

(Highlight gula)

## 1. What is Graphic Language?

1.what is graphic language

### Definition:

Graphic language is a method of communication using **lines, symbols, and drawings** to convey ideas and information about objects clearly and accurately.

👉 **Engineering Drawing** is a type of drawing used by engineers and technologists.

👉 It acts as a **communication medium** between people involved in design and manufacture (machines, bridges, buildings, etc.).

👉 For that reason, it is often called a **Graphic Language** —  
→ **A visual language used to express ideas, shape, and size using lines and symbols.**

## **2. Example of One Graphic Instrument**

2.koi ekta Graphic instrument

- **Drawing Board** – used to place drawing paper firmly with cellophane tape or board pins.

## **3. Names of Some Graphic Instruments**

3.name of some graphic instrument

- Drawing Board
  - T-Square
  - Triangles (Set Squares)
  - Compass
  - Scale
  - Divider
  - Protractor
- 

## **4. Freehand Drawing**

4.Freehand drawing

- When a drawing is done **without using instruments** — only with **pencil and eraser**, it is called **Freehand Drawing**.

- Used for **rough sketches** and **initial designs**.

---

## **5. Names of Some Drafting Instruments (4–5)**

5.name of some drafting instrument(4 or 5 ta)

1. Drawing Board
  2. T-Square
  3. Triangles
  4. Compass
  5. Divider
  6. Protractor
- 

## **6. What is the Role of Cellophane Tape (Kaj ki)?**

6.what is the role of selofan tape(kaj ki)

- Used to **fix drawing paper** on the **drawing board** so that it doesn't move while drawing.
- 

## **7. Triangle — Koi Dhoroner, Angle Ki Ki?**

7.Triangle koi dhoroner, angle ki ki

→ **Two types of triangles (Set Squares):**

1. **45°–45°–90° Triangle**

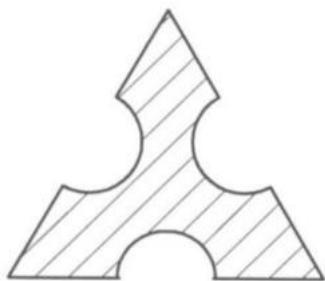
## 2. $30^\circ$ – $60^\circ$ – $90^\circ$ Triangle

- Angles:  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$ ,  $90^\circ$
  - Made of transparent plastic and used with the T-square for **vertical and inclined lines**.
- 

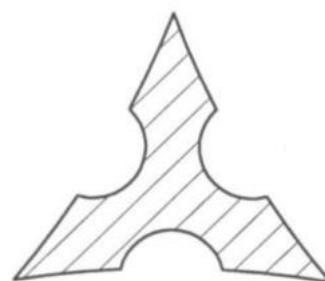
## 8. Page 8–10: Figure + Cross-Section Figure

8.page 8-10 figure dia ques + cross section fig

- **Cross-Section** means cutting an object by an **imaginary plane** to show **internal features** clearly.
- Used to explain hidden details and interior structure.
- **Figure Example:** A cube cut in half to show inside pattern.



Regular



Relieved Facet

Triangular Scale



Double Bevel



Opposite Bevel

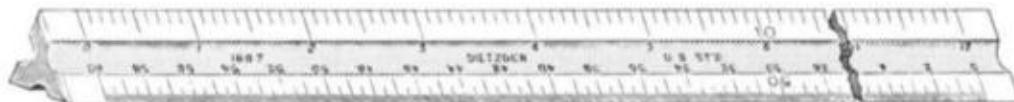


Flat bevel

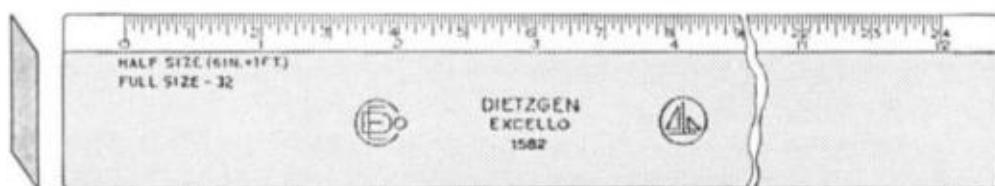
Flat Scale



(a) Metric Scale



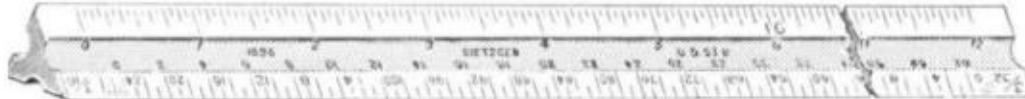
(b) Engineers Scale



(c) Mechanical Engineers Scale



(d) Decimal Scale



(e) Architects Scale

## 9. Protractors (15° kore divide thake chada)

9.protractors 15° kore divide thake (chada)

- Protractor is used to measure or lay out angles.
- It is divided in 1° intervals (0°–180°), not only 15°.
- Vernier protractor gives more accurate readings than ordinary semicircular protractor.

---

## **10. Pencil Type (Mechanical)**

10.pencil type mechanical

- Mechanical Pencil uses **replaceable leads** (0.3 mm, 0.5 mm, etc.).
  - No sharpening needed — gives **uniform and clean lines**.
  - Best choice for drafting.
- 

## **11. Page 14–15: Pencil Hardness Chart**

11.page 14-15 chart

- (i) hard (maxi,mini,7h-hard)
- (ii) medium (max and mini)
- (iii) soft (maxi and mini)

### **(i) Hard Grade (Maxi–Mini)**

- Maximum (Hardest): 9H
- Minimum (Softest in hard group): 4H
- Hard: 7H

### **(ii) Medium Grade (Max–Min)**

- Maximum (Hardest Medium): 3H
- Minimum (Softest in Medium group): B

→ Firm : F (between H and HB)

### (iii) Soft Grade (Maxi-Mini) (B = Black/Soft)

→ Maximum (Hardest in soft group): 2B

→ Minimum (Softest/Darkest): 7B



Hard → thin light line, Soft → dark thick line

**Beginners:** 2H, H, F, HB, or B

---

## 12. Paper Size (Page 18)

12.paper size 1st and last(overall 841)A0 and A4 (b:l =1/ $\sqrt{2}$ ) lagbe jana page -18

**Standard:** ISO 5457:1999

**Length : Breadth = 1 :  $\sqrt{2}$**

• A0 size is the base sheet, having an area of 1 m<sup>2</sup>.

Size	Dimensions (mm)
A0	841 × 1189
A1	594 × 841
A2	420 × 594
A3	297 × 420

A4

210 × 297

- **1st:** A0
- **Last:** A4
- **Most used:** A4 for documents and reports.

