



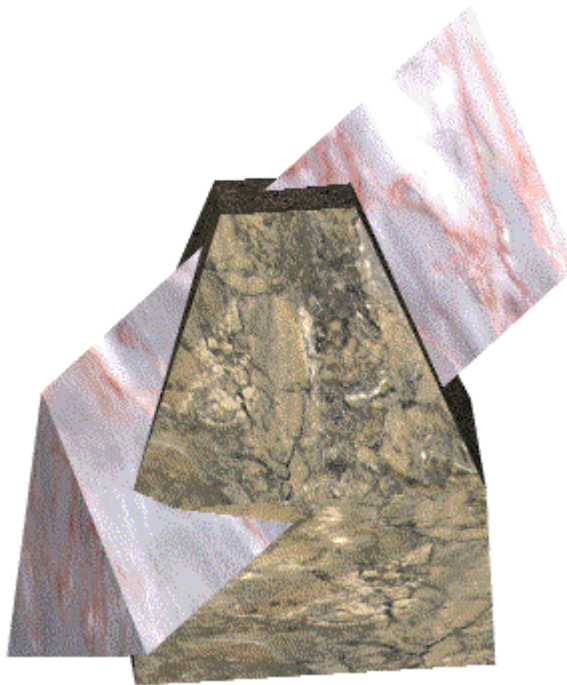
STATE EXAMINATIONS COMMISSION

LEAVING CERTIFICATE 2004

TECHNICAL DRAWING

HIGHER LEVEL

PAPER 1



MARKING SCHEME & SAMPLE SOLUTIONS

**(Other valid solutions, some of which are shown in Appendix 1,
are acceptable and marked accordingly)**

QUESTION 1**MARKS****Plan and Elevation of planes ABC and DEF**

- (i) Interpretation of co-ordinates2
- (ii) Drawing outline of planes2
- (a) Line of Intersection**
- (iii) Horizontal lines in elevation (or lines parallel to V.P.).....2
- (iv) Projections in plan (or elevation)2
- (v) Drawing line of intersection in plan and elevation2
- or**
- (iii) Edge view of one plane in auxiliary view...(1,1)2
- (iv) Projection of other plane2
- (v) Determining projections of line of intersection2
- (b) Dihedral angle**
- (i) New X_1Y_1 taken parallel to line of intersection4
- (ii) Projection of ABC and DEF on new X_1Y_1 3
- (iii) New X_2Y_2 taken perpendicular to line of intersection4
- (iv) Projection of ABC and DEF on X_2Y_2 and indicating dihedral angle ...5
- (c) Determining line from B**
- (i) Locating horizontal line on plane DEF 30mm above H.P. in an elevation and in plan...(1,3).....4
- (ii) Drawing 55mm arc about B in plan2
- (iii) Drawing correct required line in plan and elevation.....2
- (iv) Drawing 55mm arc about B in a view showing plane DEF as an edge, and indicating angle...(1,1)..2

(d) Skew lines

- (i) Creating a plane containing AB (or EF) and parallel to EF (or AB).....2
- (ii) Finding edge view of plane2
- (iii) X_2Y_2 parallel to edge view of plane2
- (iv) Location of shortest distance and projection to 1st aux.2
- (v) Projecting or measuring to plan and elevation.....2
- (vi) Indicating inclination of shortest line to H.P.4

or

- (i) Auxiliary view of AB and EF showing true length of one.....2
- (ii) Auxiliary view of AB and EF showing point view of one2
- (iii) Drawing perpendicular from point to other line2
- (iv) Projecting back to 1st aux. and drawing line perpendicular to true length line...(1,1)2
- (v) Projecting or measuring to plan and elevation.....2
- (vi) Indicating inclination of shortest line to H.P.4

Total**50**

QUESTION 2**MARKS****(a) Drawing given figure**

- (i) Finding mean proportional BD between AD and DC7
- (ii) Drawing line BD3
- (iii) Location of point A.....2
- (iv) Location of point C3
- (v) Completion of quadrilateral ABCD.....4
- (vi) Drawing of smaller (or larger) regular pentagon
with vertices on appropriate sides3
- (vii) Enlargement (or reduction) to locate point E.....1
- (viii) Completion of figure.....3

