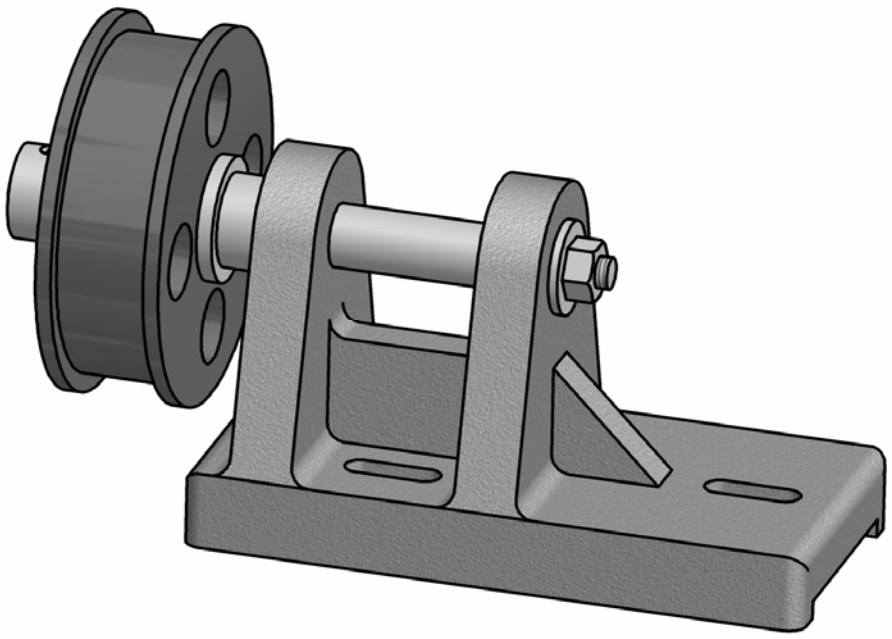
Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2006

Technical Drawing

Paper 2A - Ordinary Level
(Engineering Applications)



Marking Scheme and Sample Solutions

(Other valid solutions are acceptable and marked accordingly)

QUESTION 1 *(100 MARKS)*

CONCEPTS

A	**Assembly**	**6 marks**
B	**Sectional Elevation**	**41 marks**
C	**Plan**	**27 marks**
D	**Additional Requirements**	**26 marks**

1A ASSEMBLY 6 Marks

(i)	Spindle to Body	1
(ii)	Bushes to Pulley	1
(iii)	Assembly to Spindle	1
(iv)	Collar to Spindle	1
(v)	Grub Screw to Collar	1
(vi)	Nut and Washer to Spindle	1

1B SECTIONAL ELEVATION 41 Marks

1. Body 22 Marks

(i)	Base	8
(ii)	Base Relief Channel	2
(iii)	Slot	2
(iv)	Vertical Supports	4
(v)	Tapered Hole	2
(vi)	Counter bored Hole	2
(vii)	Webs	2

2. Spindle 6 Marks

(i)	Threaded End	1
(ii)	Centre Shaft	1
(iii)	Taper	1
(iv)	Shoulder	1
(v)	Bearing Shaft	1
(vi)	Flat End	1

3. Pulley 5 Marks

(i)	Maximum Diameter	1
(ii)	Flat	1
(iii)	Lightening Holes/Boss	1
(iv)	Bore	1
(v)	Width	1

4. Bushes **(**any one**)** 2 Marks

	Shoulder/Length	2

5. Collar 2 Marks

(i)	Diameter	1
(ii)	Length	1

6. Grub Screw 1 Mark

	Slot/Shank	1

7. Washer 1 Mark

	Washer Rectangle	1

8. Hexagonal Nut 2 Marks

(i)	Faces	1
(ii)	Curves	1

1C PLAN 27 Marks

1. Body 12 Marks

(i)	Base Outline	3
(ii)	Fillets	2
(iii)	Slots	3
(iv)	Web	2
(v)	Vertical Supports	2

2. Spindle 4 Marks

(i)	Thread	1
(ii)	Centre	1
(iii)	Shoulder	1
(iv)	Flat End	1

3. Pulley 3 Marks

(i)	Maximum Diameter	1
(ii)	Flat Diameter	1
(iii)	Width	1

4. Bush x2 2 Marks

	Shoulder Rectangles	(2 x 1)	2

5. Collar 2 Marks

	Diameter / Length	1 / 1	2

6. Grub Screw 1 Mark

	Diameter / Slot	1

7. Washer 1 Mark

	Washer rectangle	1

8. Hexagonal Nut 2 Marks

	Faces / Curve	1 / 1	2

1D ADDITIONAL REQUIREMENTS 26 Marks

(i)	**First or Third Angle Projection**	4	4 Marks
(ii)	**Title**	4	4 Marks
(iii)	**ISO Symbol** (Incorrect 2 Marks)	4	4 Marks
(iv)	**Dimensioning**	4	4 Marks
(v)	**Presentation**		10 Marks
	Excellent	10	
	Good	8	
	Fair	6	

Notes:

QUESTION 2 *(50 MARKS)*

A	**Given Views**	**18 marks**
B	**Surface Development of Pipe**	**16 marks**
C	**Joint**	**8 marks**
D	**Presentation**	**8 marks**

2A COMPLETED VIEWS — 18 Marks

(i)	Baseplate Plan (Hex. / Mid. / Semicircle / Screw Holes)	(2/1/1/1)	5
(ii)	Elliptical Hole in Baseplate (Semicircle Div. / Proj. / Outline)	(3/1/1)	5
(iii)	Pipe End Elliptical	(1/1/1)	3
(iv)	Pipe Outline		1
(v)	Elevation		4