Table 1.1: Standard Metric Paper Sizes

Paper Size	Border Size ( $b$ mm × $l$ mm)	Overall Paper Size ( $b_0$ mm × $l_0$ mm)
A0	821 × 1159	841 × 1189
A1	574 × 811	594 × 841
A2	400 × 564	420 × 594
A3	277 × 390	297 × 420
A4	190 × 267	210 × 297

---

### 13. 10 mm kore rakhbo Assignment e (Important)

13. 10 mm kore rakhbo assignment e (Important)

- While doing **assignment**, keep **10 mm margin** on all sides of the sheet.
-

## **14. Pasha Pashi 10mm & Opor Nich 15mm (Important for Exam Theory)**

14. pasha pashi 10mm and opor nich 15 mm lekhar shomoi exam theory (Important)

— For exam/theory paper:

- **Left & Right (side margins): 10 mm**
  - **Top & Bottom (up-down margins): 15 mm**
- 

## **15. Types of Line (Page 20)**

15.types of line er range p-20

**Line Thickness:**

Two types of line thickness are used in engineering drawing —

1. **Thick Lines** → 0.5 mm to 0.8 mm (ANSI standard ≈ 0.7 mm)
2. **Thin Lines** → 0.3 mm to 0.5 mm (ANSI standard ≈ 0.35 mm)

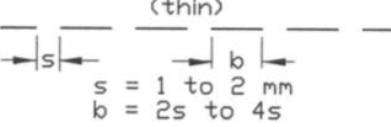
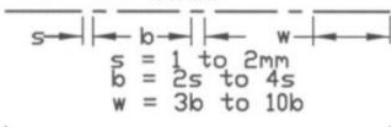
Category	Line Thickness	Examples	Standard Reference
Thick Lines	0.5 mm – 0.8 mm	• Visible lines (object outlines)	ANSI Y14.2-1995 ISO 128:1982(E)

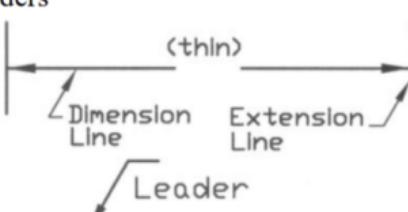
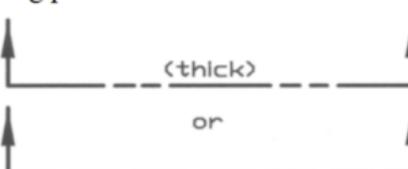
	$(ANSI \approx 0.7 mm)$	<ul style="list-style-type: none"> <li>• Cutting plane lines</li> <li>• Short break lines</li> </ul>	
Thin Lines	<p><math>0.3 \text{ mm} - 0.5 \text{ mm}</math></p> <p><math>(ANSI \approx 0.35 \text{ mm})</math></p>	<ul style="list-style-type: none"> <li>• Hidden lines</li> <li>• Center lines</li> <li>• Extension &amp; leader lines</li> <li>• Dimension lines</li> <li>• Section lines</li> <li>• Phantom lines</li> <li>• Long break lines</li> </ul>	<p>ANSI Y14.2-1995</p> <p>ISO 128:1982(E)</p>

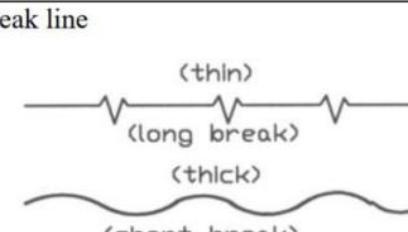
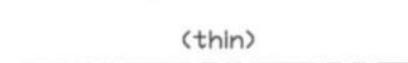
## Page 21–23 Chart (Important for Assignment)

Page-21-23 chart (Important)-(for assignment)

Table 1.2: Types of Lines with Their Usage (contd.)

Sl No.	Types of Line	Usage
1	Visible line / object line  (thick)	to indicate all visible outlines of an object. It shows the shape of an object.
2	Hidden line / dashed line  (thin) s = 1 to 2 mm b = 2s to 4s	to represent the hidden edge of an object. It must begin and end with a dash touching the visible lines. Dashes that show hidden lines usually touch each other at intersection.
3	Center line  (thin) s = 1 to 2 mm b = 2s to 4s w = 3b to 10b	to show the center line of holes, pitch line.

Sl No.	Types of Line	Usage
4	Extension line, dimension line and Leaders 	to show dimension of an object extension line, dimension line and leaders are used.
5	Section line 	to indicate the cut portion of an object.
6	Cutting plane line 	to show the imaginary cutting of an object

7	ISO Cutting Plane Line 	
8	Break line 	to show a break on the object. It shortens the view of a long part.
9	Phantom line/repeat line 	to show the alternate position of an object or the position of an adjacent part.

## **16. Hidden Line**

16.hidden line

- A **broken (dashed) line** used to show **edges not directly visible** from the outside.
- 

## **17. Title Block (May Ask to Draw)**

18.title block akte dite pare, (length 120 mm, width 60 mm,->12cm,6cm)

(Sob capital letter)

→ **Length:** 120 mm (12 cm)

→ **Width:** 60 mm (6 cm)

**Includes:**

- INTERNATIONAL ISLAMIC UNIVERSITY CHITTAGONG
- TITLE
- SCALE
- MAT
- NAME
- DEPT
- ROLL
- DATE

BANGLADESH UNIVERSITY OF ENGG. & TECH., DHAKA		
TITLE:		
SCALE:	MAT:	
NAME:		
DEPT:	ROLL:	DATE:

Figure 1.30: Title Block



**Write in CAPITAL LETTERS only.**

→ Usually placed at **bottom-right corner** of sheet.

---

## 18. Category of Scaling (Page 28)

18.category of scaling p-28

→ **Scales** are used for **measurement only**, not for drawing lines.

**Three Categories:**

1. **Full Scale (1:1)** → Actual size

2. **Reduced Scale (1:n)** → Drawing smaller than real object,  
 $<1:1$

3. **Enlarged Scale (n:1)** → Drawing larger than real object,  
 $>1:1$

## **18.1) Recommended Scale Sizes (Size Dia Name)**

18.1) recomanded scale size dia name ask korbe.

### **Examples of Recommended Ratios:**

- **Full Scale:** 1:1
- **Reduced Scale:** 1:2, 1:5, 1:10
- **Enlarged Scale:** 2:1, 5:1, 10:1

Table 1.4: Recommended Scales of International Standard

Category	Recommended Scales		
Enlargement Scale	50:1 5:1	20:1 2:1	10:1
Full Size	1:1		
Reduction Scale	1:2 1:20 1:200 1:2000	1:5 1:50 1: 500 1: 5000	1:10 1:100 1: 1000 1:10000

### **Common Types of Scale:**

Metric Scale, Engineer's Scale, Mechanical Engineer's Scale, Architect's Scale.

## 19. Marginal Size (Dan Pashe Marignal Size)

19. Marginal size dan pashe

- Right-side margin is kept for binding or notes.
  - Margins: 10 mm side, 15 mm top-bottom.
  - Maintain neat borders around the sheet.
- 



### FINAL QUICK RECAP

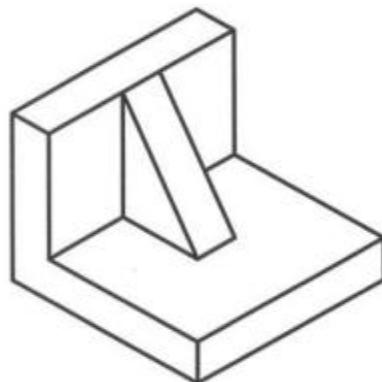
No.	Topic	Key Point / Summary
1	<b>Graphic Language</b>	A <i>visual communication method</i> using lines, symbols, and drawings to express shape, size, and ideas clearly.
2	<b>Example of Graphic Instrument</b>	<b>Drawing Board</b> – holds paper using cellophane tape or board pins.
3	<b>Some Graphic Instruments</b>	Drawing Board, T-Square, Triangles, Compass, Scale, Divider, Protractor.
4	<b>Freehand Drawing</b>	Drawn <b>without instruments</b> using only pencil and eraser; used for <b>sketches</b> .