(b) Drawing similar figure equal in area to 90mm square

- (i) Redrawing of quadrilateral ABCD3
- (ii) Determining triangle equal in area to ABCD3
- (iii) Determining rectangle equal in area to ABCD3
- (iv) Determining square equal in area to ABCD4
- (v) Establishing 90mm square1
- (vi) Correct determination of one side length on enlarged figure5
- (vii) Drawing of radiating line(s) and completion of enlarged figure5

Total**50**

QUESTION 3**MARKS****(a) Cone A and Sphere B**

- (i) Elevation and plan of cone A3
- (ii) Locate centre of sphere B in elevation and draw elevation of B2
- (iii) Bisection of angle between cone edge and base extended
or draw line Rmm from edge of cone.....2
- (iv) Locate centre2
- (v) Project centre point to plan and rotate about cone A4
- (vi) Locate centre in plan and draw plan of sphere (incl. hidden detail)4

(b) Projections of 2nd Sphere

- (i) Location of point 47mm above H.P. at edge of sphere in elevation1
- (ii) Drawing of normal and tangent at this point.....(2,2)4
- (iii) Bisection of angle between tangent and XY line and locate centre.....3
- (iv) Project centre to plan and rotate about sphere B.....2
- (v) Bisection of angle between cone edge and XY line.....2
- (vi) Locate centre1
- (vii) Project centre to plan and rotate about cone A2
- (viii) Draw plan of sphere (incl. hidden detail)2
- (ix) Draw elevation of sphere (incl. hidden detail)2

(c) Projections of Cylinder

- (i) Elevation of point P1
- (ii) Locate plan of point P and draw line OP extended...(1,1).....2
- (iii) Drawing one set of relevant arcs/lines.....3
- (iv) Drawing second set of arcs/lines corresponding with (iii)4
- (v) Drawing of correct locus1
- (vi) Drawing projections of required cylinder (incl. hid. detail)3

Total**50**

QUESTION 4

MARKS

Outline Plan and Elevation

- (i) Drawing outline plan of shaped solid3
- (ii) Drawing outline elevation of shaped solid4
- (iii) Drawing outline elevation of inclined prism...(3,1)4
- (iv) Transfer of widths to plan3

Interpenetration

- (v) Determining points **A, B & C** in elevation and plan...(3x2)6
- (vi) Determining points **D, E, & F** in elevation and plan...(3x2).....6
- (vii) Determining points **G, H, I, & J** in elevation and plan...(4x2)8
- (viii) Determining points **K, L & M** in elevation and plan...(3x2)..6
- (ix) Joining intersection points in correct order.....3
- (x) Completion of drawing (incl. hidden detail)7

Total **50**

QUESTION 5**MARKS**

- (a)
- (i) Drawing figure as given.....4
 - (ii) Dividing circle into a number of equal parts2
 - (iii) Stepping distances to locate B_1 , B_2 , and B_3 2
 - (iv) Erection of perpendiculars to locate O_1 , O_2 , and O_3 3
 - (v) Drawing arcs radius OP from O_1 , O_2 and O_3 , respectively3
 - (vi) Drawing arcs C_1-P , C_2-P , C_3-P from B_1 , B_2 , B_3 , respectively3
 - (vii) Location of points O_R and P_R before rotation...(2,1)3
 - (viii) Location of points O_R and P_R in rotated positions2

Inclined line

- (i) Stepping distances to locate B_4 , B_5 , etc2
- (ii) Erection of perpendiculars to locate O_4 , O_5 , etc.....2
- (iii) Drawing arcs radius OP from O_4 , O_5 , etc3
- (iv) Drawing arcs C_4-P , C_5-P , etc from B_4 , B_5 , etc respectively.....6
- (v) Plotting of correct curve...(1,1,2)4

(b) Involute

- (i) Drawing of quadrant PA 1
- (ii) Dividing arc PA into a number of equal parts (min 3).....2
- (iii) Drawing of tangents at ends of dividing lines3
- (iv) Completion of involute locating P_1 , P_2 , P_33
- (v) Plotting of correct curve.....2

Total**50**

QUESTION 6

MARKS

- (a) (i) Drawing lines AF and FP3
- (ii) Locating point on eccentricity line / directrix4
- (iii) Determining one vertex6
- (iv) Locating points on the curve (min 5 excluding vertex)5
- (v) Drawing curve...(Any = 2)4

