Coimisiún na Scrúduithe Stáit
State Examinations Commission

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State Examinations Commission

Leaving Certificate Examination 2007

Technical Drawing
Paper 1 – Ordinary Level
(Plane and Solid Geometry)

Marking Scheme
and Sample Solutions

(Other valid solutions are acceptable and marked accordingly

Question 1

Question 2

(a) Triangle ABC   18

1.   Draw the line AC 130 long 4
2.   Geometrical division of 212 6
3.   Locate point B 4
4.   Draw lines AB and BC 4

Point D   12

5.   Mark the altitude 4
6.   Draw semicircle on line AC 4
7.   Draw lines AD and CD 4

(b) Area Conversion   15

8.   Convert ABCD to a triangle 4
9.   Triangle to a rectangle 3
10. Rectangle to a square 4
11. Draw the square 4

12. *Presentation*   5 5

                                    Total **50**

Question 3

Question 4

Question 5

			Marks
(a)	**Setting up**	**18**	
	1. Given plan..		**8**
	2. Given elevation		**8**
	3. Traces VTH...		**2**
	Auxiliary Elevation	**8**	
	4. X_1Y_1 perp. to H.T.		**2**
	5. Projections from plan		**2**
	6. Edge view of the plane		**2**
	7. Auxiliary view the of solid		**2**
	Truncation	**13**	
	8. Points c, d, e, f, g, h, i in plan		**5**
	9. Points a, b, d, e, f, g, h and i in elevation		**2**
	10. Complete the plan		**3**
	11. Complete the elevation..		**3**
(b)	**True shape**	**6**	
	12. Setting up the true lengths and widths		**4**
	13. Draw the true shape..		**2**
	14. ***Presentation***	**5**...	**5**
		Total	**50**

Question 6

(a) Parabola   **16**

1. Set up minor axis and focal points **4**
2. Locate major axis **4**
3. Locate points on curve **4**
4. Draw the curve **4**

Tangent   **8**

5. Locate Point T **2**
6. Tangent construction **3**
7. Draw tangent **3**

(b) Hyperbola   **21**

8. Set up as given (2,2,2) **6**
9. Locate the directrix **4**
10. Locate the vertex **2**
11. Set up the correct eccentricity for the curve **3**
12. Points on the curve **3**
13. Draw the curve. **3**

14. *Presentation*   **5** **5**

                                                  Total **50**

Question 7

Marks

Given views   **26**
1. Given plan **8**
2. Given elevation **8**
3. End elevation (10x1) **10**

Interpenetration   **19**
4. Points a, b and c **6**
5. Points d, e, g and h in elevation **4**
6. Complete the elevation.. **4**
7. Points e, f and g in plan **3**
8. Complete the plan **2**

9. *Presentation*   **5**.. **5**

                                    Total **50**

A

D

C

B

87.85

212

X

B

A

r

t

C

p

s

B

A

r₁

t₁

s₁

A

C

o

X

X

Y

g

e

f

g

e

h

d

f

a

b

c

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State Examinations Commission

Leaving Certificate Examination 2007

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

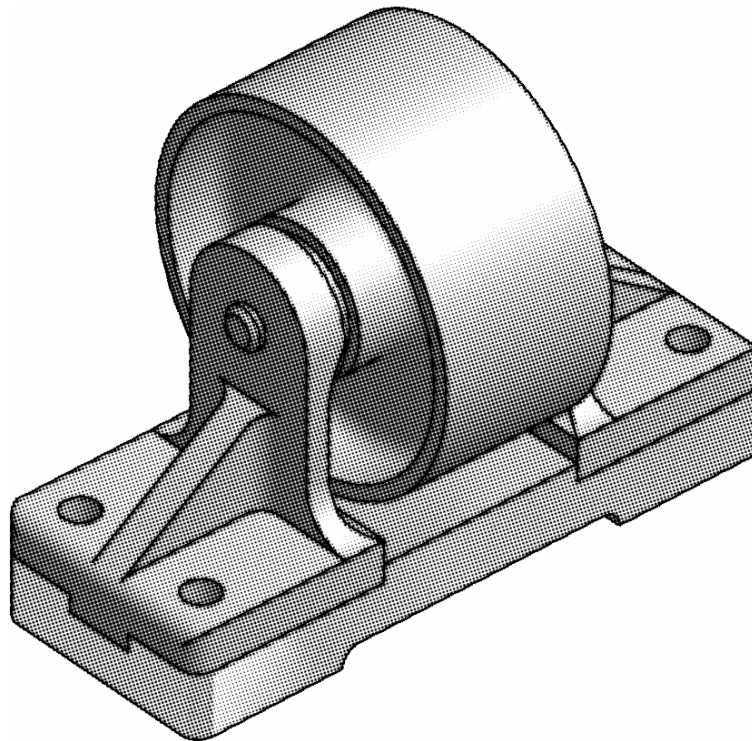|		
A	**Assembly**	**6 marks**
B	**Sectional Elevation**	**40 marks**
C	**Plan**	**28 marks**
D	**Additional Requirements**	**26 marks**

1A ASSEMBLY   6 Marks

(i)	Left Bracket to Base Plate	1
(ii)	Right Bracket to Base Plate	1
(iii)	Bushes to Roller	1
(iv)	Assembly to Shaft	1
(v)	Shaft Assembly to Brackets	1
(vi)	Set Screws to Base	1

1B   SECTIONAL ELEVATION   40 Marks

1. Base Plate   (10 Marks)

(i)	Base Outline 3/3	6
(ii)	Base Relief Channel	2
(iii)	Counter Bored Holes	2

2. Left Bracket   (10 Marks)

(i)	Base Outline	2
(ii)	Vertical Support	3
(iii)	Web	1
(iv)	Threaded Hole	1
(v)	Top Hole	1
(vi)	Vertical Relief	2

3. Right Bracket   (5 Marks)

(i)	Mirror Image	5

4. Shaft/Spindle   (4 Marks)

(i)	Centre Shaft	2
(ii)	Shaft Ends	2

5. Bushes (any one)   (2 Marks)

(i)	Shoulder/Length	2

6. Roller   (7 Marks)

(i)	Maximum Diameter	1
(ii)	Bore	1
(iii)	Width	1
(iv)	Lightening Relief	4

7. Set Screws   (2 Marks)

(i)	Head/Shank	2

1C   PLAN   **28 Marks**

1. Body   (10 Marks)

(i)	Base (outline/raised centre) 4/2	6
(ii)	Fillets	2
(iii)	Holes	2

2. Left Vertical Support   (9 Marks)

(i)	Top Boss	3
(ii)	Web	2
(iii)	Fillets	4

3. Right Vertical Support   (3 Marks)
(i)	Mirror Image	3

4. Bush x2   (4 Marks)
(i)	Shoulder Rectangles (2 x 2)	4

5. Roller   (2 Marks)
(i)	Outline (Length/Width)	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	

QUESTION 2   *(50 MARKS)*

A	**Given Views**	**26 marks**
B	**Surface Development of Pipe**	**16 marks**
C	**Presentation**	**8 marks**

2A   COMPLETED VIEWS   26 Marks

(i)	Triangular Duct End Elevation	4
(ii)	Pipe centreline (ht/angle 1/1)	2
(iii)	Pipe Outline	2
(iv)	Top Beak (semicircle/pt/lines)	3
(v)	Duct Outline Elevation	3
(vi)	Pipe Outline	2
(vii)	Elliptical Hole	5
(viii)	Elliptical Arcs (any one arc 3)	5

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 Lower Curve	2

2C   PRESENTATION   8 Marks

Excellent	8
Good	6
Fair	4

Note: Indexing to be considered under this heading

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 30° Dwell	1
(iv)	30° to 210° Uniform Acc & Ret	2
(v)	210° to 270° Uniform Velocity	1
(vi)	270° to 360° Simple Har. Motion	2
(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 30° Dwell	2
(v)	30° to 210° Uniform Acc & Ret	2
(vi)	210° to 270° Uniform Velocity	2
(vii)	270° to 360° Simple Har. Motion	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

3B   MECHANISM   20 Marks

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

(a) Line Diagram   (4 Marks)

(i)	Crank OA	1
(ii)	Crank BC	1
(iii)	Link ABP	2

(b) Locus of P   (10 Marks)

(i)	Locus of A	2
(ii)	Points for B	3
(iii)	Points for P	3
(iv)	Drawing Locus of P	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*

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

   (b) Size Description   (12 Marks)

(i)	Diameters	2
(ii)	Lengths	2
(iii)	Hole	2
(iv)	Under Cut	1
(v)	Chamfers	2
(vi)	Fillet Radius	1
(vii)	Screw Thread Designation	2

   (c) Presentation   (2 Marks)

(i)	Centre Line	1
(ii)	Dimensions	1

4B   MACHINE PART   **12 Marks**

    (a)   Parts List   **6 Marks**
    (b)   Mechanism Operation   **6 Marks**

    (a)   Parts List   **(6 M*arks*)**

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

    (b)   Mechanism Operation   **(6 M*arks*)**

        (i)   Description   3
        (ii)   Sketch   3

4C   ENGINEERING TERMS   **6 Marks**

        (i)   Piston   2
        (ii)   Connecting Rod   2
        (iii)   Gudgeon Pin   2