<b>5</b>	<b>Drafting Instruments (4–5)</b>	Drawing Board, T-Square, Triangles, Compass, Divider, Protractor.
<b>6</b>	<b>Role of Cellophane Tape</b>	Used to <b>fix drawing paper</b> on the board firmly.
<b>7</b>	<b>Triangles</b>	Two types: <b>45°–45°–90° &amp; 30°–60°–90°</b> ; angles 30°, 45°, 60°, 90°. Used for vertical/inclined lines.
<b>8</b>	<b>Cross-Section Figure</b>	Shows <b>internal features</b> by cutting an object along an <b>imaginary plane</b> .
<b>9</b>	<b>Protractor (15° kore divide thake chada)</b>	Measures angles <b>0°–180°</b> , divided in <b>1° intervals</b> , not just 15°. Vernier type = more accurate.
<b>10</b>	<b>Pencil Type (Mechanical)</b>	Uses <b>replaceable thin leads (0.3 mm–0.7 mm)</b> ; no sharpening; gives clean, uniform lines.
<b>11</b>	<b>Pencil Hardness Chart</b>	<b>Hard (9H–4H), Medium (3H–B), Soft (2B–7B)</b> ; Hard = thin lines, Soft = dark lines.
<b>12</b>	<b>Paper Size (ISO 5457:1999)</b>	Ratio <b>1 : √2</b> ; <b>A0 = 841×1189, A4 = 210×297</b> ; A4 is most used.

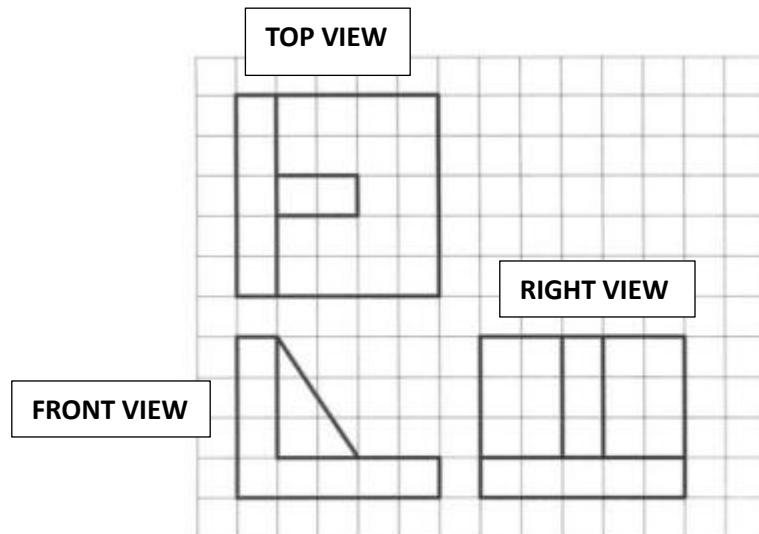
<b>13</b>	<b>Assignment Margin</b>	Keep <b>10 mm margin</b> on all sides.
<b>14</b>	<b>Exam Margin Rule</b>	<b>Left–Right: 10 mm, Top–Bottom: 15 mm.</b>
<b>15</b>	<b>Types of Lines</b>	<b>Thick (0.5–0.8 mm)</b> → Visible/Cutting lines; <b>Thin (0.3–0.5 mm)</b> → Hidden/Center/Dimension lines; standards: <b>ANSI Y14.2-1995, ISO 128:1982(E)</b> .
<b>16</b>	<b>Hidden Line</b>	<b>Dashed line</b> showing edges not directly visible.
<b>17</b>	<b>Title Block</b>	Size <b>120×60 mm (12×6 cm)</b> ; includes <b>Title, Name, Scale, Dept, Roll, Date</b> ; all in <b>CAPITAL letters</b> ; placed at <b>bottom-right</b> .
<b>18</b>	<b>Category of Scaling</b>	<b>Full (1:1), Reduced (1:n), Enlarged (n:1)</b> ; used for <b>measurement only</b> .
<b>18.1</b>	<b>Recommended Scales</b>	Full: 1:1; Reduced: 1:2, 1:5, 1:10; Enlarged: 2:1, 5:1, 10:1; Common: Metric, Engineer's, Architect's.

<b>19</b>	<b>Marginal Size (Right side)</b>	Right side margin for notes/binding; maintain <b>10 mm sides, 15 mm top-bottom.</b>
-----------	---------------------------------------	--

**TOP,FRONT,RIGHT**



**Fig. P3.1**



**Solution of P3.1**

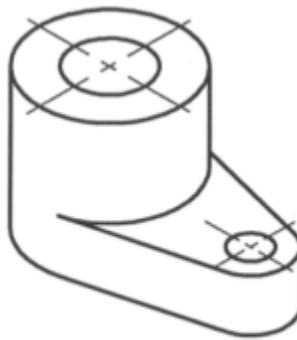
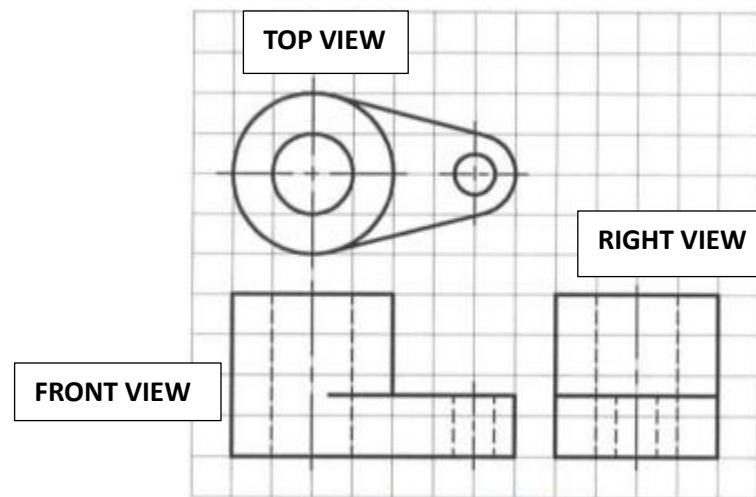
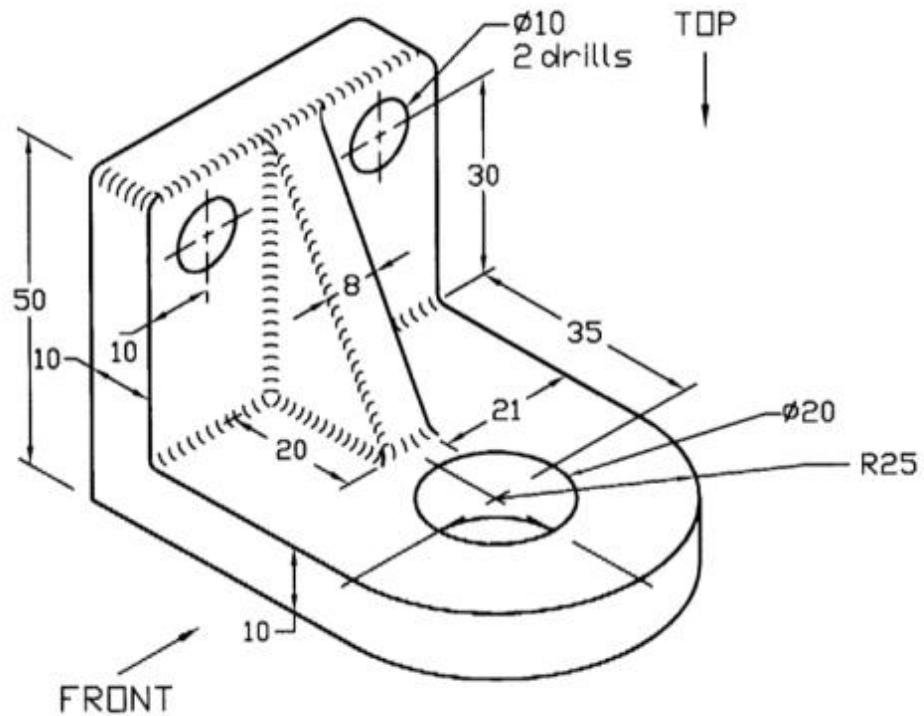


