and the right view for the shaper ram adjuster shown in Figure HA:7.1. Show the cutting-plane in an appropriate view.

Question- HA:7.2

Draw the sectional and other orthographic view that will best describe the piece in Figure HA:7.2.



TA101A-Home Assignment 8

30

Perspective View

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- HA:8.1

Draw the perspective view of a hut shown below with given one center vision point on horizontal plane and front face of the hut lying on picture plane as shown.

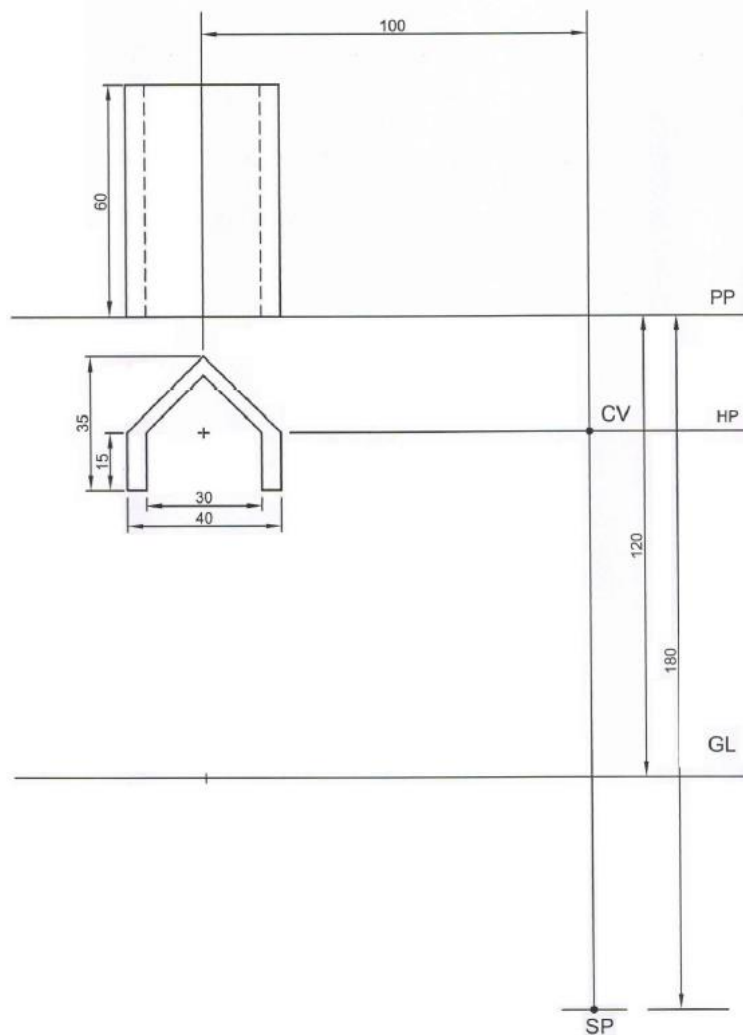


Figure HA:8.1

TA101A-Home Assignment 9

3x10 = 30

Line and Plane

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm.
- Consider the grid size 5 mm.

Question- HA:9.1

CD makes an angle of 60° with AB in Figure HA:9.1. Knowing that D lies on the line segment AB, draw the top and front views of CD.

Question- HA:9.2

Point X, Y and Z lie in the plane of the triangle ABC in Figure HA:9.2. Draw the top and front views of triangle XYZ.