QUESTION 5 (SECTION A)   *(50 Marks)*

5A	**Isometric View**	**41 Marks**
5B	**Engineering Terms**	**9 Marks**

5A   ISOMETRIC VIEW   41 Marks

(a)	**Correct View**	**4 Marks**
(b)	**Sectioned View**	**12 Marks**
(c)	**Un-Sectioned View**	**21 Marks**
(d)	**Presentation**	**4 Marks**

(a)   Correct View   (4 Marks)

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

(b)   Sectioned View   (12 Marks)

(i)	Base Block	3
(ii)	Base Underside Cut Out	2
(iii)	Top Surface Recess	2
(iv)	Vertical Portion	2
(v)	Cylinder Top/Lower	3

(c)   Un-Sectioned View   (21 Marks)

(i)	Construction Large Diameter	2
(ii)	Construction Small Diameter	2
(iii)	Construction Web	2
(iv)	Left Vertical Body	2
(v)	Top Surface Base	2
(vi)	Top Surface Recess	2
(vii)	Base Underside Cut Out	1
(viii)	Webs	3
(ix)	Inner Curve	2
(x)	Outer Curve	2
(xi)	Curved Surface Top	1

(d)   Presentation   (4 Marks)

Excellent	4
Good	3
Fair	2

5B   ENGINEERING TERMS   9 Marks

(i)	Splined Shaft	3
(ii)	Keyway	3
(iii)	Stud	3

QUESTION 5 (SECTION B)   (50 Marks)

5(a)   Six Commands   (6 M*arks*)

        6 x 1   6

5(b)   Three Commands Explanation   (9 M*arks*)

        Sketch   2   ⎫
                       ⎬   3 x 3
        Note   1   ⎭

5(c)   Wire Frame Representation   (10 M*arks*)

    (i)   View as given   2
    (ii)   Triangular Wedge   2
    (iii)   Rectangular Block Front   2
    (iv)   Base Block   2
    (v)   Vertical Block & Curve   2

5(d)   Cad Profile   (25 M*arks*)

    (i)   Rectangle   4
    (ii)   Chamfer   2
    (iii)   Line Joining Lower Chamfer   2
    (iv)   Line AB   2
    (v)   Line CD   2
    (vi)   Arc BEC   2
    (vii)   Circle Ø30   2
    (viii) Circle Ø16   2
    (ix)   Circular Array   3
    (x)   Rectangle   2
    (xi)   Presentation   2

60

80

206

18

ROLLER SUPPORT BRACKET
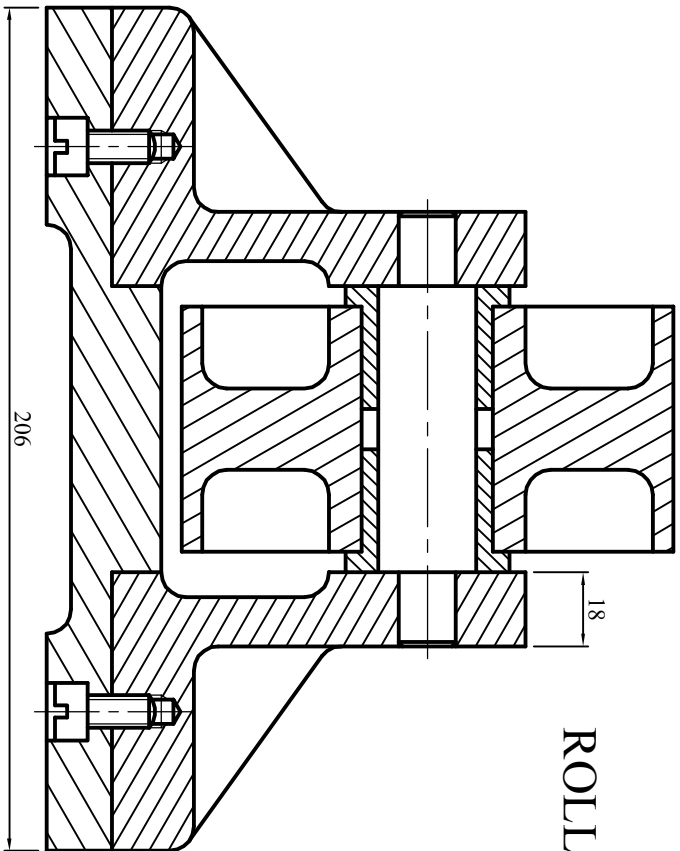
Q1. (a) & (b)
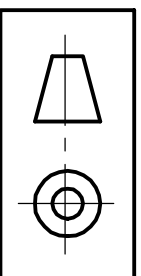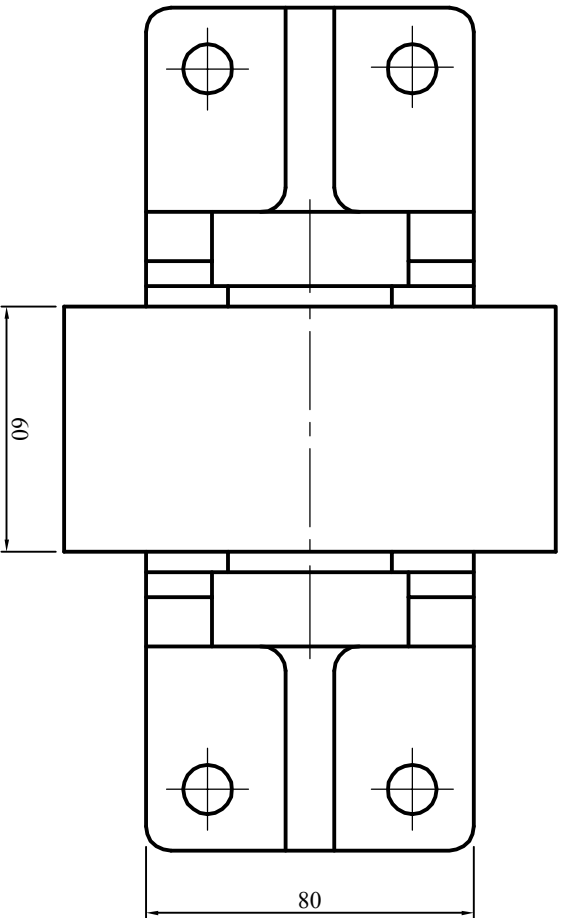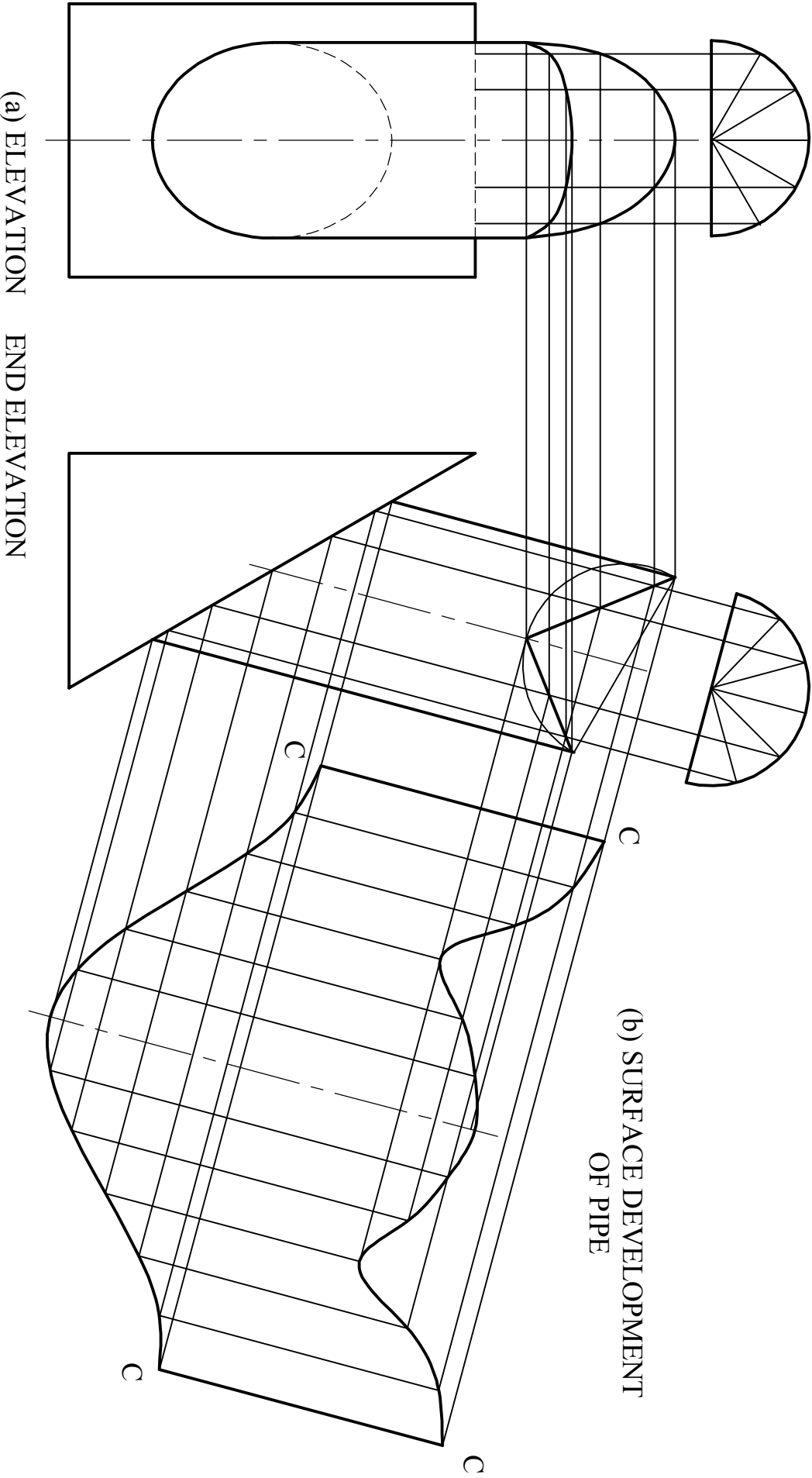
(a) ELEVATION & END ELEVATION