Fig. P3.21

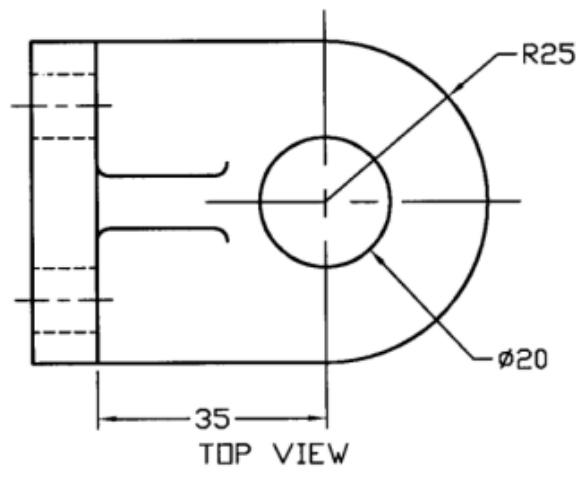


Solution of P3.21

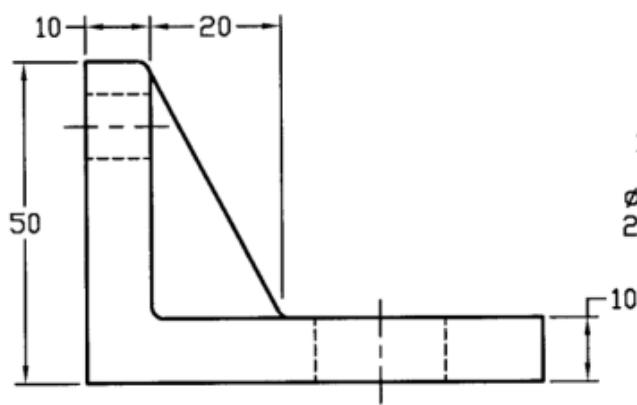
**Prob. P3.58:** Draw top, front and right side views of the holder as shown in Fig. P3.58.



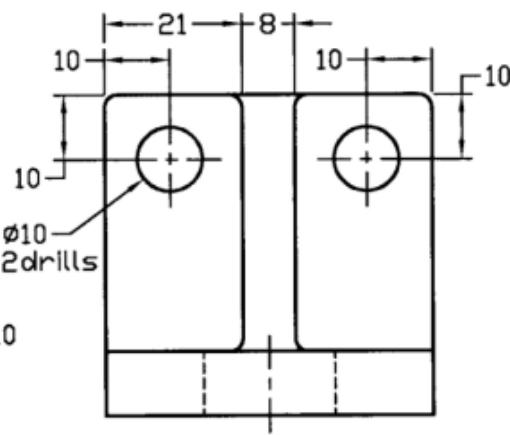
**Fig. P3.58**



TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

**Solution of P3.58**

**Prob. P3.60:** Draw top, front and right side views of the bracket as shown in Fig. P3.60.

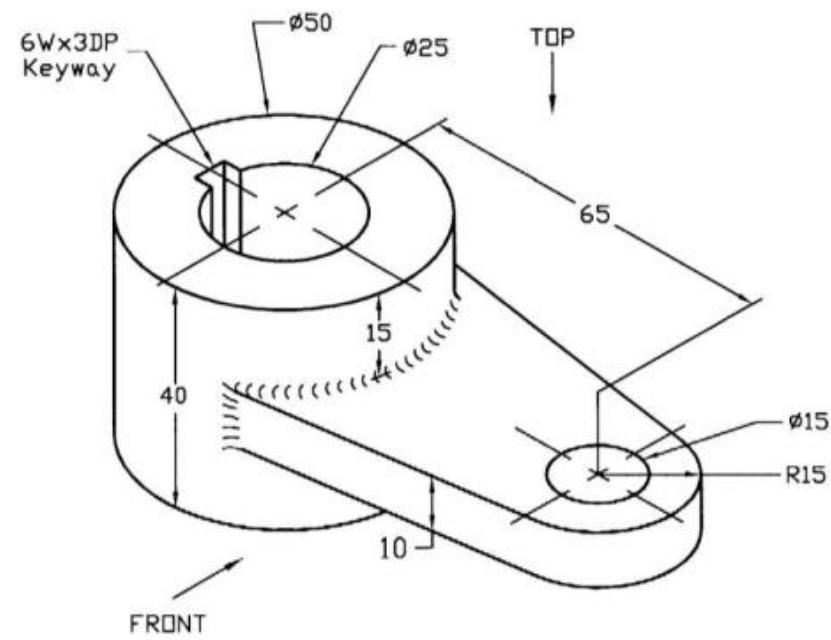
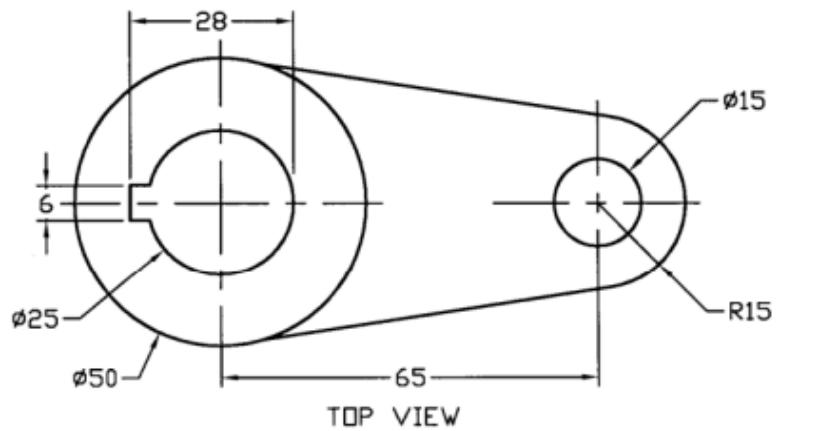
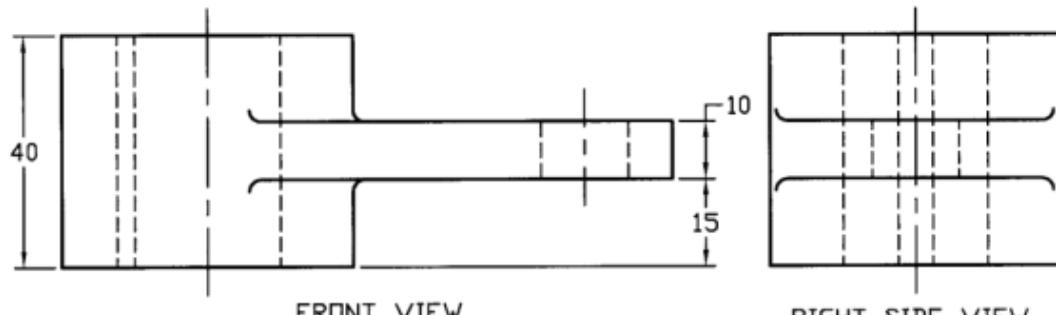