2B SURFACE DEVELOPMENT OF PIPE — 16 Marks

(i)	Seam on CC (Any seam 2 marks)	4
(ii)	Stepping off of Circumference	4
(iii)	Length of Generators	4
(iv)	Outline of Top Curve	2
(v)	Outline of Base Curve	2

2C JOINT — 8 Marks

(i)	Name	2
(ii)	Left Hand Lap	2
(iii)	Right Hand Lap	2
(iv)	Sketch	2

2D PRESENTATION — 8 Marks

Excellent	8
Good	6
Fair	4

Note: Indexing to be considered under this heading

Notes:

QUESTION 3 *(50 MARKS)*

3A Cam Profile **30 Marks**
3B Mechanism **20 Marks**

3A CAM PROFILE 30 Marks

(a) Displacement Diagram **10 Marks**
(b) Cam Profile **15 Marks**
(c) Presentation **5 Marks**

(a) Displacement Diagram 10 Marks

(i)	360° Divisions	1
(ii)	Lift/Travel	2
(iii)	0° to 180° Uniform Acc. & Ret.	2
(iv)	180° to 210° Dwell	1
(v)	210° to 300° Simple Harmonic Motion	2
(vi)	270° to 360° Uniform Velocity	1
(vii)	Drawing of Curve	1

(b) Cam Profile 15 Marks

(i)	Minimum Radius	2
(ii)	Camshaft Diameter	1
(iii)	Maximum Radius	1
(iv)	0° to 180° Uniform Acc. & Ret.	2
(v)	180° to 210° Dwell	2
(vi)	210° to 300° Simple Harmonic Motion	2
(vii)	270° to 360° Uniform Velocity	2
(viii)	Direction of Rotation	2
(ix)	Drawing Profile	1

(c) Presentation 5 Marks

Excellent	5
Good	4
Fair	3

Note: Indexing to be considered under this heading

Notes:

3B MECHANISM 20 Marks

(a) Line Diagram 4 Marks
(b) Locus of F 10 Marks
(c) Machine Guard 3 Marks
(d) Presentation 3 Marks

(a) Line Diagram 4 Marks

(i)	Crank AB	1
(ii)	Crank CD	1
(iii)	Link BE	1
(iv)	Arm EF	1

(b) Locus of F 10 Marks

(i)	Locus of B	2
(ii)	Points for B	2
(iii)	Points for D	2
(iv)	Points for F	2
(v)	Drawing Locus of F	2

(c) Machine Guard 3 Marks

(i)	Minimum Clearance	1
(ii)	Drawing of Guard Outline	2

(d) Presentation 3 Marks

Excellent	3
Good	2
Fair	1

Note: Indexing to be considered under this heading

Notes:

QUESTION 4 *(50 MARKS)*

4A	**Dimensional Drawing**	**32 Marks**
4B	**Machine Part**	**12 Marks**
4C	**Engineering Terms**	**6 Marks**

4A DIMENSIONAL DRAWING 32 Marks

(a)	**Shape Description**	**18 Marks**
(b)	**Size Description**	**12 Marks**
(c)	**Presentation**	**2 Marks**

(a) Shape Description 18 Marks

(i)	Square Shaft	2
(ii)	Diameter / Length	2
(iii)	Under Cut	2
(iv)	Diameter / Length	2
(v)	Chamfers	2
(vi)	Fillet	1
(vii)	Diameter / Length	1
(viii)	Taper Maximum Diameter	1
(ix)	Taper Minimum Diameter	1
(x)	Taper Length	1
(xi)	Diameter / Length	1
(xii)	Thread Convention	1
(xiii)	Dome	1

(b) Size Description 12 Marks

(i)	Diameters x 4	2
(ii)	Lengths x 8	2
(iii)	Square	2
(iv)	Under Cut	1
(v)	Chamfer	2
(vi)	Fillet Radius	1
(vii)	Screw Thread Designation	2

(c) Presentation 2 Marks

(i)	Centre Line	1
(ii)	Dimensions	1

Notes:

4B MACHINE PART — 12 Marks

(a) Parts List — 6 Marks
(b) Relief Valve Operation — 3 Marks
(c) Relief Valve Regulation — 3 Marks

(a) Parts List — 6 Marks

(i)	Table	1
(ii)	Item Number / Name	5

(b) Relief Valve Operation — 3 Marks

(i)	Description	2
(ii)	Sketch	1

(c) Relief Valve Regulation — 3 Marks

(i)	Description	2
(ii)	Sketch	1

4C ENGINEERING TERMS — 6 Marks

(i)	Flanged elbow	2
(ii)	Rolled steel channel	2
(iii)	Butterfly valve	2

Notes:

QUESTION 5 SECTION A *(50 Marks)*

5A ISOMETRIC VIEW 50 Marks

(a) Correct View 4 Marks
(b) Sectioned View 15 Marks
(c) Un-Sectioned View 26 Marks
(d) Presentation 5 Marks

(a) Correct View 4 Marks

(i)	Correct View Point P	4
	Oblique (2 Marks)	

(b) Sectioned View 15 Marks

(i)	Hole LHS	3
(ii)	Outer Diameter	2
(iii)	Left Portion	3
(iv)	Top Right	2
(v)	Vertical Right	3
(vi)	Groove	2

(c) Un-Sectioned View 26 Marks

(i)	Construction Large Diameter	2
(ii)	Construction Small Diameter	2
(iii)	Construction Web	2
(iv)	Curved Surface LHS	2
(v)	Inner Curve	2
(vi)	Outer Curve	2
(vii)	Hole Bottom	1
(viii)	Left Vertical Body	2
(ix)	Top Surface	2
(x)	Square Hole Portion	3
(xi)	Web	2
(xii)	Inner Surface RHS	2
(xiii)	Groove	2