(b) SURFACE DEVELOPMENT
OF PIPE

Q2

CAM
PROFILE

ROTATION

Q3. (a)

DISPLACEMENT DIAGRAM

DWL   UAR   UV   SHM

0° 30° 60° 90° 120° 150° 180° 210° 240° 270° 300° 330° 360°

90°
120°
60°
150°
30°
180°
0°
210°
330°
240°
300°
270°

Q3.(b)

GUARD PROFILE

LOCUS OF 'P'

A

B

C

P

6x45°

20

M20x2.5

R10

Ø40

50

Ø84

28

4x45°

18

Ø50

36

Ø16

40

Ø30

U'CUT 4x4

30

M20x2.5

Q4. (a)
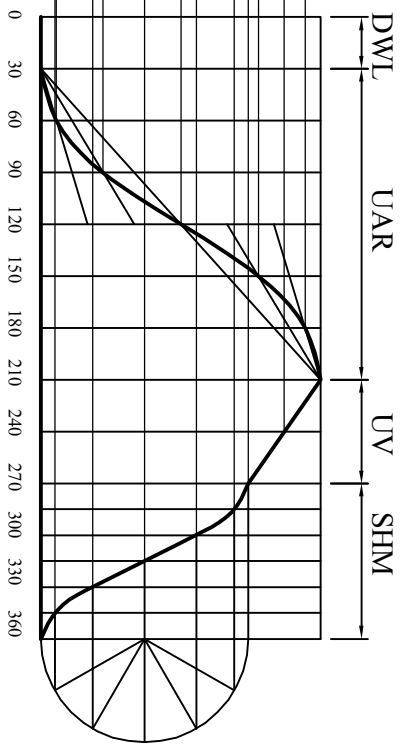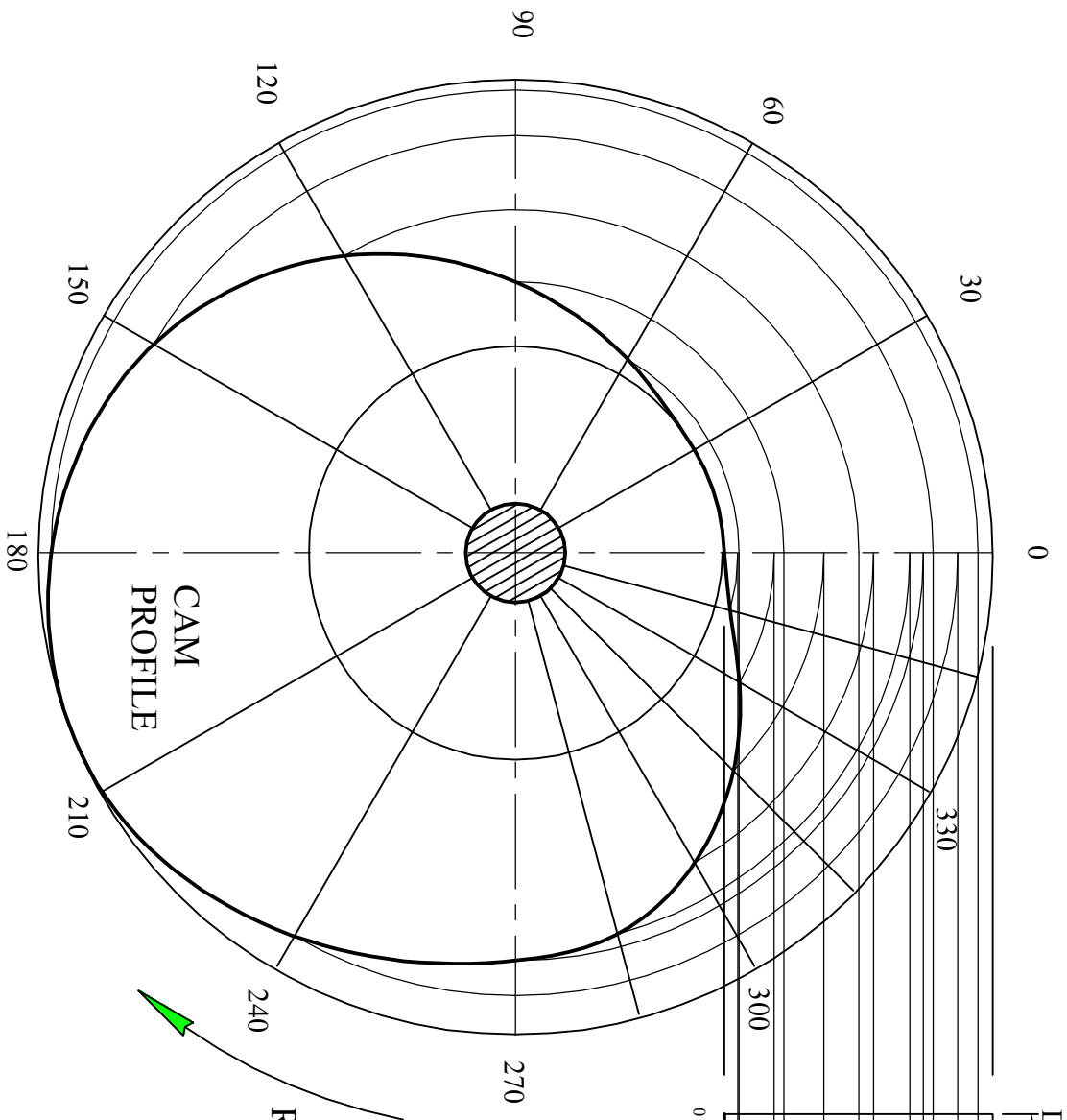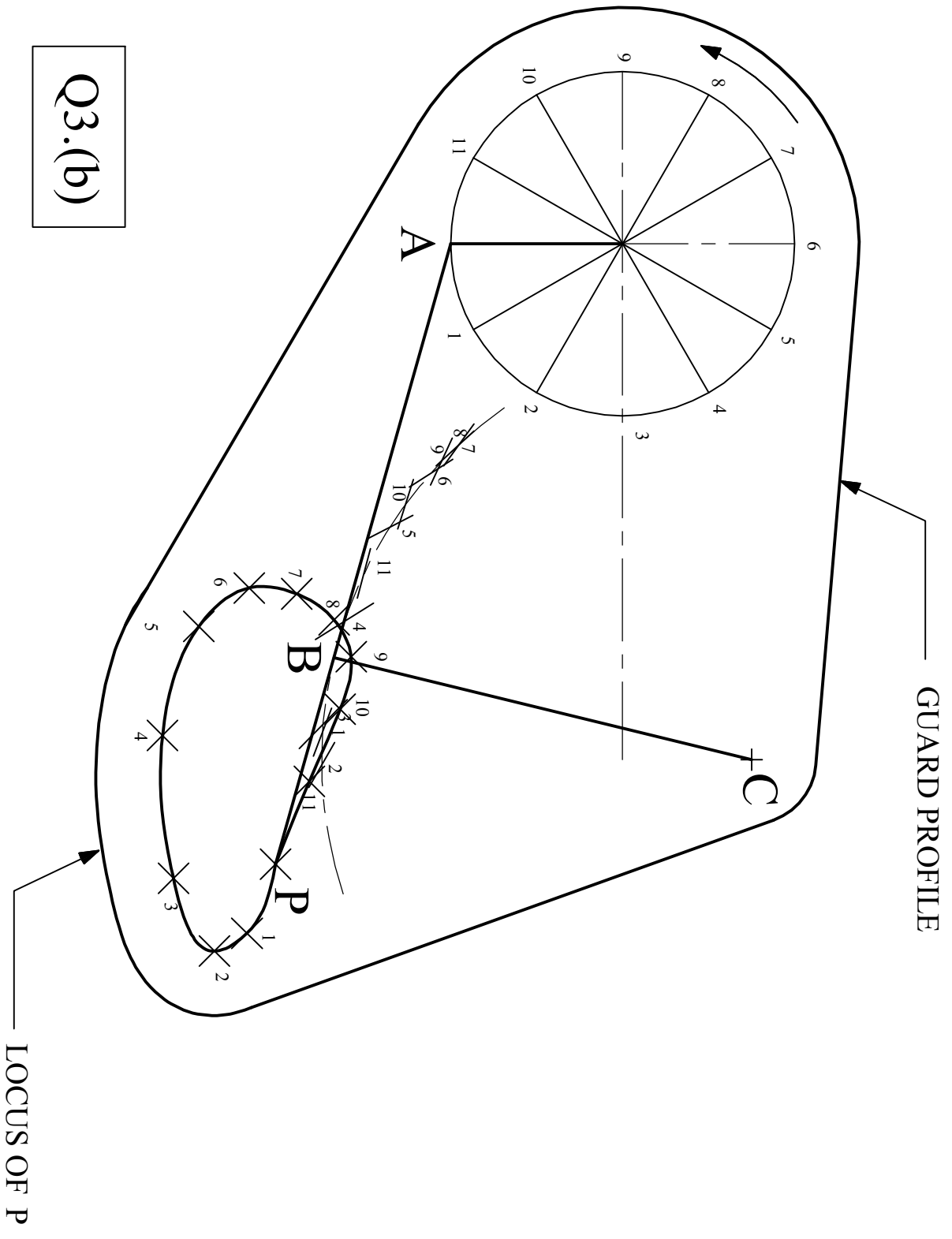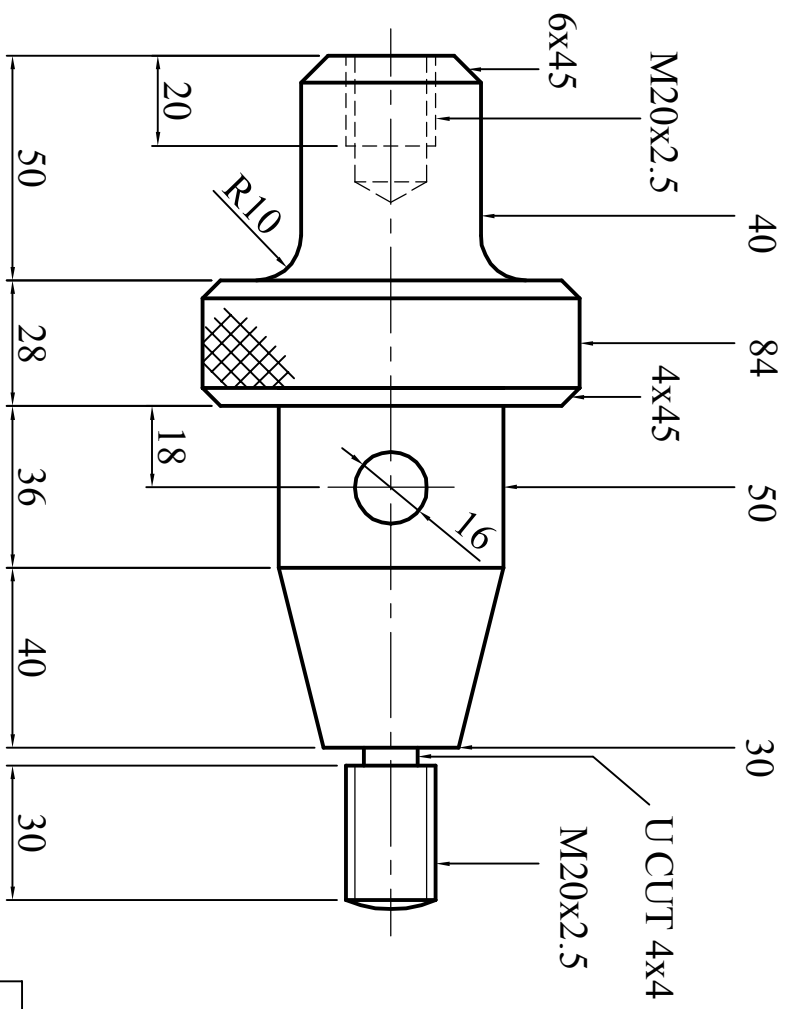
NUMBER	NAME
1	CAM
2	PUSHROD
3	ROCKER
4	VALVE
5	CAMSHAFT