Fig. P3.60



TOP VIEW



FRONT VIEW

RIGHT SIDE VIEW

**Solution of P3.60**

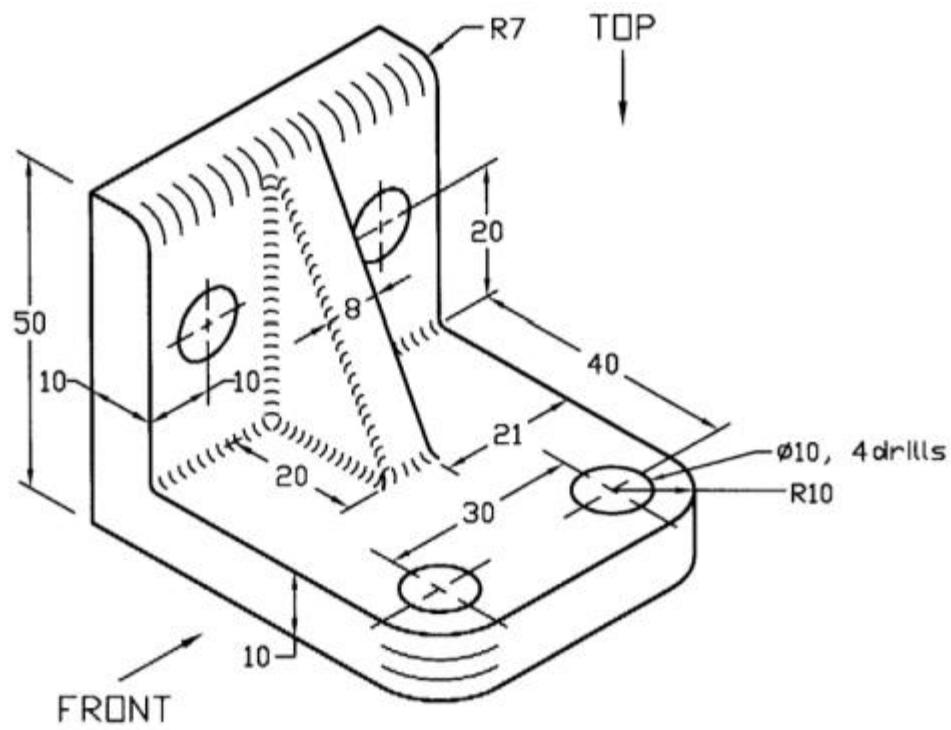
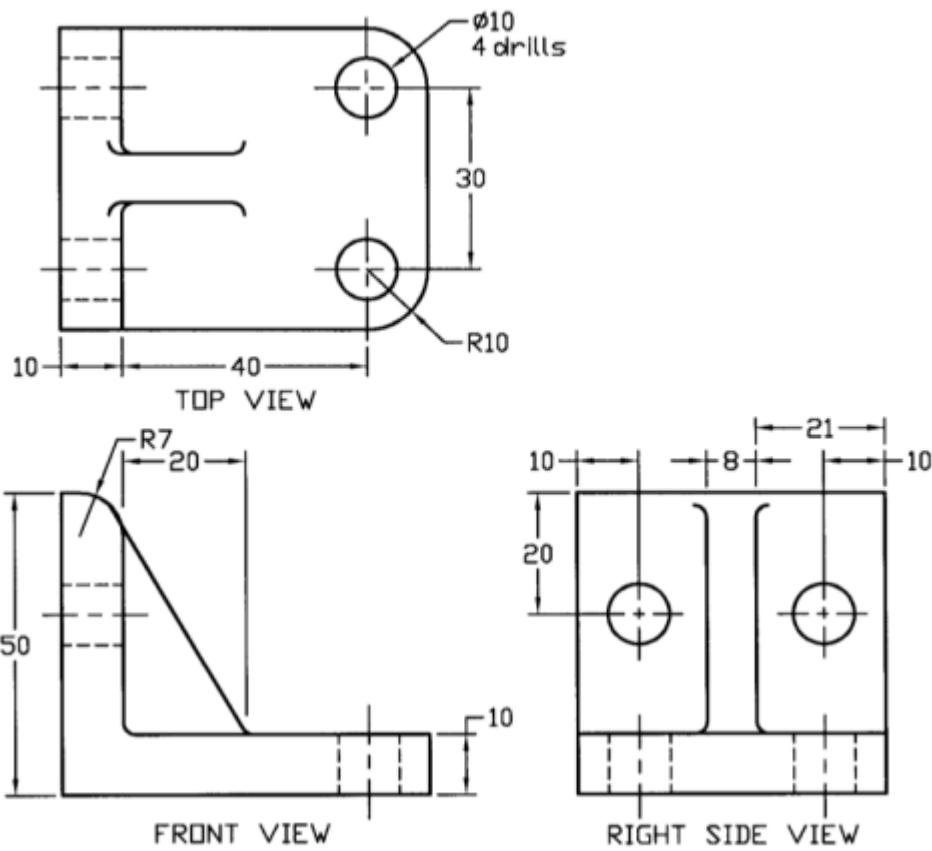


Fig. P3.59



**Solution of P3.59**

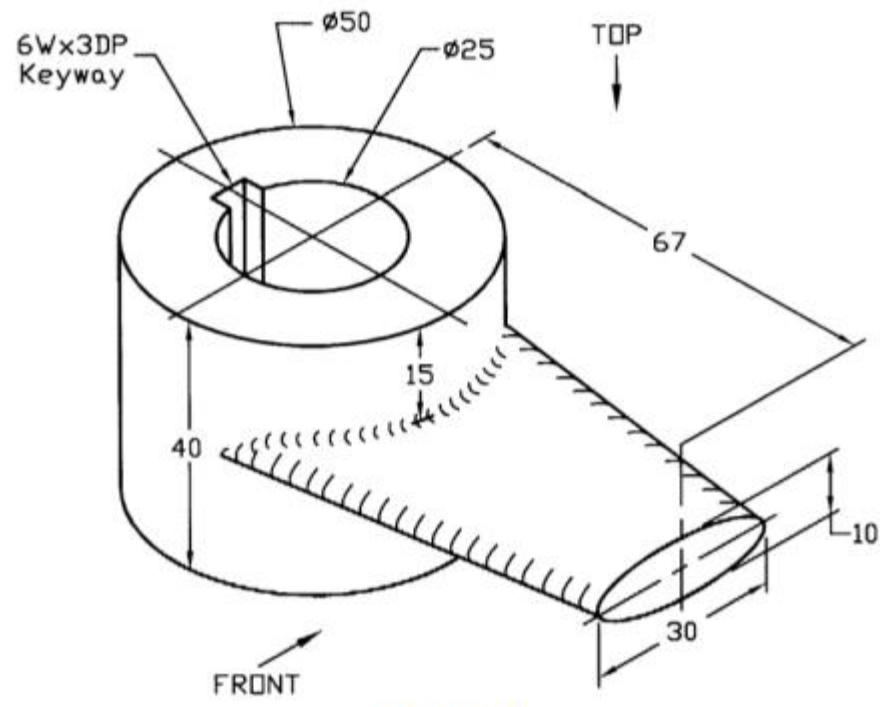
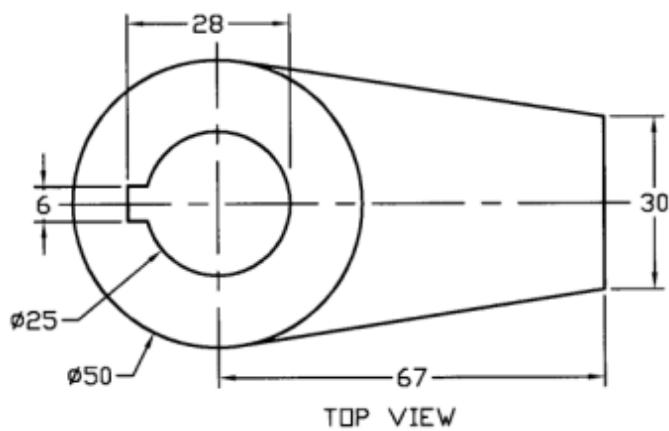
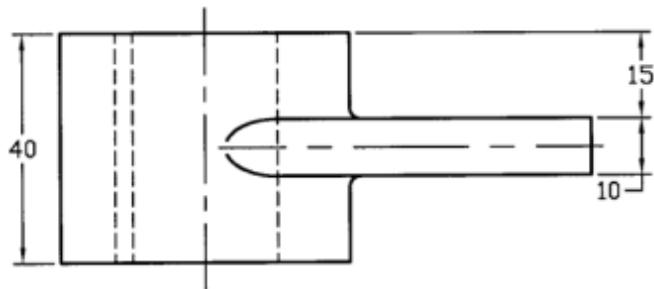