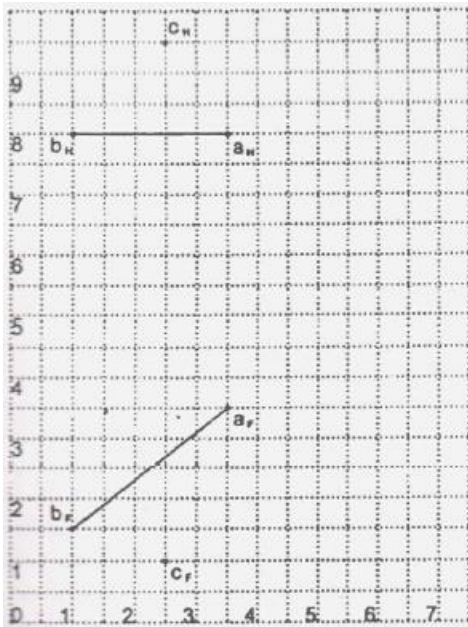


Figure HA:9.1

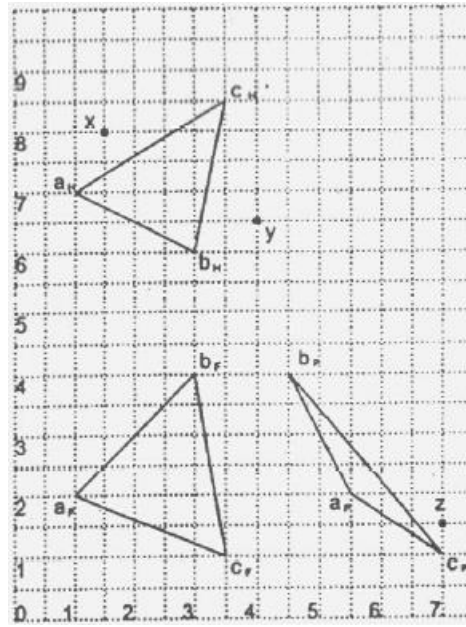


Figure HA:9.2

Question- HA:9.3

AB has a bearing $N60^\circ W$ and intersects the line XY at a point C. B is 9.5 cm below X. Complete the top view and front view of AB and C. What is the true length of BC?

$X_H(3.5, 7.5)$; $Y_H(5.5, 8.5)$; $A_H(6.5, 7)$

$X_F(3.5, 3)$; $Y_F(5.5, 1)$; $A_F(6.5, 3)$

TA101A-Home Assignment 10

3x10 = 30

Relation between Line and Plane

Instructions

- All problems are to be done on a single A4 size grid sheet. Use separate sheet for each problem.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All grids are 5 mm size.

Question- HA:10.1

Draw the top view of the plane PQR (Figure HA:10.1) which is perpendicular to planes ABC and ABD.

Question- HA:10.2

Find the true size of the angle between the line VW and the plane PQR (Figure HA:10.2).

Question- HA:10.3

Draw the top and front views of the line of intersection between plane ABC and cone VO as shown in Figure 10.3. Complete the cone and show visibility. Draw the top view of the line of intersection between the plane and the cone.

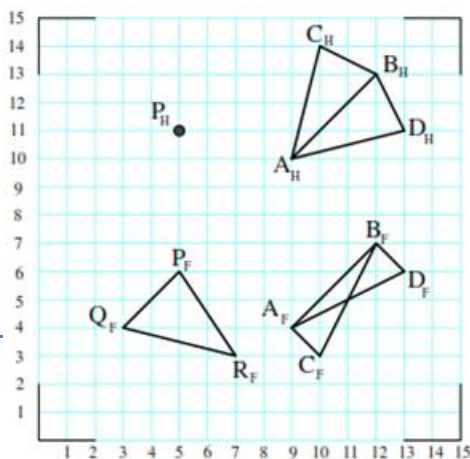


Figure HA:10.1

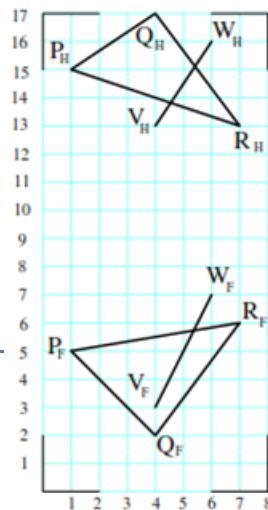


Figure HA:10.2

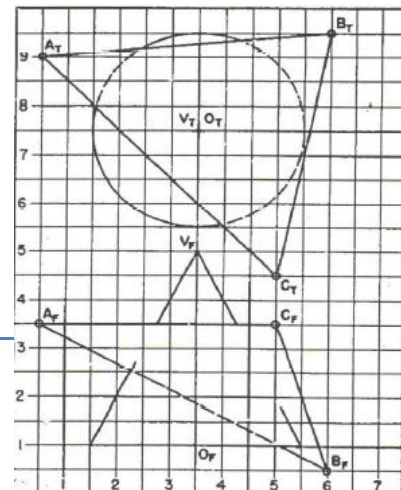


Figure HA:10.3

TA101A-Home Assignment 11

2x15 = 30

Auxiliary View

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm

Question- HA:11.1

Two orthographic views of an object are shown in Figure HA:11.1. Draw the given views and obtain a normal view of the oblique surface.

Question- HA:11.2

Draw necessary views to describe the offset guide shown in Figure HA:11.2. Use the drawn auxiliary views to complete the orthographic views. (Note: Top view cannot be completed without the help of the front and auxiliary views.)