(d) Presentation 5 Marks

Excellent	5
Good	4
Fair	3

Notes:

QUESTION 5 SECTION B *(50 Marks)*

5(a) Six Commands **6 Marks**

6 x 1		6

5(b) Three Commands Explanation **9 Marks**

Sketch	2	3 x 3
Note	1	

5(c) Wire Frame Representation **10 Marks**

(i)	View as given	2
(ii)	Left Block	2
(iii)	Main Block	2
(iv)	Top Curve	2
(v)	Triangukar Wedge	2

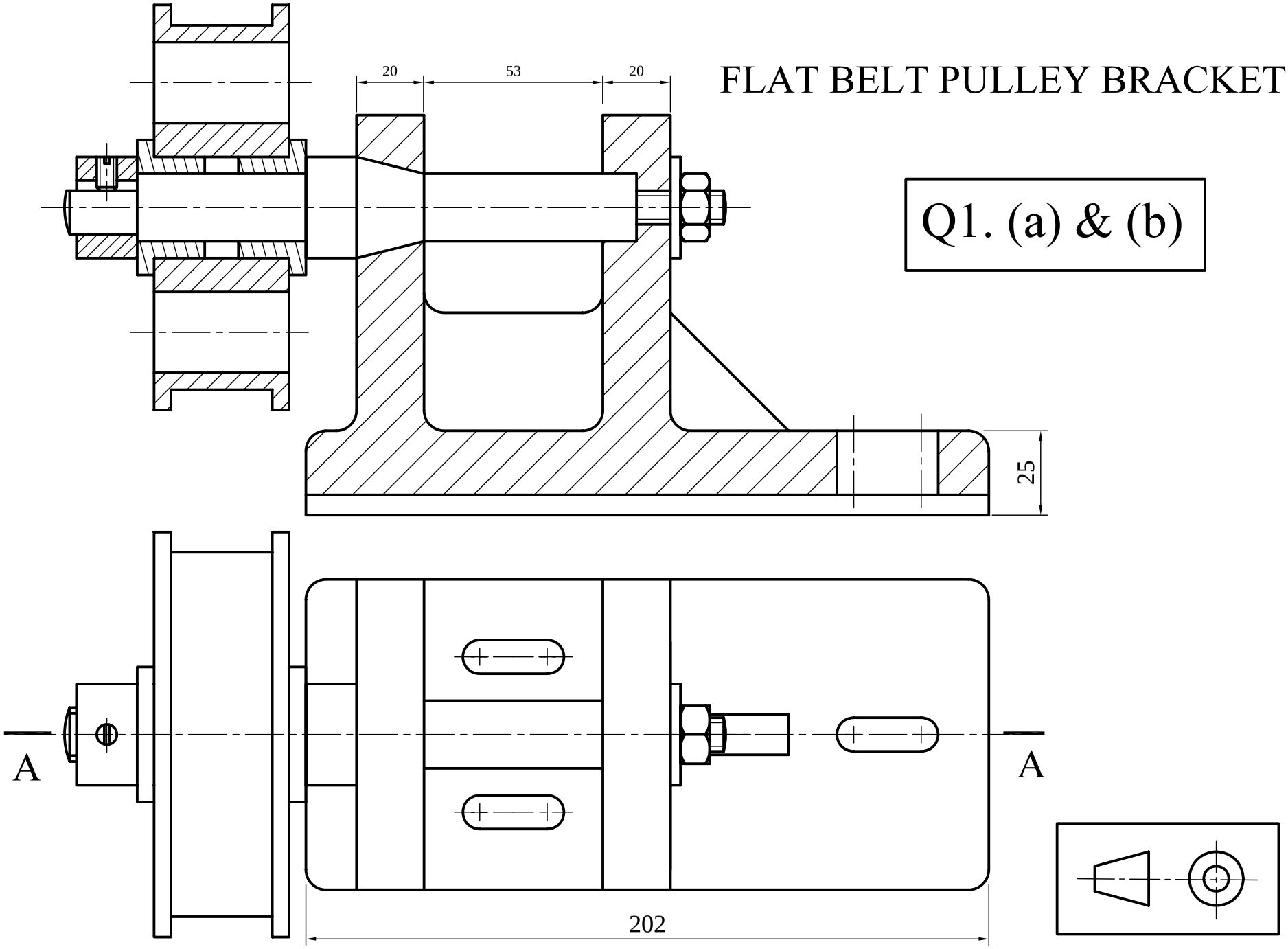
5(d) Cad Profile **25 Marks**

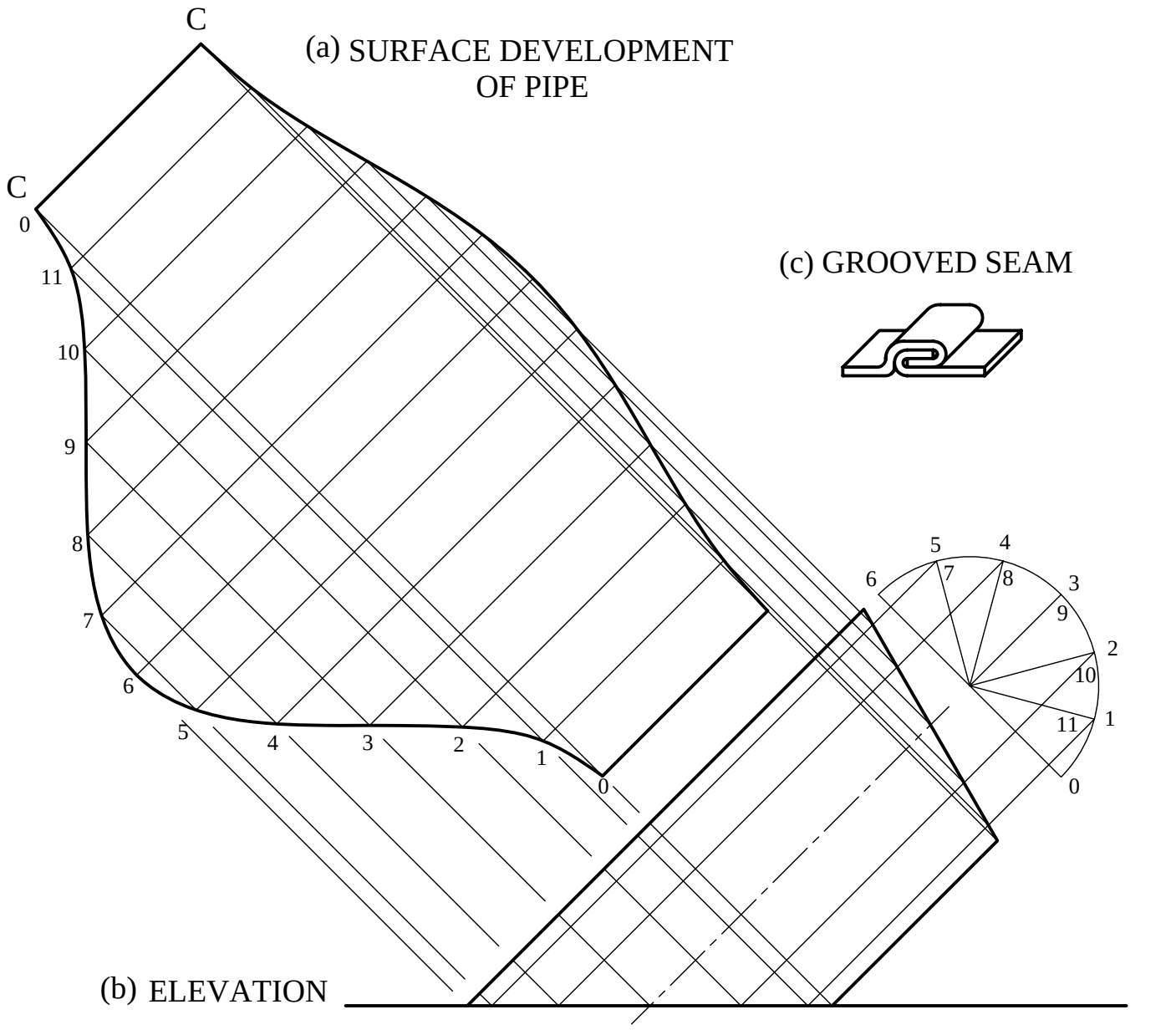
(i)	5 Lines 5 x 1	5
(ii)	Lines BC and CD	4
(iii)	Fillet	1
(iv)	Polyline KL	1
(v)	Mirror Image	4
(vi)	Circle ϕ140	2
(vii)	Small Button Rectangle	2
(viii)	Rectangular Array	2
(ix)	Large Rectangle	2
(x)	Presentation	2

Notes:

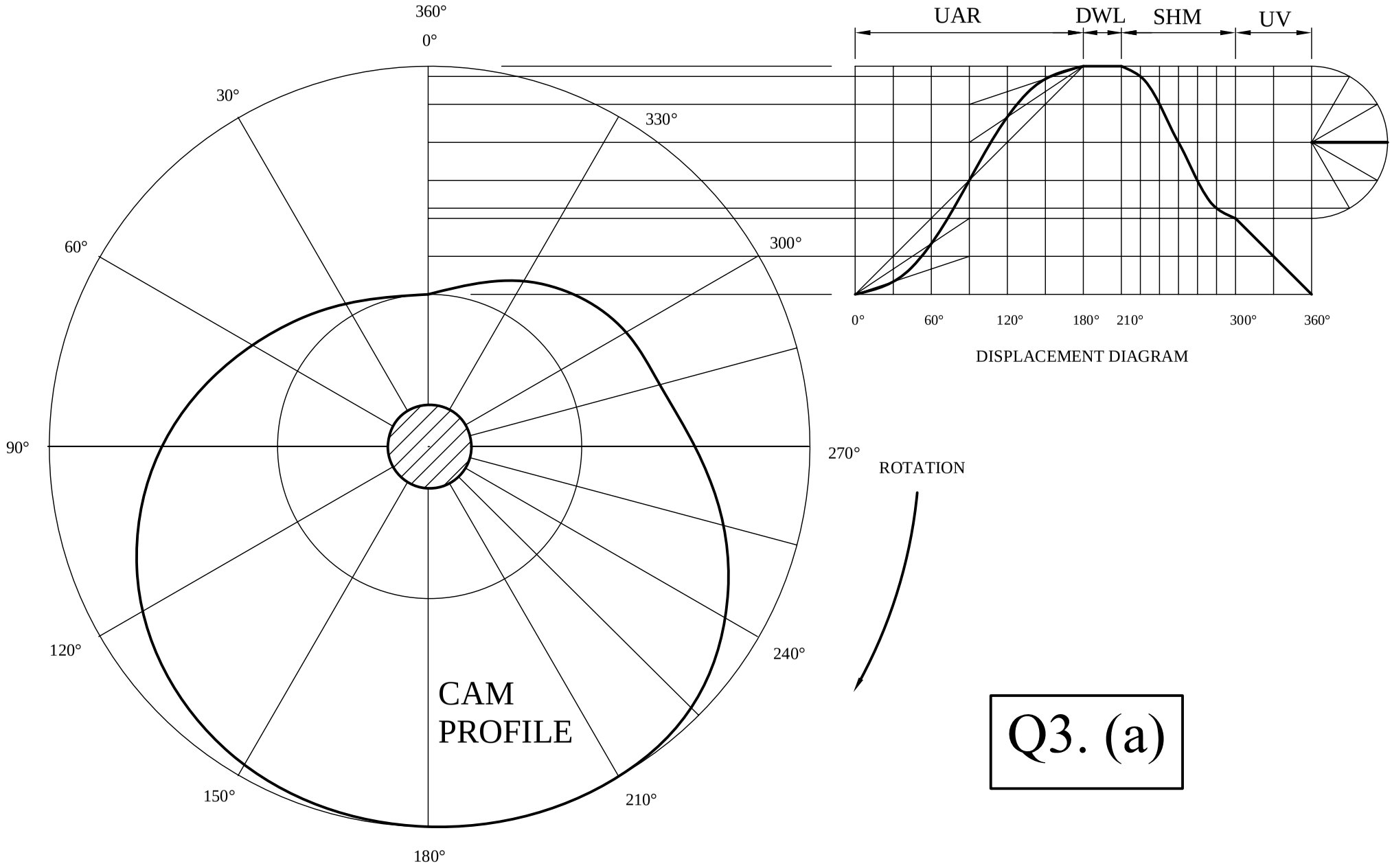
FLAT BELT PULLEY BRACKET

Q1. (a) & (b)

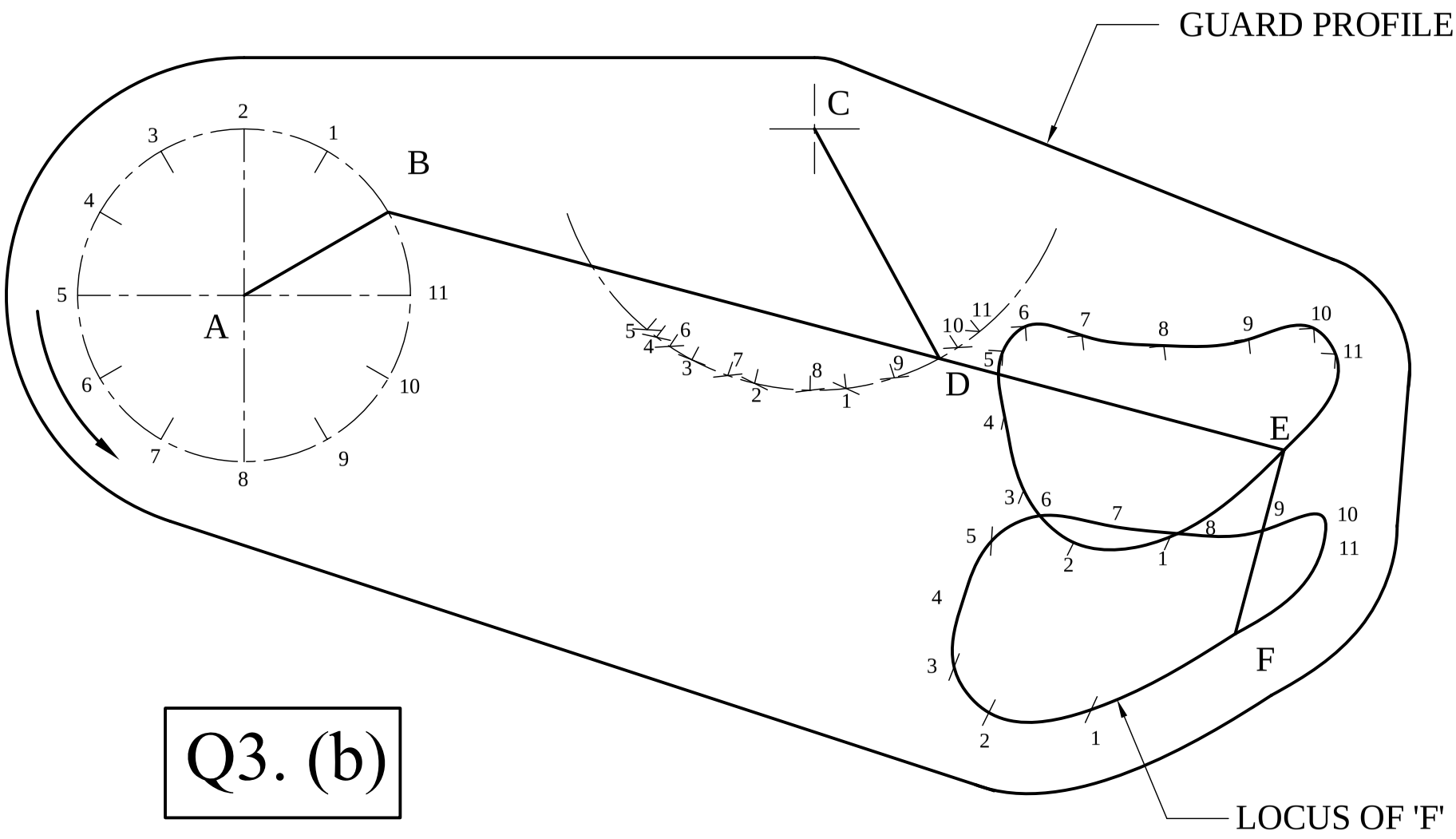



C
(a) SURFACE DEVELOPMENT
OF PIPE
C
0
11
10
9
8
7
6
5
4
3
2
1
0
(c) GROOVED SEAM
5
4
6
7
8
3
9
2
10
1
11
0
(b) ELEVATION
AND
PLAN

Q2. (a), (b), (c)