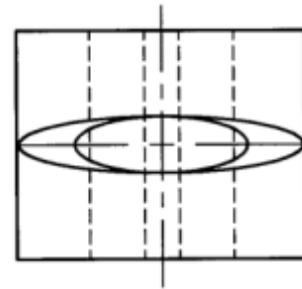
Fig. P3.61



TOP VIEW



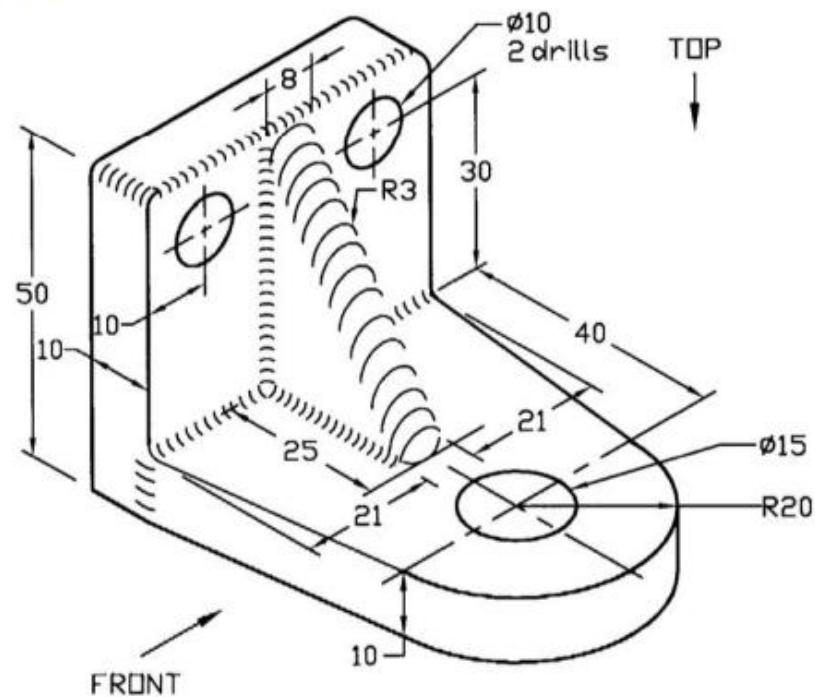
FRONT VIEW



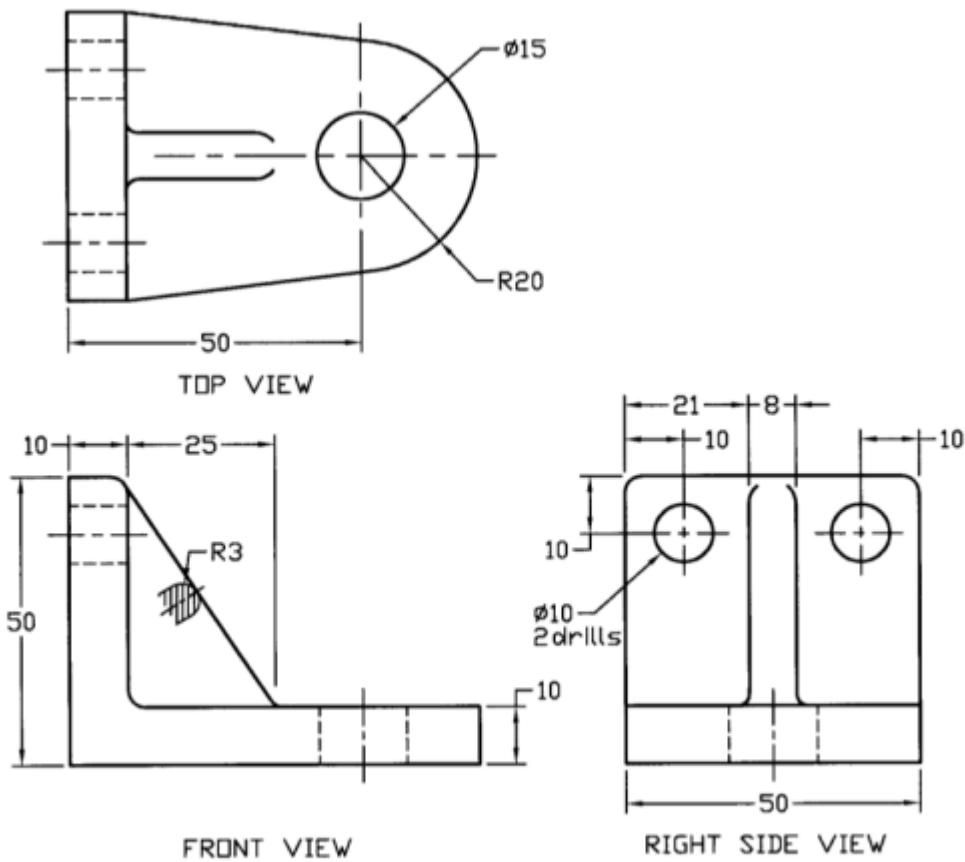
RIGHT SIDE VIEW

**Solution of P3.61**

**Prob. P3.62:** Draw the top, front and right side views of the fixer as shown in Fig. P3.62.



**Fig. P3.62**



## SECTION VIEW

#### 4.2 Generating Sectional View

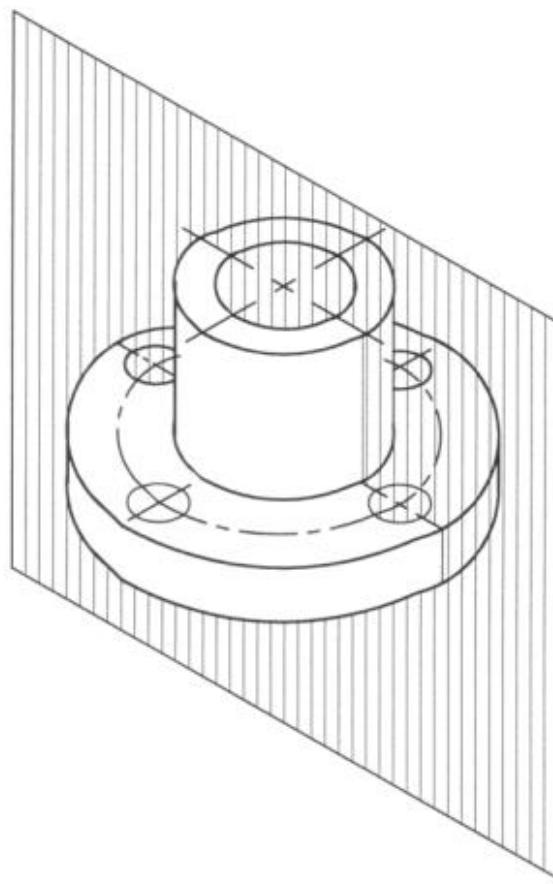


Figure 4.1: Object with Cutting Plane Through Mid-Section

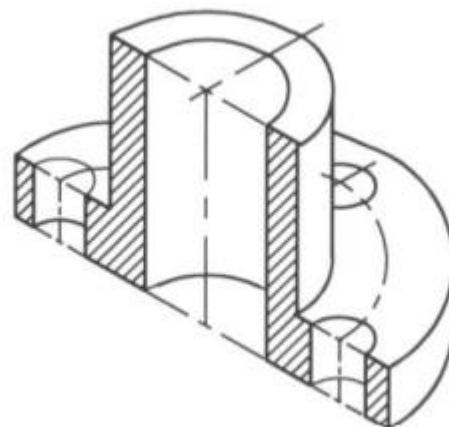


Figure 4.2: Section After Cutting and Removal of Front Portion

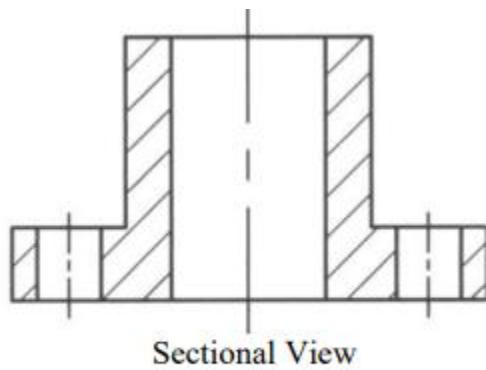


Figure 4.3: Views Showing Cutting Plane and Section

#### 4.3 **Section Lining**

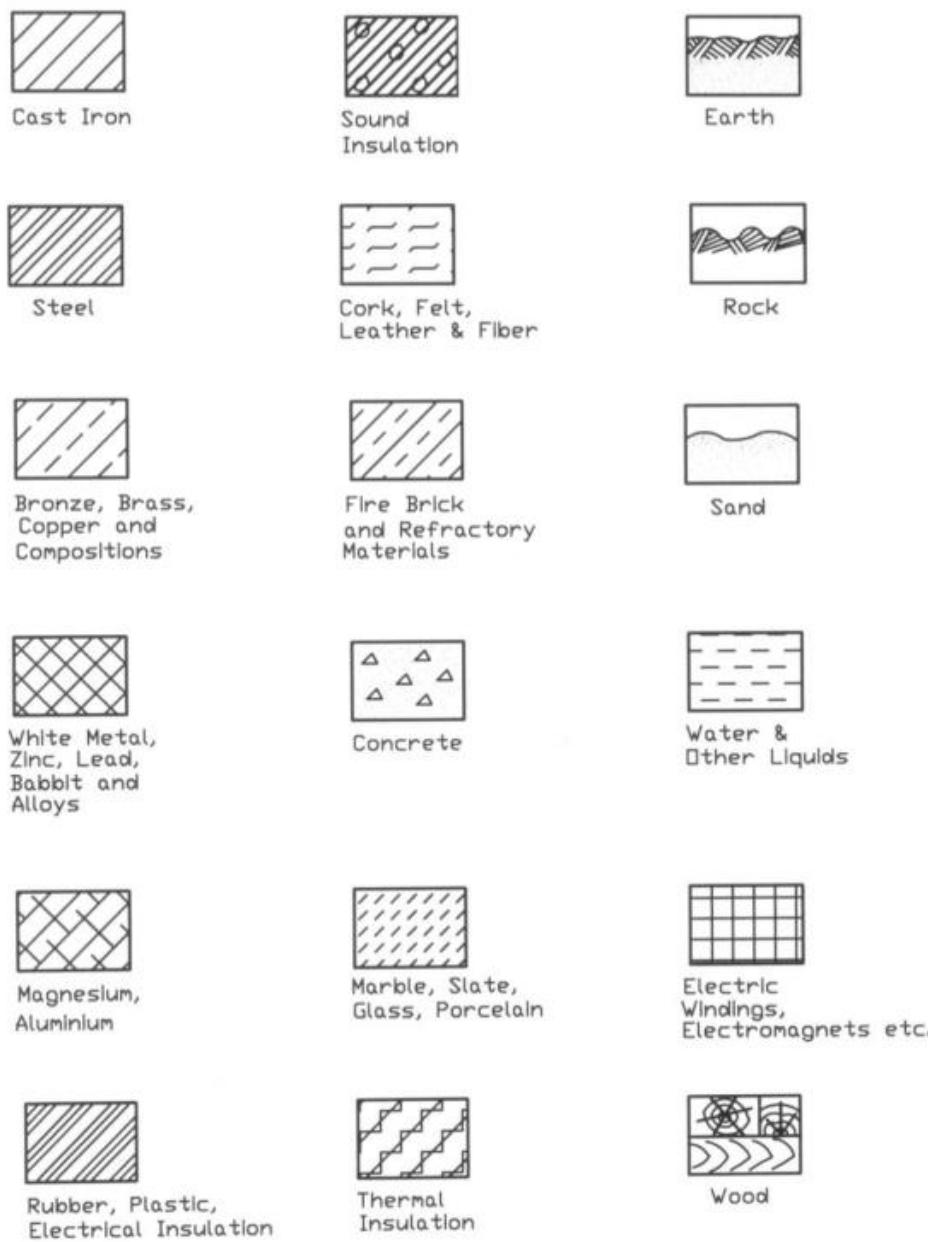


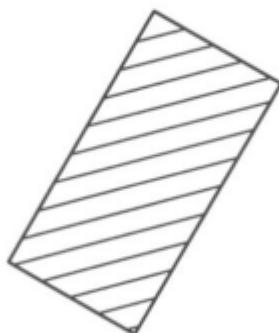
Figure 4.4: Symbols for Section Lining

**Section lining** is often called cross-hatching. The purpose of section line is to indicate the surface that has been cut hypothetically thereby clarifying the internal shape of the object and the material from which the object is made of. The symbols of section lining for various materials have been given in Figure 4.4.

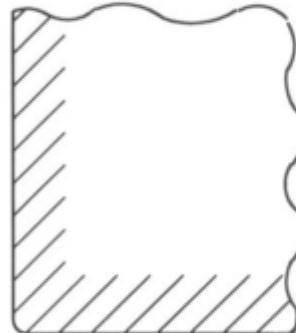