(ii) As given the valve is in the closed position. When the cam rotates the pushrod rises vertically lifting the lefthand side of the rocker and causing the righthand side to tilt downwards pushing on the end of the valve and thus causing it to open the port. As the cam continues to rotate the pushrod will fall causing the rocker to return to the earlier position and thus close the valve again. The valve will continue to open and close as the cam rotates.

VALVE CLOSED

VALVE OPEN

(iii)
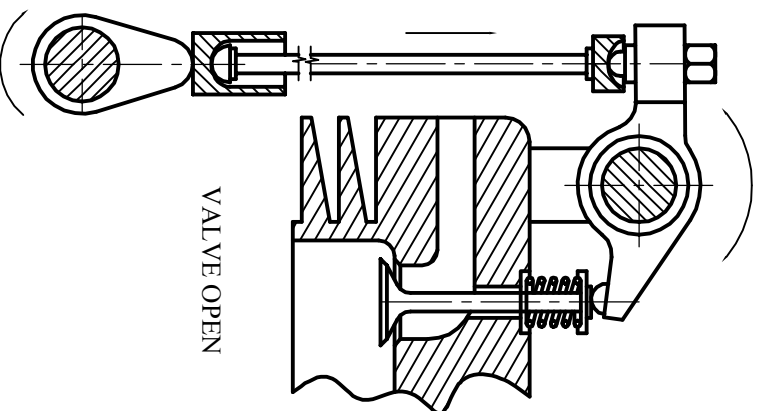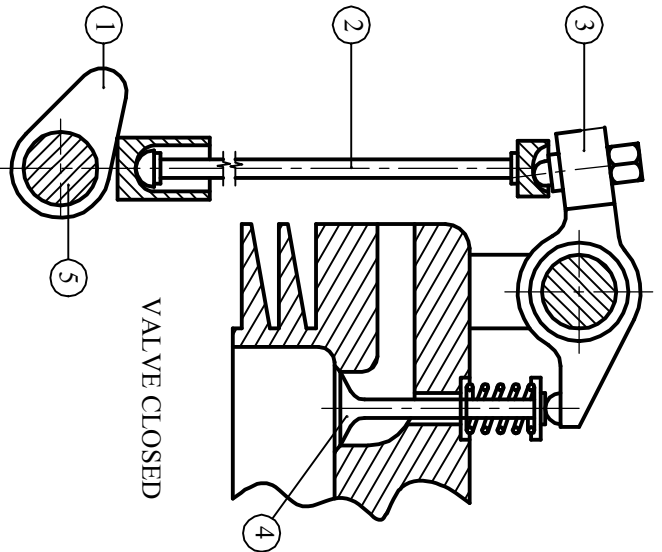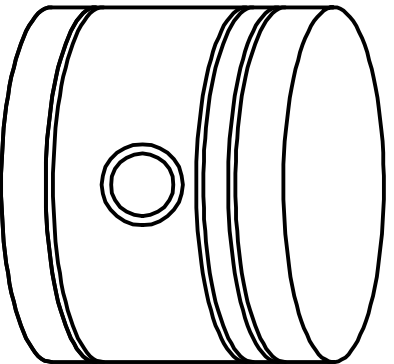
PISTON
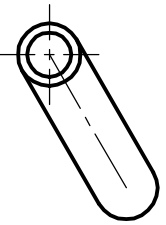
GUDGEON PIN
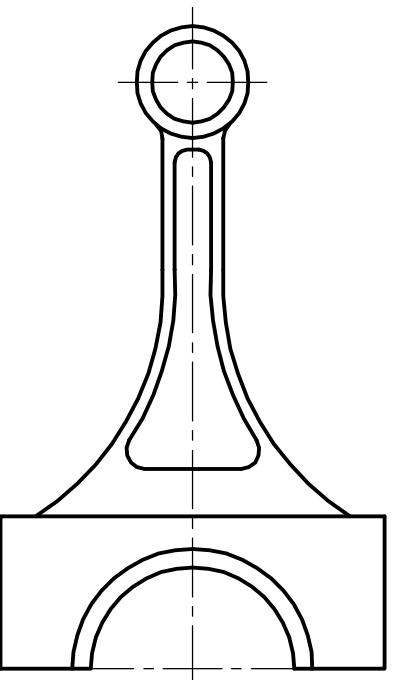
CONNECTING ROD

Q4. (b) & (c)