Tangent

- (vi) Drawing line from focus at 45° to axis to meet major circle2
- (vii) Determining point of contact5
- (viii) Drawing of required tangent...(Any = 1)3

or

- (vi) Drawing chords at 45° to axis, bisecting them, joining midpoints & extending line to establish point of contact..(2,2,2,1).....7
- (vii) Drawing of required tangent...(Any = 1)3

- (b) (i) Drawing line PAC2
- (ii) Determining point B3
- (iii) Determining direction of axis3
- (iv) Location of focus1
- (v) Drawing eccentricity line / directrix3
- (vi) Locating points on the curve (min 3 and the vertex)4
- (vii) Drawing curve...(Any = 1)2

Total 50

QUESTION 7**MARKS****(a) Outline Plan and Elevation**

- (i) Drawing plan of pyramid resting on H.P.....5
- (ii) Auxiliary direction and X_1Y_1(2,1).....3
- (iii) Rotated pyramid in auxiliary elevation5
- (iv) Required plan of pyramid (2 further points & apex).....3
- (v) Drawing elevation of pyramid.....6

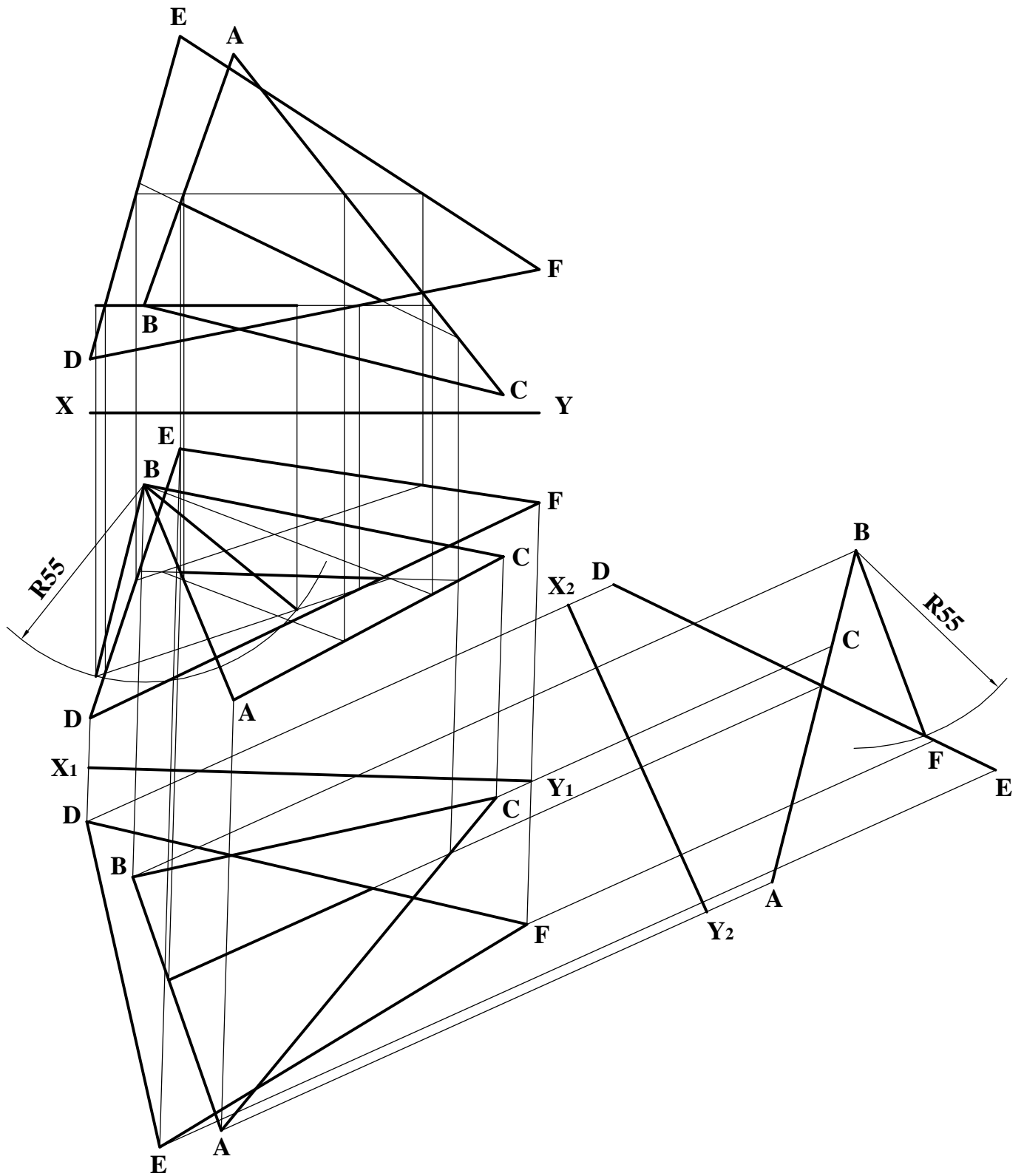
Cut surface

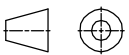
- (i) Location of 60° cone under D in elevation and plan.....7
- (ii) Drawing H.T. through A tangential to circle.3
- (iii) X_1Y_1 perpendicular to H.T.2
- (iv) Edge view of plane3
- (v) Identification of cut surface in auxiliary view2
- (vi) Cut surface in plan and elevation2
- (vii) Completion of plan and elevation2