The lines used to indicate section are thin and they are usually drawn at an angle of  $45^{\circ}$  to the major outline of the object. The spacing of the lines has to be reasonably uniform for good appearance. The pitch or in other words the perpendicular distance between the consecutive lines may vary between 1 to 3 mm.

When two adjacent pieces are to be crosshatched in an assembly drawing, they may be done in opposite directions. However, for more than two pieces, section angle other than  $45^{\circ}$  such as  $30^{\circ}$  or  $60^{\circ}$  may be used. Alternatively, all pieces may be sectioned at the same angle of  $45^{\circ}$  but with different pitch. If a part is so shaped that section lining at  $45^{\circ}$  runs parallel to its principal outlines, another direction may be chosen (Figure 4.5a). For the large area, section lines may be provided only on the edges of the area (Figure 4.5b) depending on the size of the surface to be sectioned.

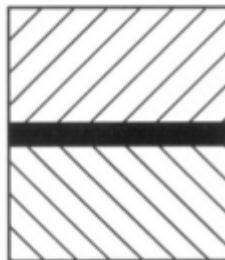
When the thickness is small such as for packing, gaskets, sheet metal, plastic sheet etc., the section lining may be omitted and the area may be filled in completely (4.5c). Dimensions or other lettering should not be placed in sectional areas in general. When it becomes essential omit the section lining for them where they have to be inserted (Figure 4.5d).