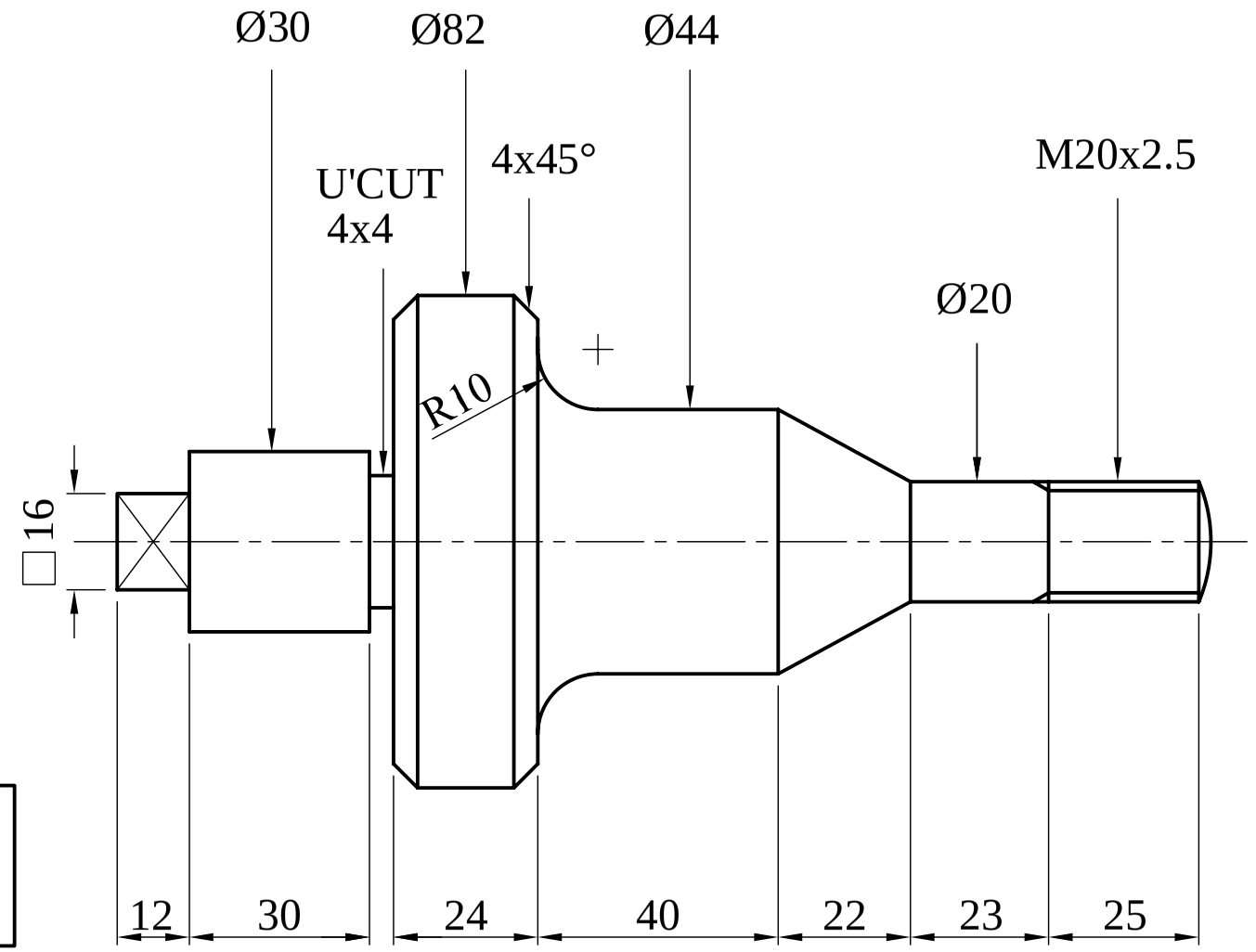

360°
0°
30°
330°
60°
300°
90°
270°
120°
240°
150°
210°
180°
CAM
PROFILE
ROTATION
UAR
DWL
SHM
UV
0°
60°
120°
180°
210°
300°
360°
DISPLACEMENT DIAGRAM

Q3. (a)



Q3. (b)

(a)



Q4. (a)

Q4. (b), (c)

(b)

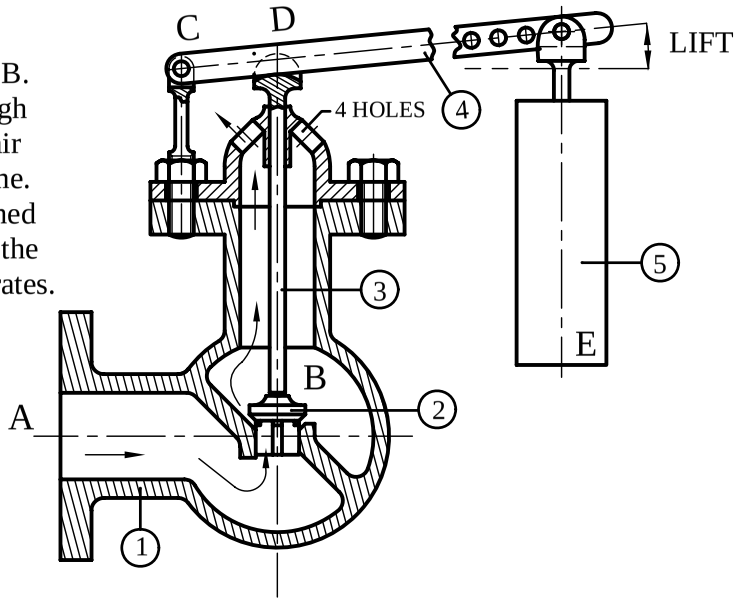
(i)