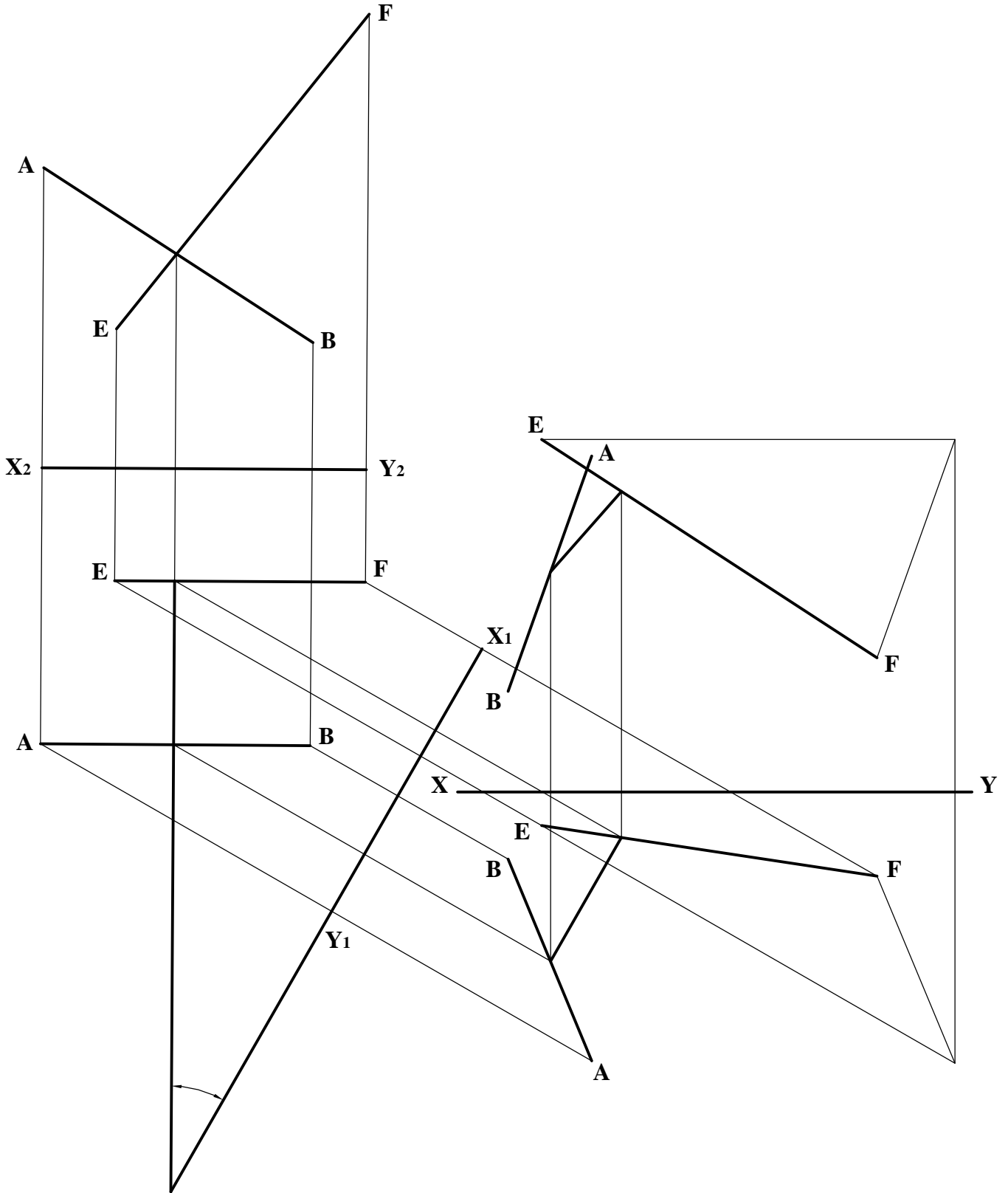
(b) Location of point F

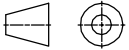
- (i) Location of 20° cone under C in elevation and plan.....3
- (ii) Location of point F on AB in plan.....2
- (iii) Location of point F on AB in elevation.....2

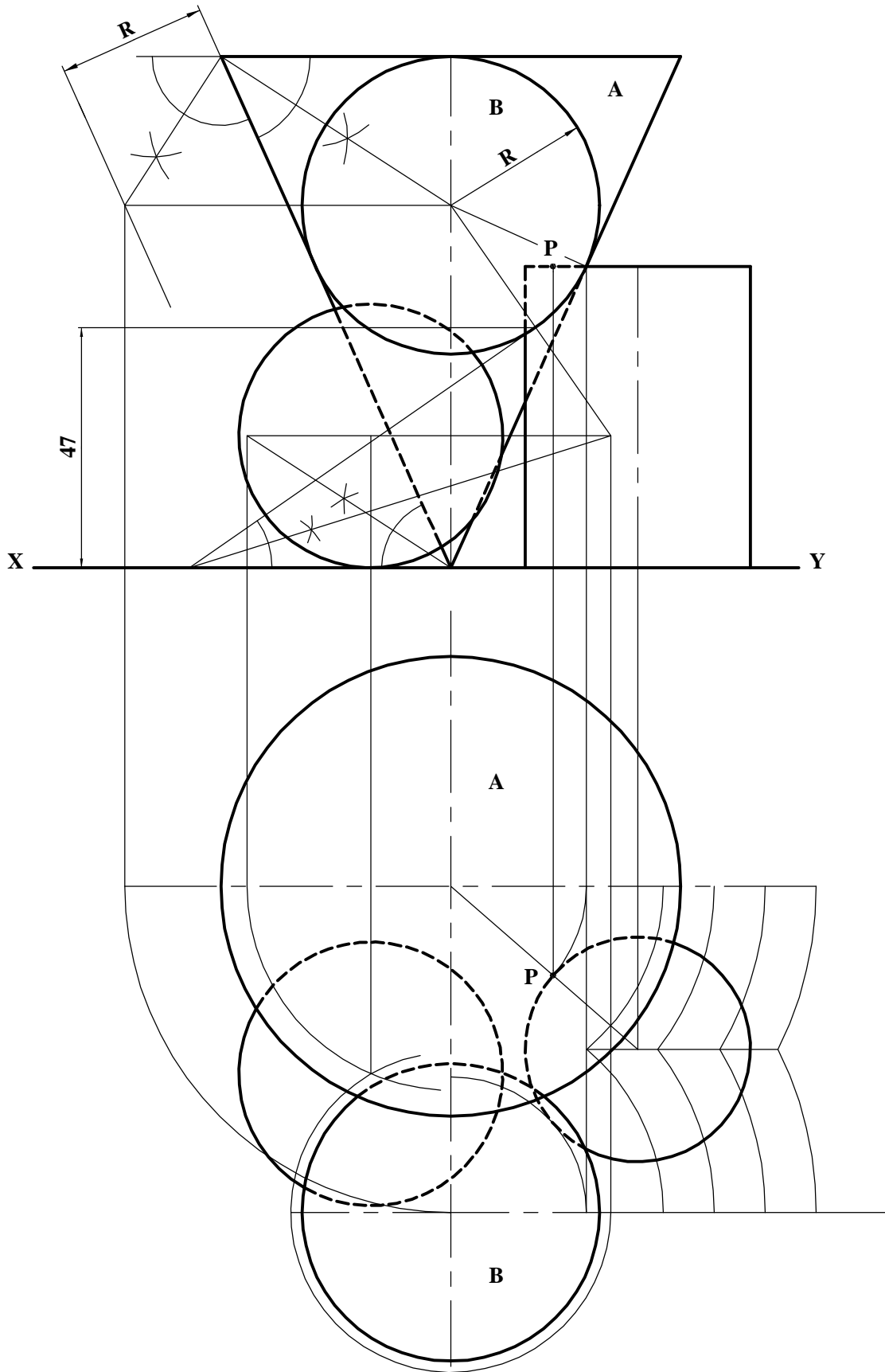
Total**50**



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
PROJECTION	MARKING SCHEME.
	QUESTION 1(a),(b) & (c).
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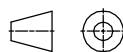


TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
PROJECTION	MARKING SCHEME.
	QUESTION 1(d).
SCALE: N/A	DATE: JUNE 2004.