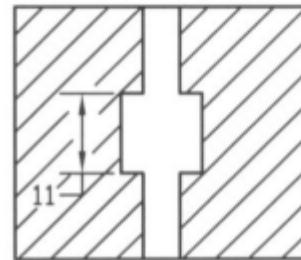
(a) Outline at  $45^{\circ}$



(b) Large Area



(c) Section in Thin Part



(d) Section Line Omitted

Figure 4.5: Sectioning in Special Features

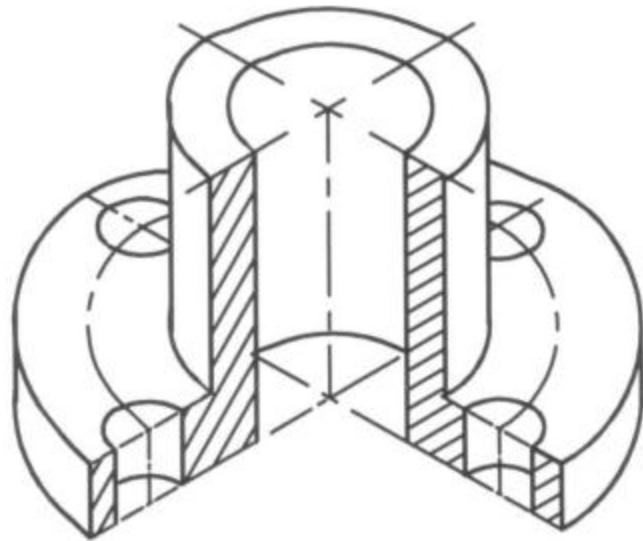


Figure 4.6: Object With Half Section

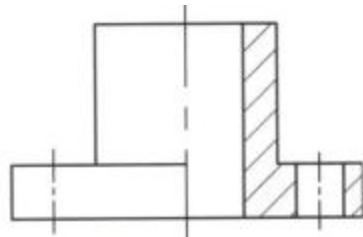


Figure 4.8: View With Half Section  
(Divided With Center Line)

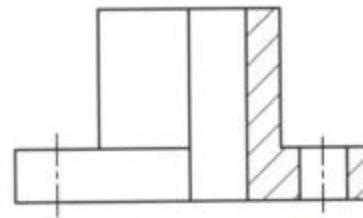


Figure 4.9: View With Half Section  
(Divided With Visible Line)

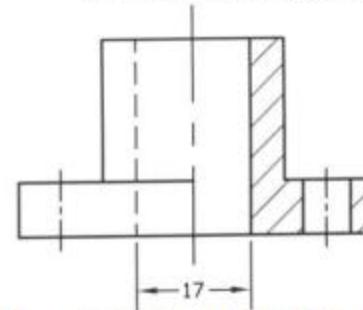


Figure 4.10: View With Half Section  
(For Dimensioning)

#### 4.8 Lugs in Section

In Figure 4.21, an object with a lug has been presented. A view with cutting plane line of this object has been given in Figure 4.22a. The sectional view has been shown in Figure 4.22b, where the lug has not been sectioned.

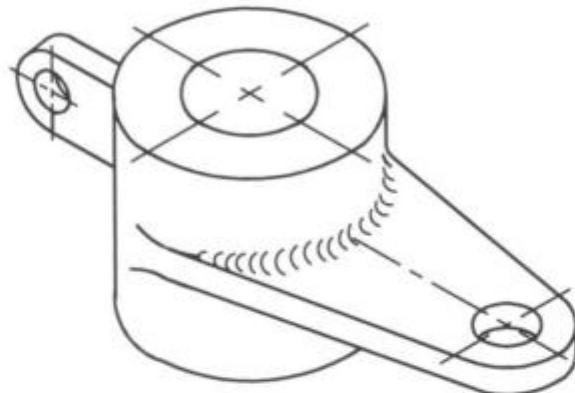
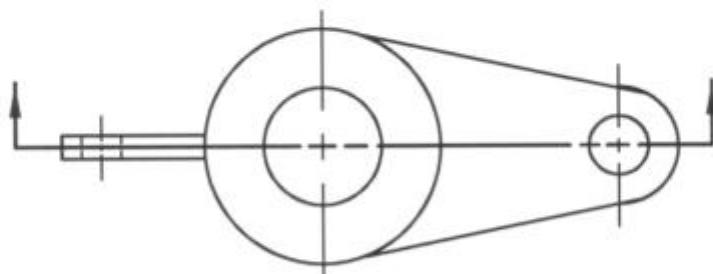
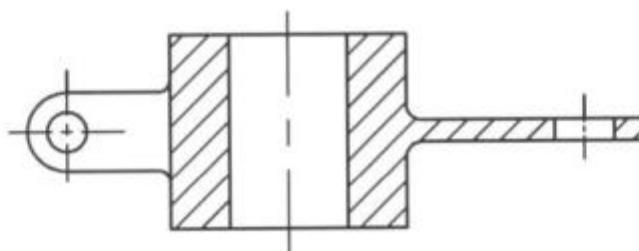


Figure 4.21: An Object With a Lug



(a) View With Cutting Plane Line



(b) Preferred Sectional View

Figure 4.22: Sectional View with Lug

#### 4.6 Ribs in Section

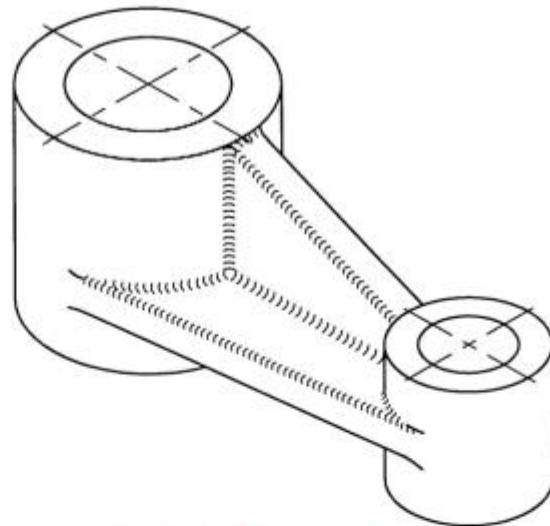
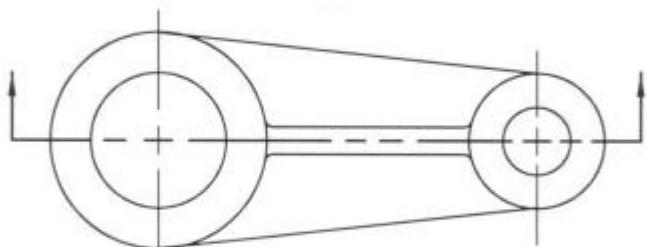
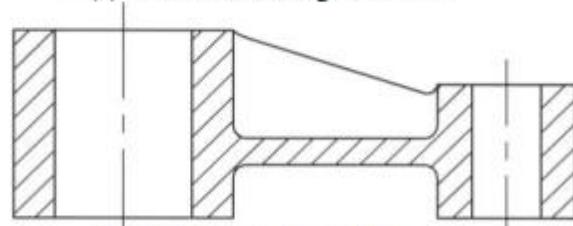


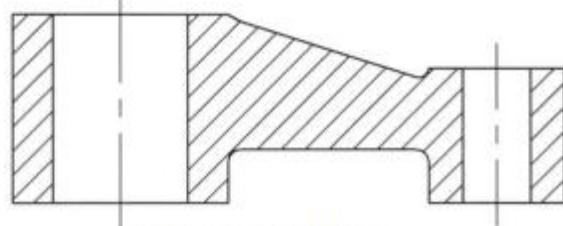
Figure 4.15: Object with Rib



(a) View with Cutting Plane Line



(b) Preferred Sectional View



(c) True Sectional View

Figure 4.16: Sectional View with Ribs