P

Q5. (a) SECTION A

60°
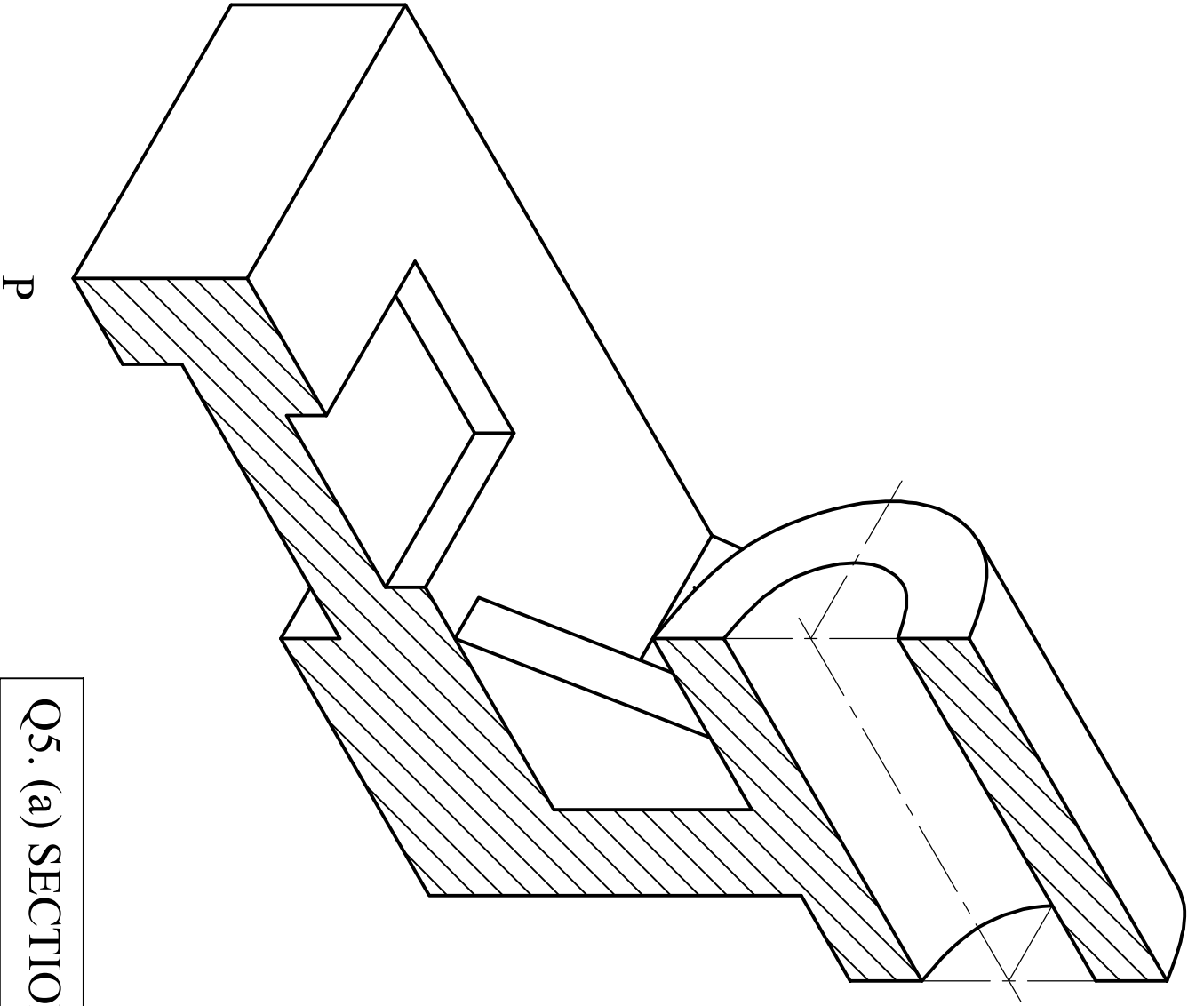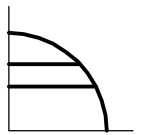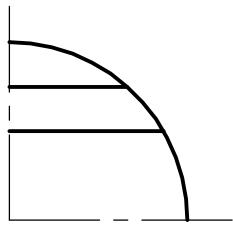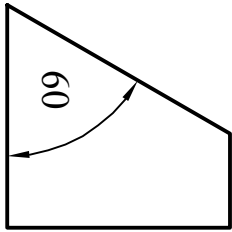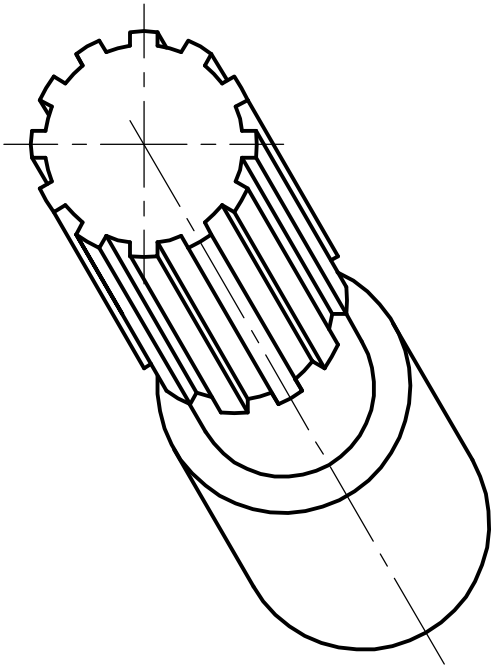
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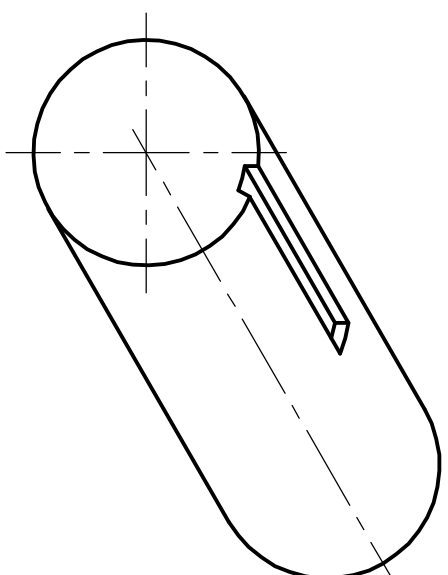
STUD

KEYWAY
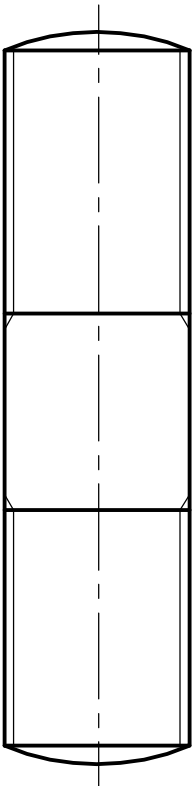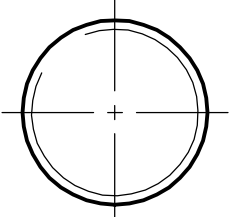
Q5. (b) SECTION A

(b)

(i) MIRROR

This command creates a new version of an existing object such that the new version is reflected symmetrically with respect to a prescribed line or plane.
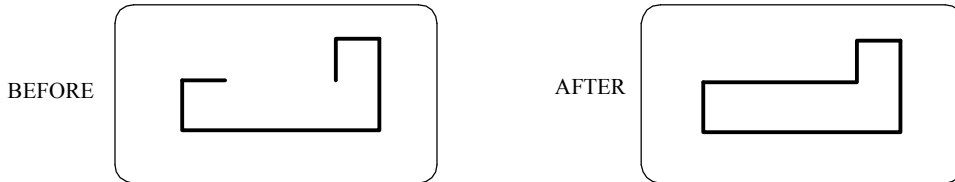
BEFORE   AFTER
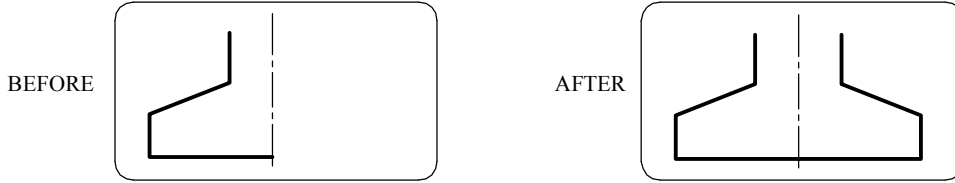
(ii) BREAK

This command erases parts of an object or splits an object in two.
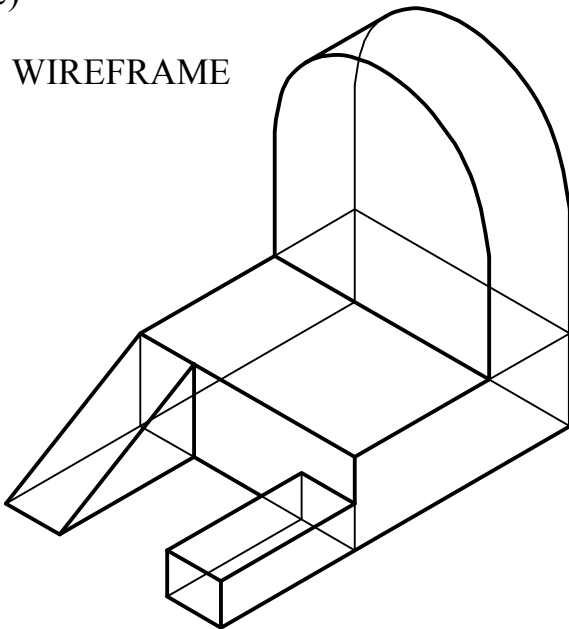
BEFORE   AFTER
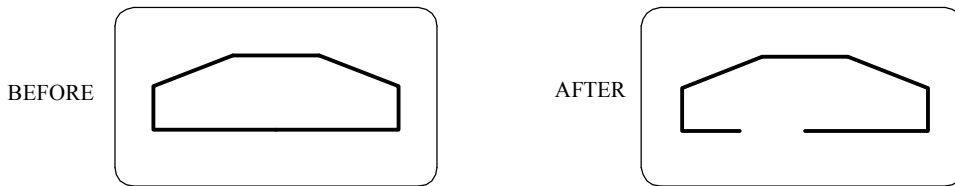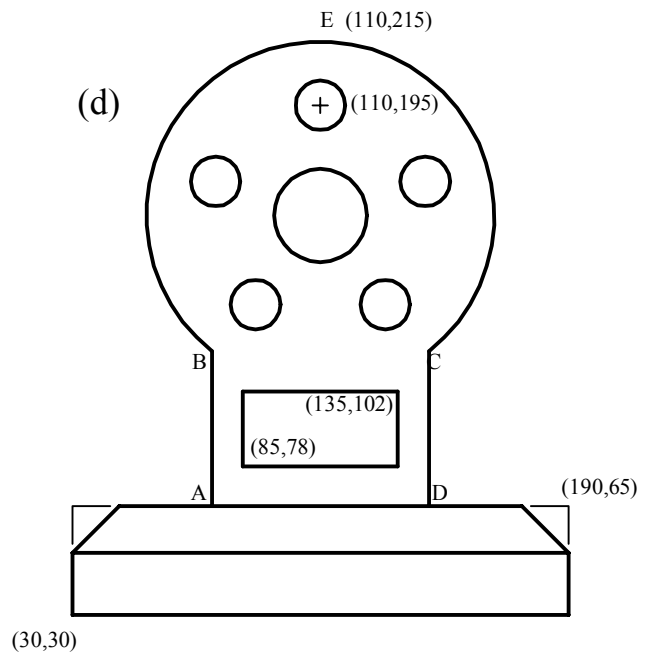
(iii) EXTEND

This command extends an object to meet another object.