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.

PROJECTION

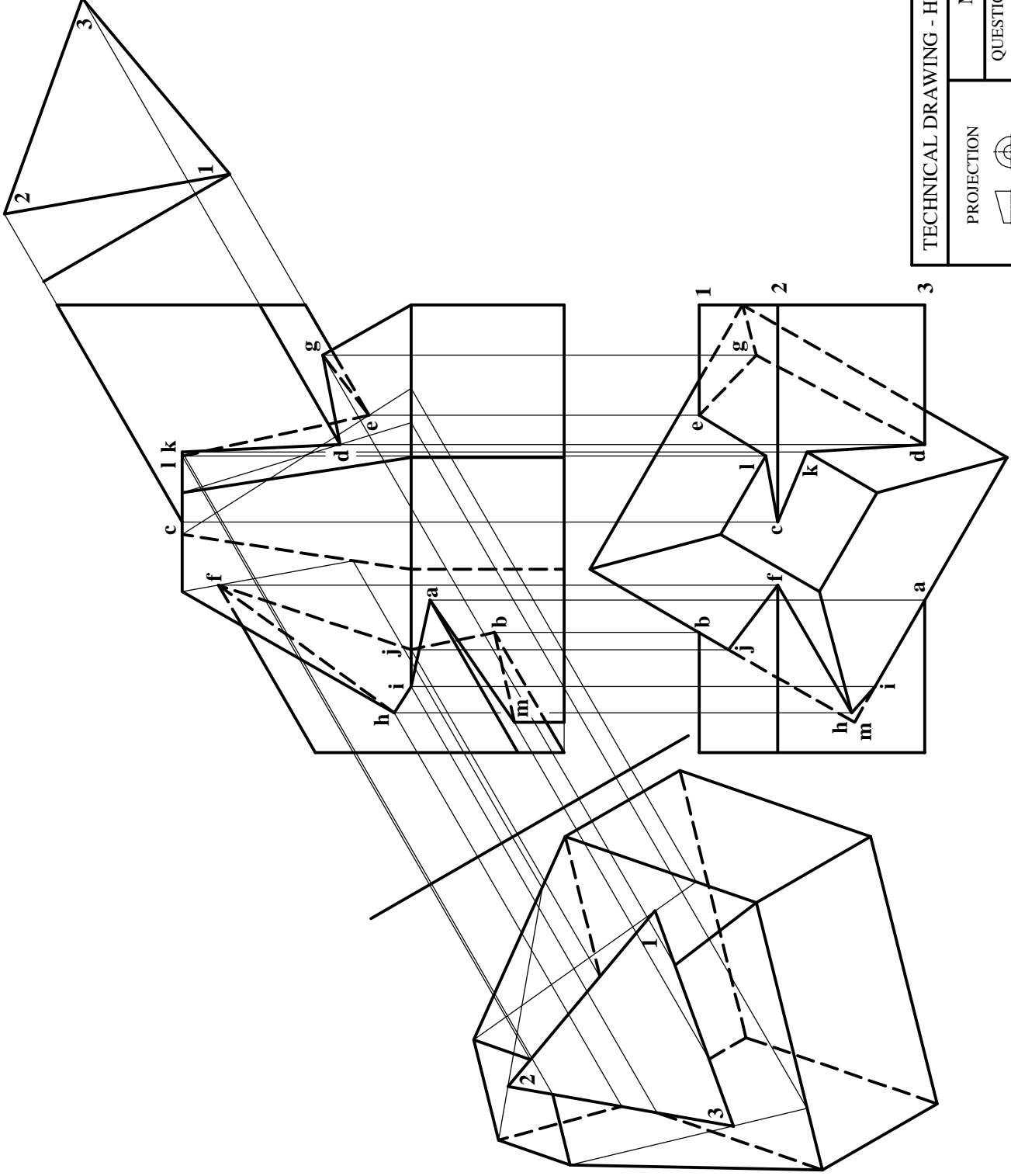


MARKING SCHEME.