NUMBER	NAME
1	BODY
2	VALVE
3	SPINDLE
4	LEVER
5	WEIGHT

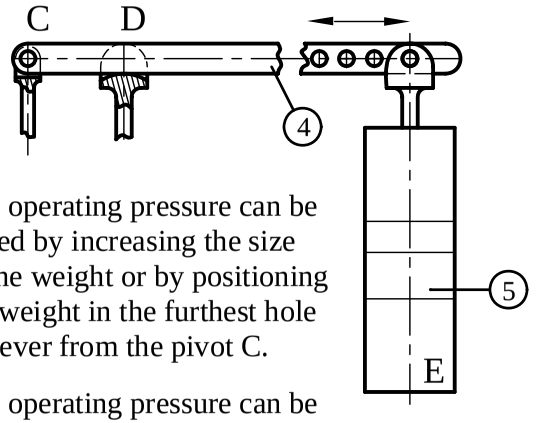
(ii)

Pressure builds from A to valve B. When the pressure is large enough it lifts the valve and allows the air to escape through 4 holes in dome. The lever pivots at C and is pushed up at D. The weight E regulates the pressure at which the valve operates.

Once the pressure is relieved the valve is forced down by the downward force from the lever and weight. It stays in the closed position until the pressure again rises and the cycle begins again.



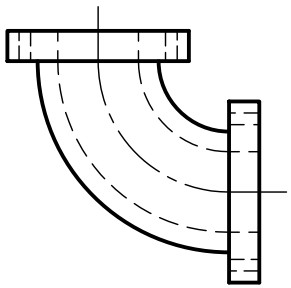
(iii)



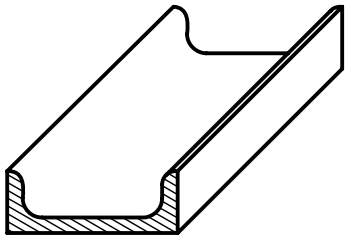
The operating pressure can be raised by increasing the size of the weight or by positioning the weight in the furthest hole on lever from the pivot C.

The operating pressure can be lowered by decreasing the size of the weight or by positioning the weight in a hole nearer the pivot C as indicated in sketch.

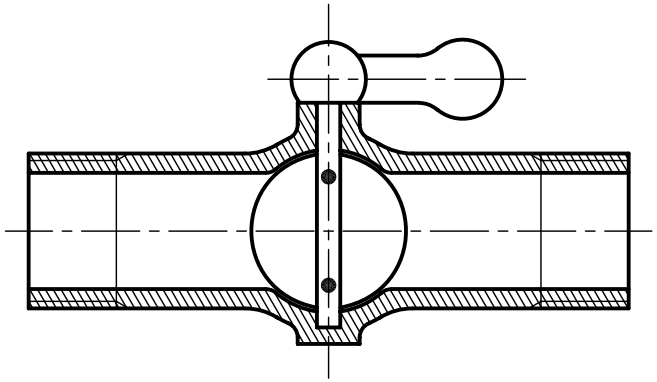
(c)