BEFORE   AFTER

(c)

WIREFRAME

(d)

E (110,215)

(110,195)

B   C

(135,102)

(85,78)

A   D   (190,65)

(30,30)

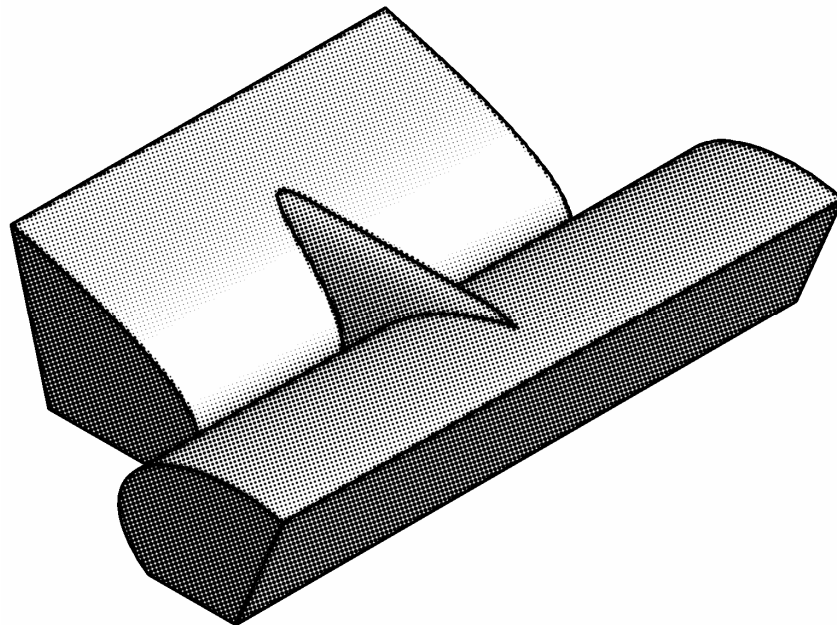Q5. (b), (c), (d) SECTION B

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State Examinations Commission

Leaving Certificate Examination 2007

Technical Drawing
## Paper II (B) – Ordinary Level
## (Building Applications)
(200 Marks)