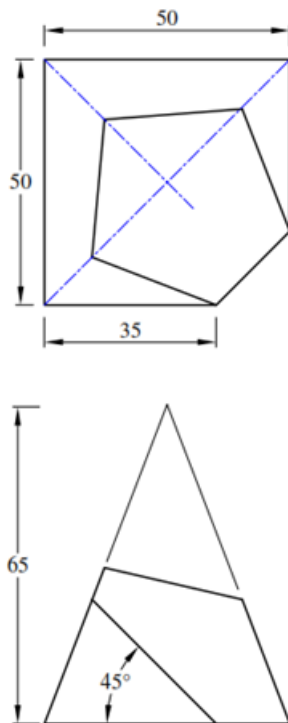


Figure HA:11.1

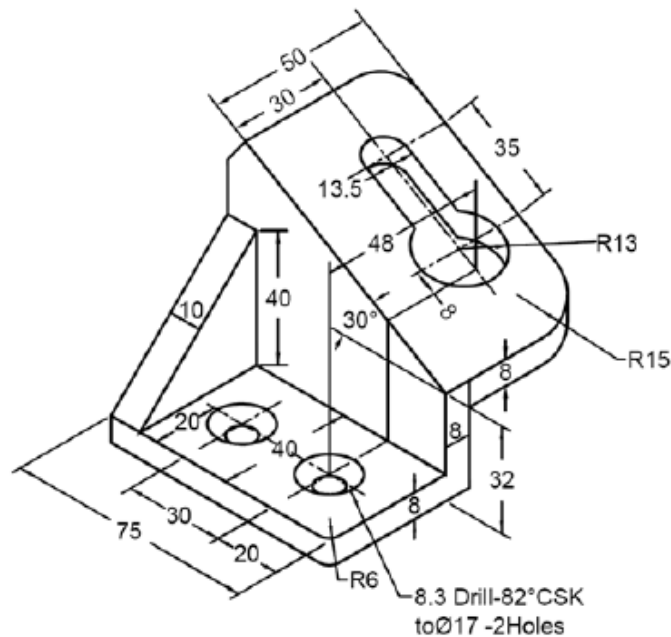


Figure HA:11.2

TA101A-Home Assignment 12

3x10 = 30

Intersection of Line, Plane and Solid

Instructions

- All problems are to be done on a single A3 drawing sheet.
- Write your name, roll number etc. in the title block using 10 mm letters.
- All dimensions are in mm
- Grids are 5 mm size

Question- HA:12.1

Draw the top view and front view of the line of intersection between the planes ABC and cone VO (Figure HA:12.1). Show visibility.

Question- HA:12.2

Find the curves of intersection between the pipes of Figure HA:12.2.

Question- HA:12.3

A vertical cylinder of 70 mm diameter whose axis is perpendicular to the horizontal plane is penetrated by another cylinder of the same size, whose axis is parallel to the frontal plane and inclined by 15° to the horizontal plane. The distance between the axes of two cylinders is 6 mm. Draw the projections showing curves of intersection.

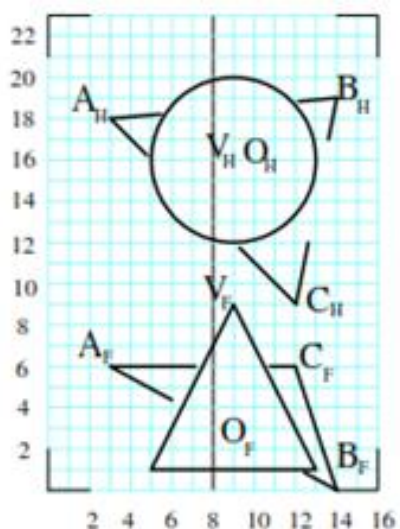


Figure HA:12.1

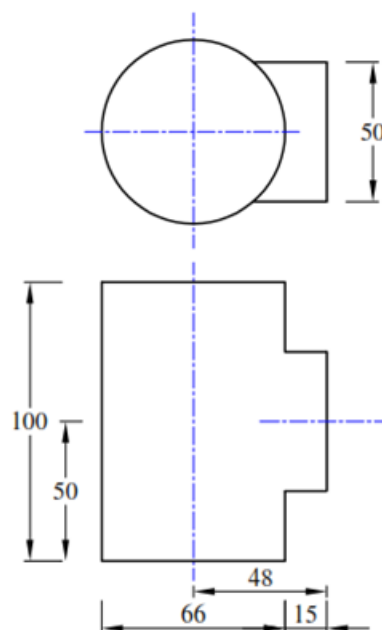


Figure HA:12.2