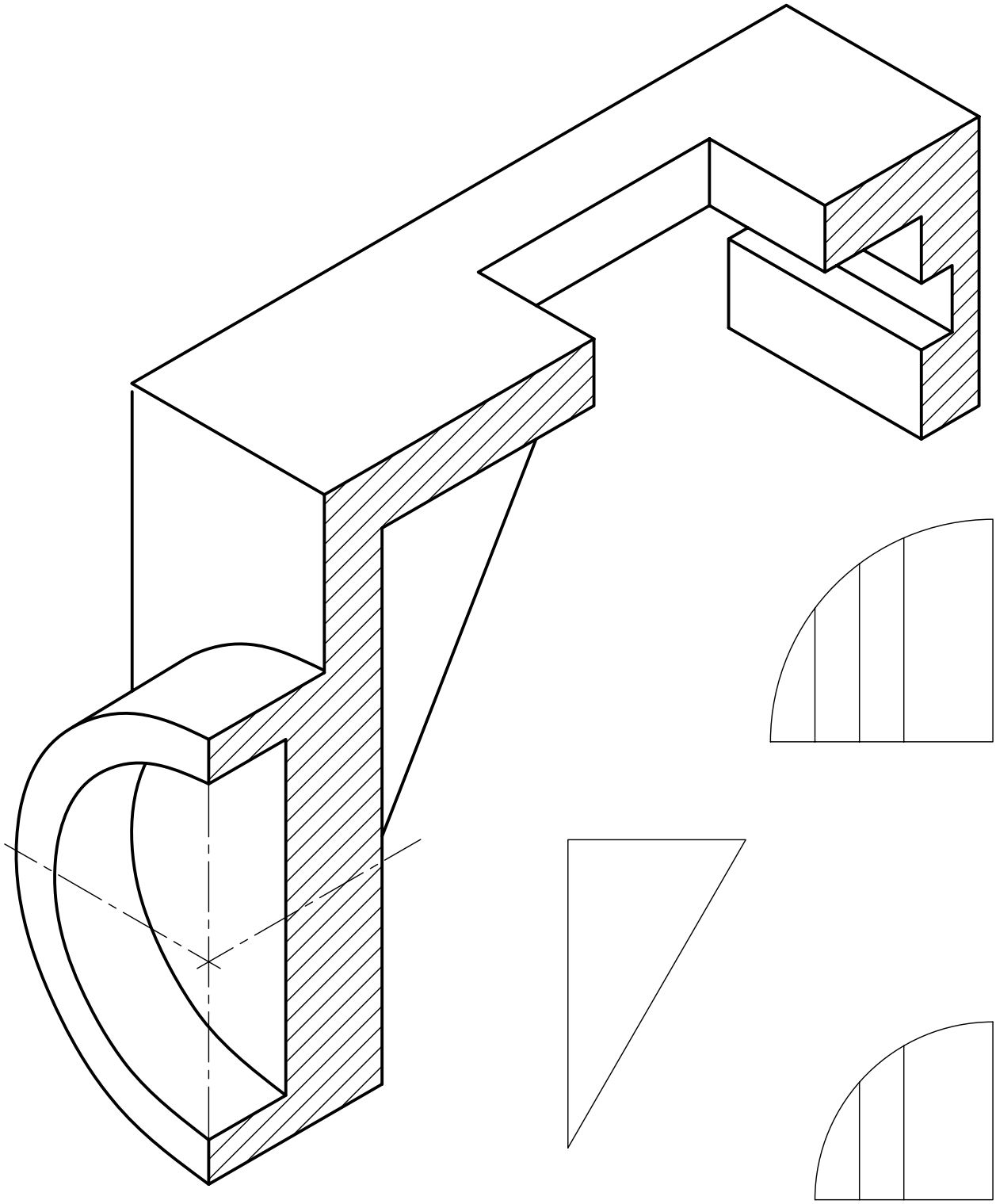
(i) FLANGED ELBOW



(ii) ROLLED STEEL CHANNEL



(iii) BUTTERFLY VALVE



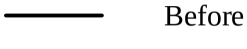
Q5. SECTION A

(a) Six Computer Aided Drawing commands: line, offset, fillet, circle, trim, hatch etc.

(b)

(i) LENGTHEN

This command changes the length of lines and the included angle of arcs. The modification can be positive or negative.



(ii) PAN

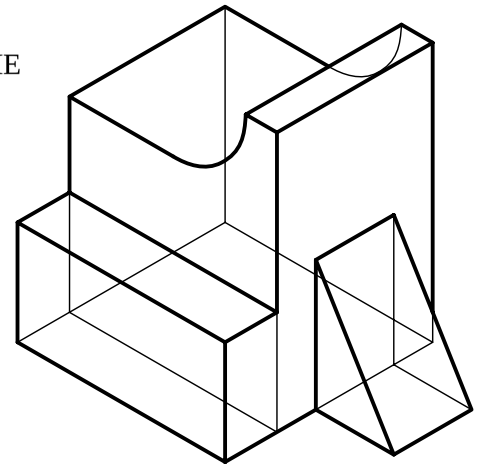
This command moves the drawing display in the current viewport.

(iii) ZOOM

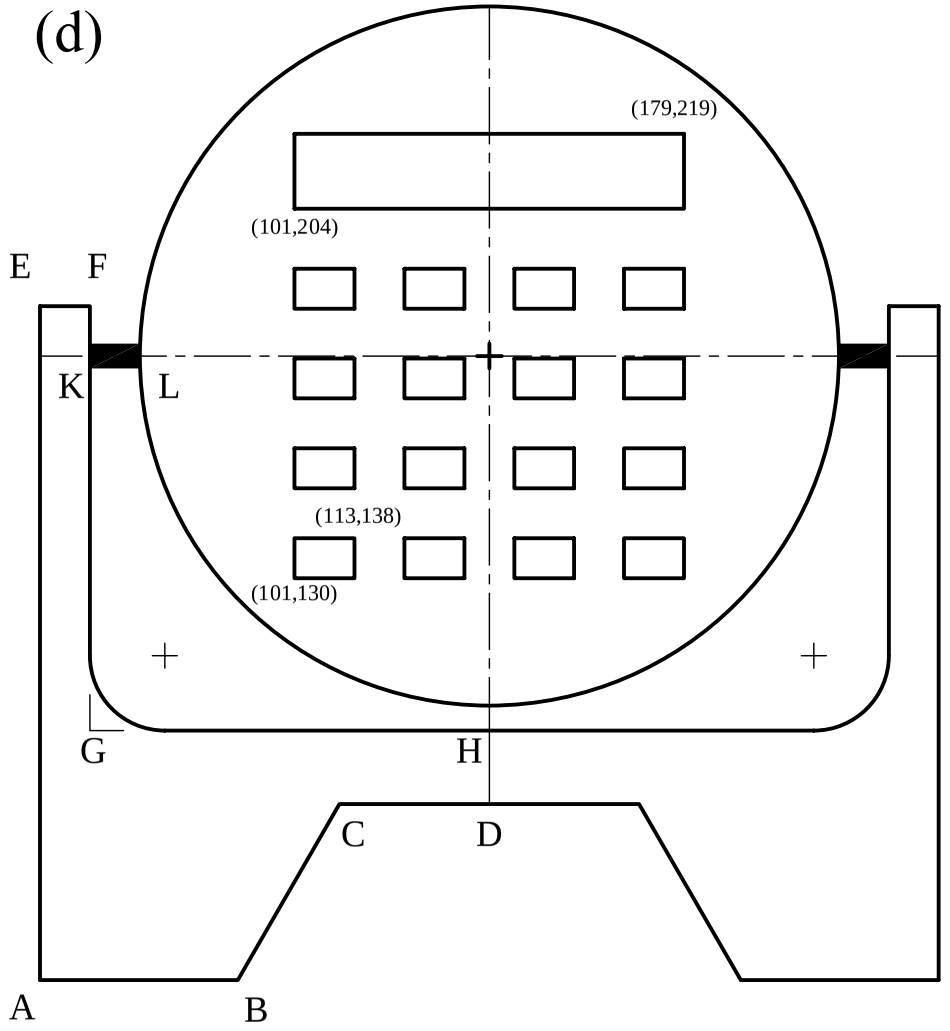
This command increases or decreases the apparent size of objects in the current viewport.

(c)

WIREFRAME



(d)



Q5. (a), (b), (c), (d) SECTION B