QUESTION 1

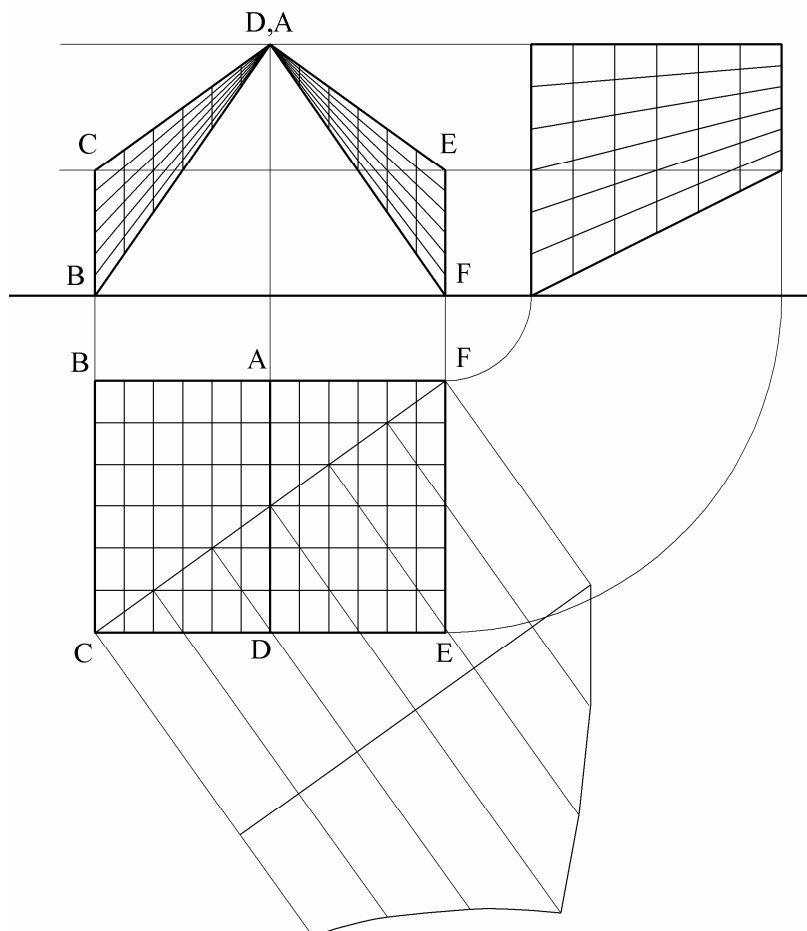|			Marks
1)	Draw the given plan (any 4 lines)		4
2)	Position spectator, PP, VP$_1$ and VP$_2$ in plan. (1,2,2) (Any spectator 1, Any PP 2, -1 if V. points wrong.)		5
3)	Ground line, horizon line and V.P.'s in elevation. (1,1,2) (-1 for incorrect projection)		4
4)	Projection lines from S to plan (Any one line)		2
5)	Perspective of base lines. (1,1,1)		3
6)	Measure height of base and complete (1, 1x2, 1x2, 1x4) top and front surfaces of base		9
7)	Locate and apply H$_1$ and complete main building (3,4)		7
8)	Locate and apply H$_2$ & H$_3$, and complete (2,1,5) protruding section (without triangular portion). (5 lines)		8
9)	Locate and apply H$_4$ and complete perspective drawing (Any 2 triangle edges = 2) (1,2)		3
10)	Presentation		5
		Total	**50**
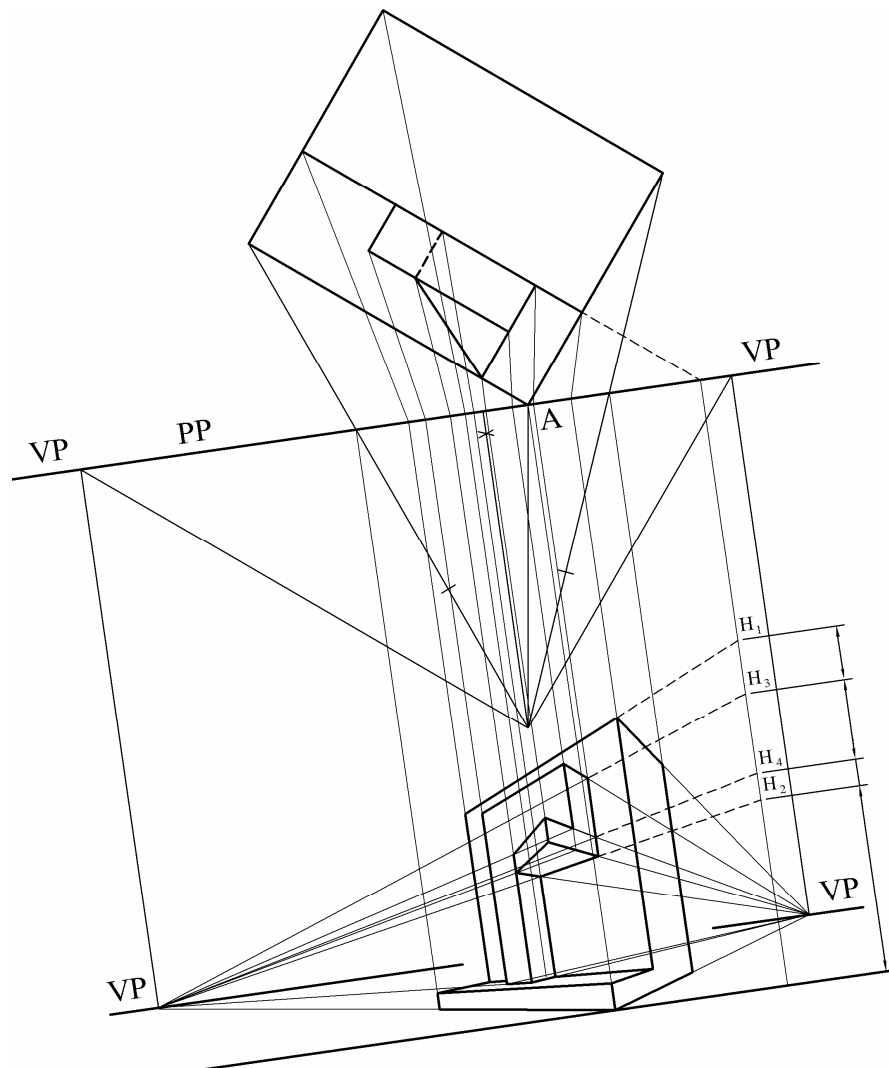
QUESTION 2		Marks
1)	Draw roof perimeter in plan. (any 4 lines)	4
2)	Draw edge view of surface B in End View (or Auxiliary) and establish ridge in elevation	4
3)	Edge view of surface A and apply ridge height in aux. view and project to plan (Full 5 if angle bisected)	5
4)	Complete plan and elevation of main roof surface (1,1, 1x2)	4
5)	Dormer window in end view, elevation and plan (2,2,2)	6
6)	Solar panel in elevation and plan (1,2)	3
7)	**True shape of Solar Panel** Determine slope length, and draw true shape (2,2)	4
8)	**Development of surface A** Determine true lengths, and draw development (1x4)	4
9)	**Dihedral angle between A and B** True length of line of intersection. (1x4)	4
10)	Determination of dihedral angle (1x7) **or** (1, 2x2, 1x2)	7
11)	Presentation	5
	Total	**50**
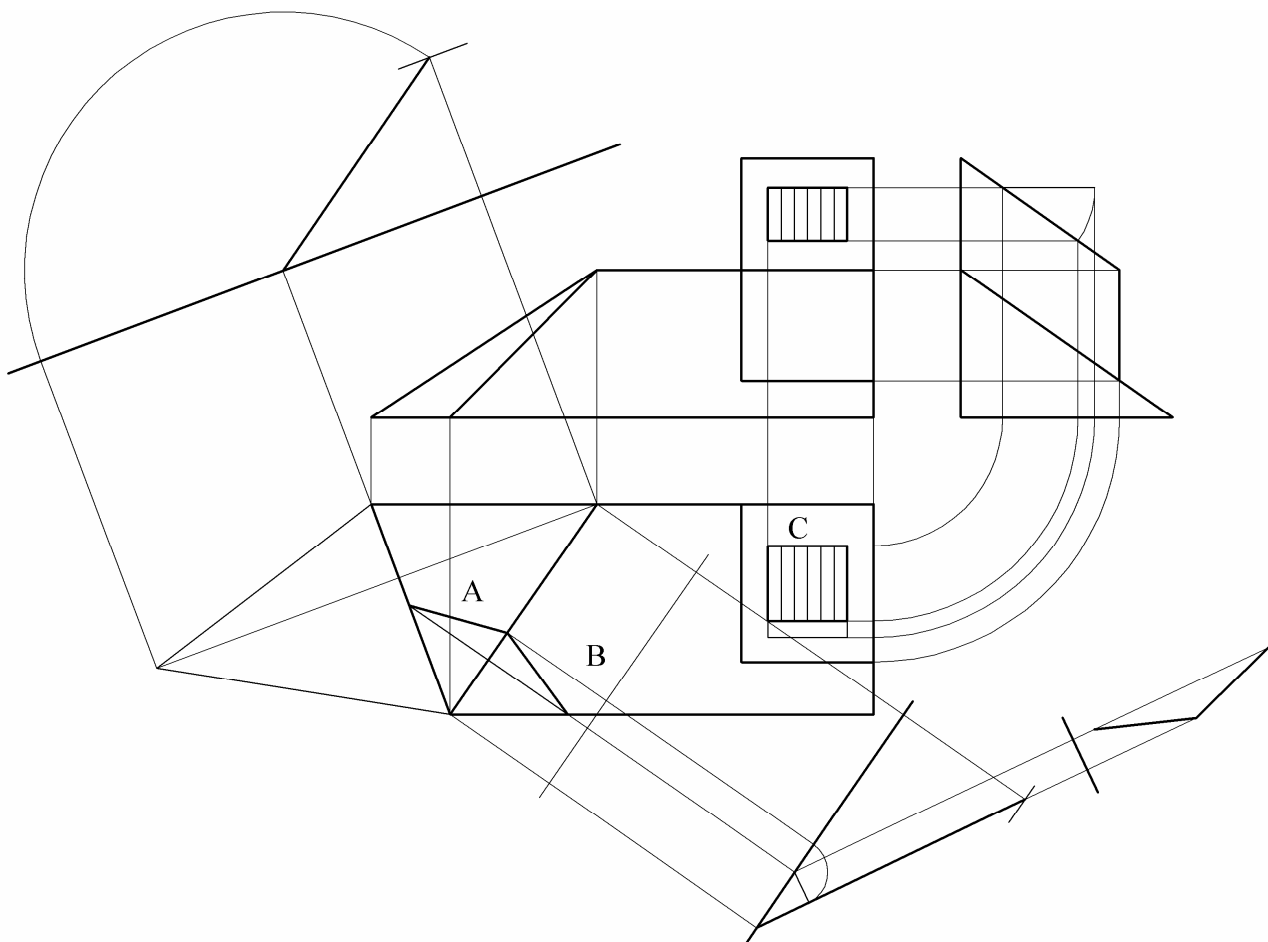
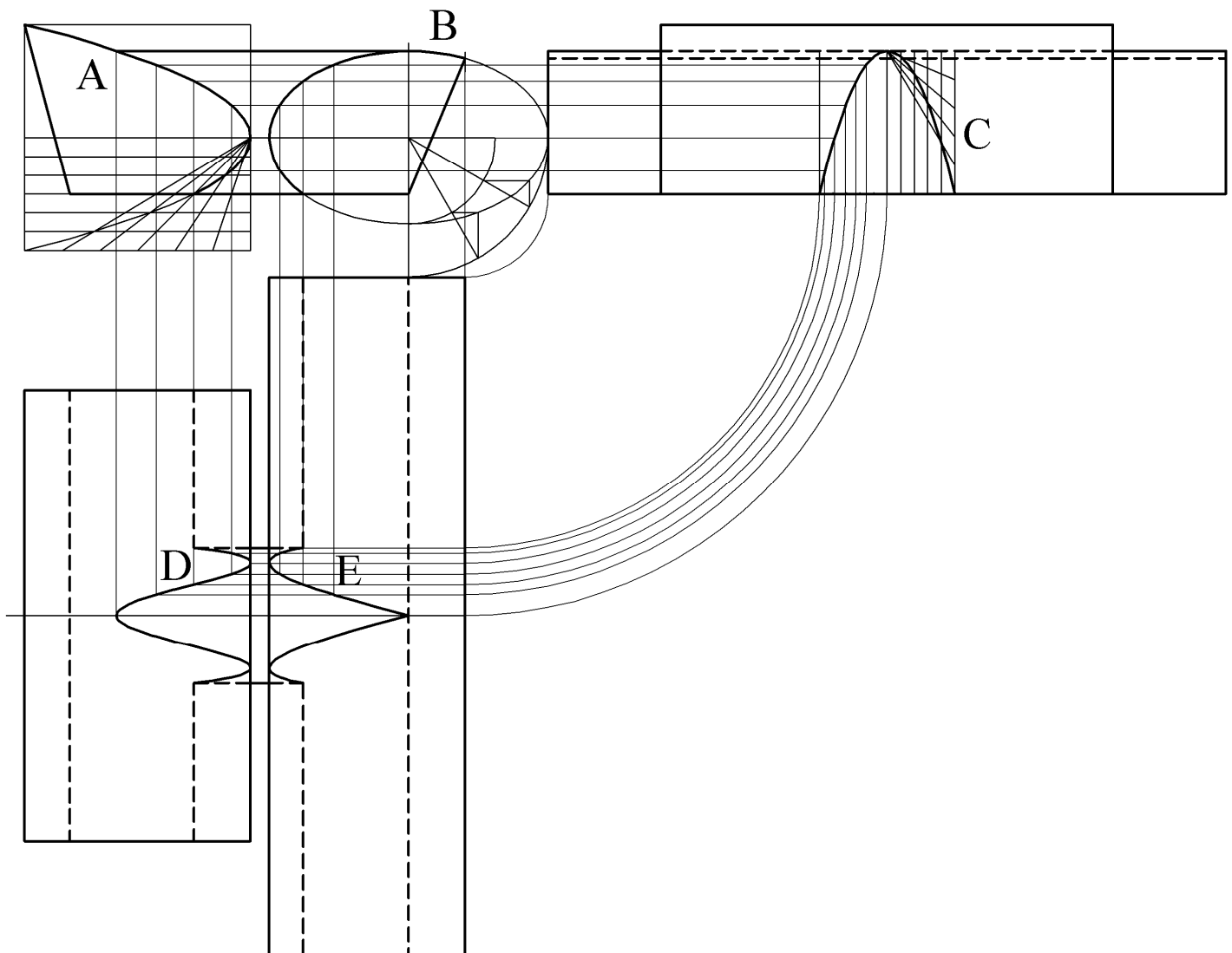|	QUESTION 3		Marks
1)	Draw the given plan and elevation	(5,5)	10
2)	Lines at appropriate angles in plan and elevation	(2,2)	4
3)	Determine shadow cast by rectangular sign	(1x4 + 1x5)	9
4)	Determine shadow cast by solar panel	(2x4 + 1x4)	12
5)	Shadow cast by cylindrical pole	(1,1,1)	3
6)	Correct outline of shadow area (4 intersection points)	(1x4)	4
7)	Identify shadow cast.		3
8)	Presentation		5
		Total	50
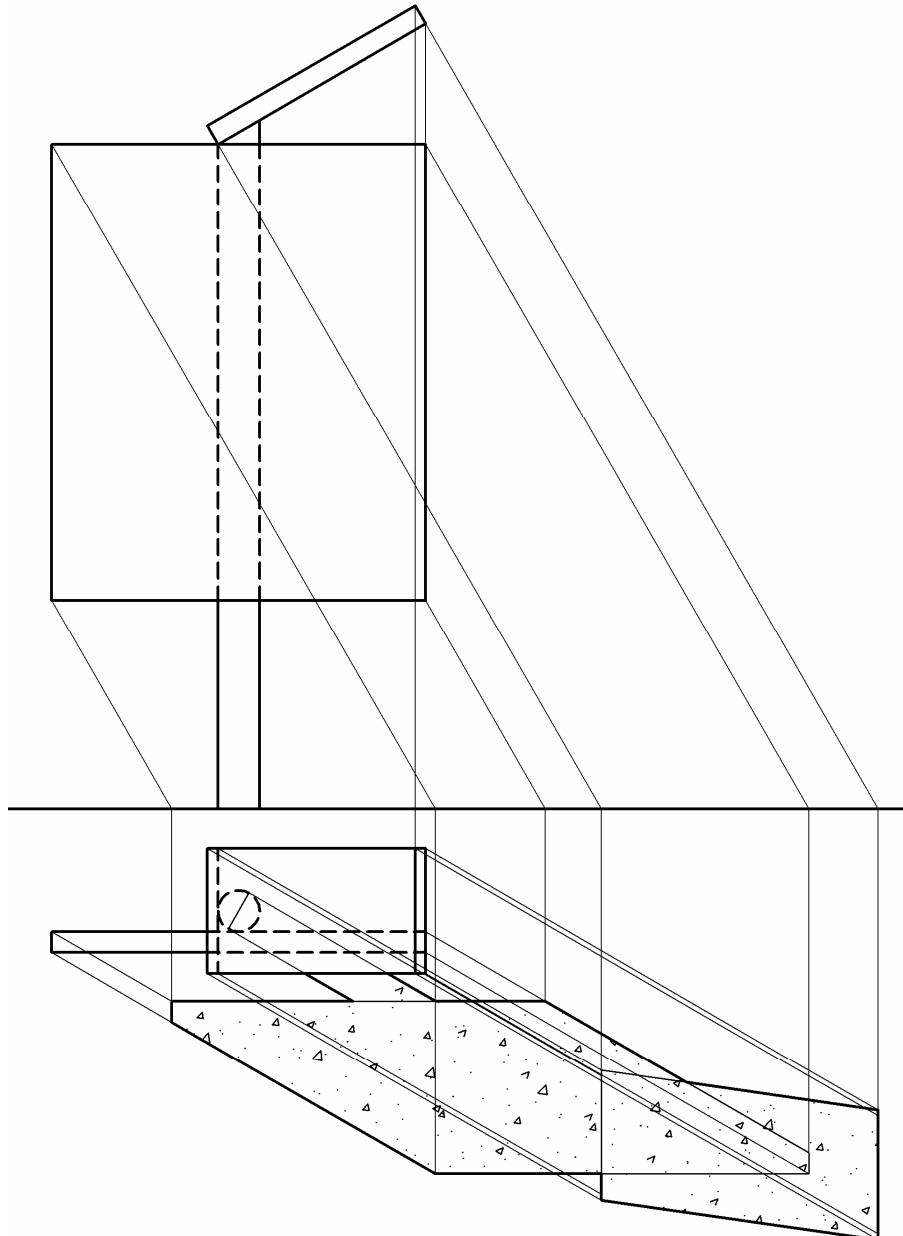
QUESTION 4		Marks
1)	**Plan and elevation** Draw the given plan, including the elements. (5,1,1)	7
2)	Project outline elevation and measure heights. (2,3)	5
3)	Draw outline elevation. (3,1)	4
4)	Proportional division & draw 4 sets of (1x2, 1x4) elements in elevation.	6
5)	**End Elevation** Determine heights and width of end elevation. (2,1)	3
6)	Draw outline of end elevation. (1x4)	4
7)	Complete end elevation (projections & elements) (1x2, 1x2)	4
8)	**True shape of section** Use of line CF or XY line parallel to CF	1
9)	Project intersections from plan (3, 1x2)	5
10)	Measure heights (1,1,3)	5
11)	Draw the true shape (Any curve)	1
12)	Presentation	5
	Total	**50**

QUESTION 5

			Marks
1)	Draw the given views	(4,4)	8
2)	Isometric axis (corner & two 30° lines) (-1 if wrong angle)	(1,1,1)	3
3)	Base of block A in isometric.	(1,1)	2
4)	Flat surfaces of block A in isometric.	(3,2)	5
5)	Brick steps in isometric.	(1x4, 1x2)	6
6)	Outline of straight portion of alcove in isometric.	(1x2, 1x2, 1)	5
7)	Cage for top curve of alcove in elevation	(1,1)	2
8)	Transfer of cage and draw curve of alcove	(1x3,1)	4
9)	Drawing of shelf and completion of alcove	(1x3,1,1)	5
10)	Drawing of Chimney	(1x3,1,1)	5
11)	Presentation		5
		Total	**50**
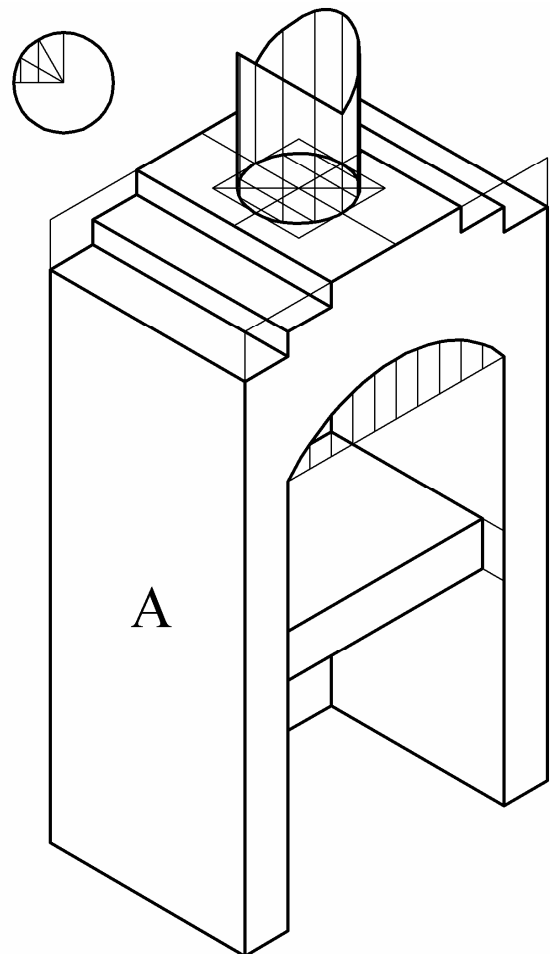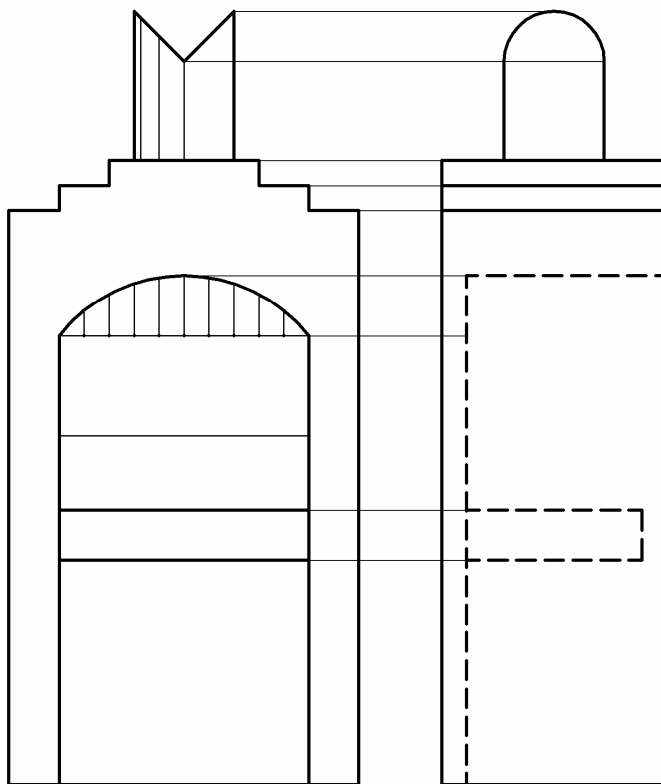
QUESTION 6			Marks
1)	Construction of and drawing of parabola A (Rectangle, dividing lines, curve)	(2,2,2,1)	7
2)	Location, construction of and drawing of ellipse B (Location, axes, construction, points, curve)	(1,2,2,2,1)	8
3)	Completion of elevation		5
4)	Draw outline End View (without parabola) (2 widths, 2 heights & centerline)	(1x5)	5
5)	Construction of and drawing of parabola C	(2,2,2,1)	7
6)	Draw Outline Plan (without curves) (width, height & centerline)		3
7)	Construction and drawing of curve D	(1x4, 1)	5
8)	Construction and drawing of curve E	(1x4, 1)	5
9)	Presentation		5
		Total	**50**

QUESTION 7

			Marks
1)	**Profile** Measure heights and draw horizontal sections. (3,2)		5
2)	Projections from intersections of line DE with contours to profile (Any 5, -1 if projected from wrong line)		5
3)	Draw outline profile (4,4)		8
4)	**Dip and strike** Join points A, B and C in plan.		3
5)	Draw triangle in elevation (3,3)		6
6)	Horizontal line in elevation		2
7)	Strike in plan		3
8)	New XY line, viewing direction for dip		2
9)	Determine dip		3
10)	**Pylon** Project intersection of contours at right angles to FG , Measure heights and draw profile (1,1,1,1)		4
11)	Determine location for turbine (1,1,1,1)		4
12)	Presentation		5
		Total	**50**

Scála Scale 1:1000