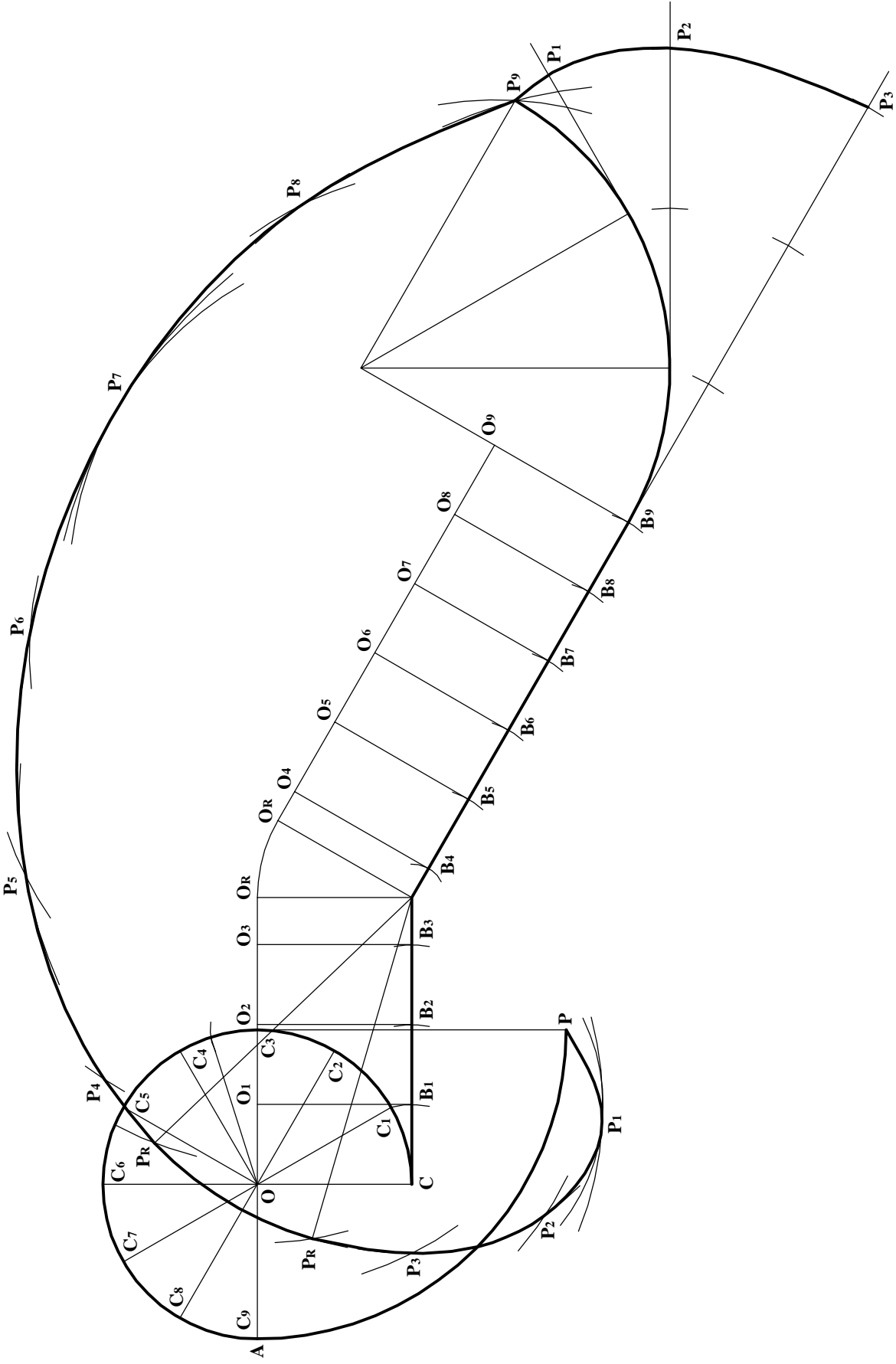
QUESTION 3.

SCALE: N/A.

DATE: JUNE 2004.



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
PROJECTION	MARKING SCHEME.
QUESTION 4.	SCALE: N/A.
DATE: JUNE 2004.	

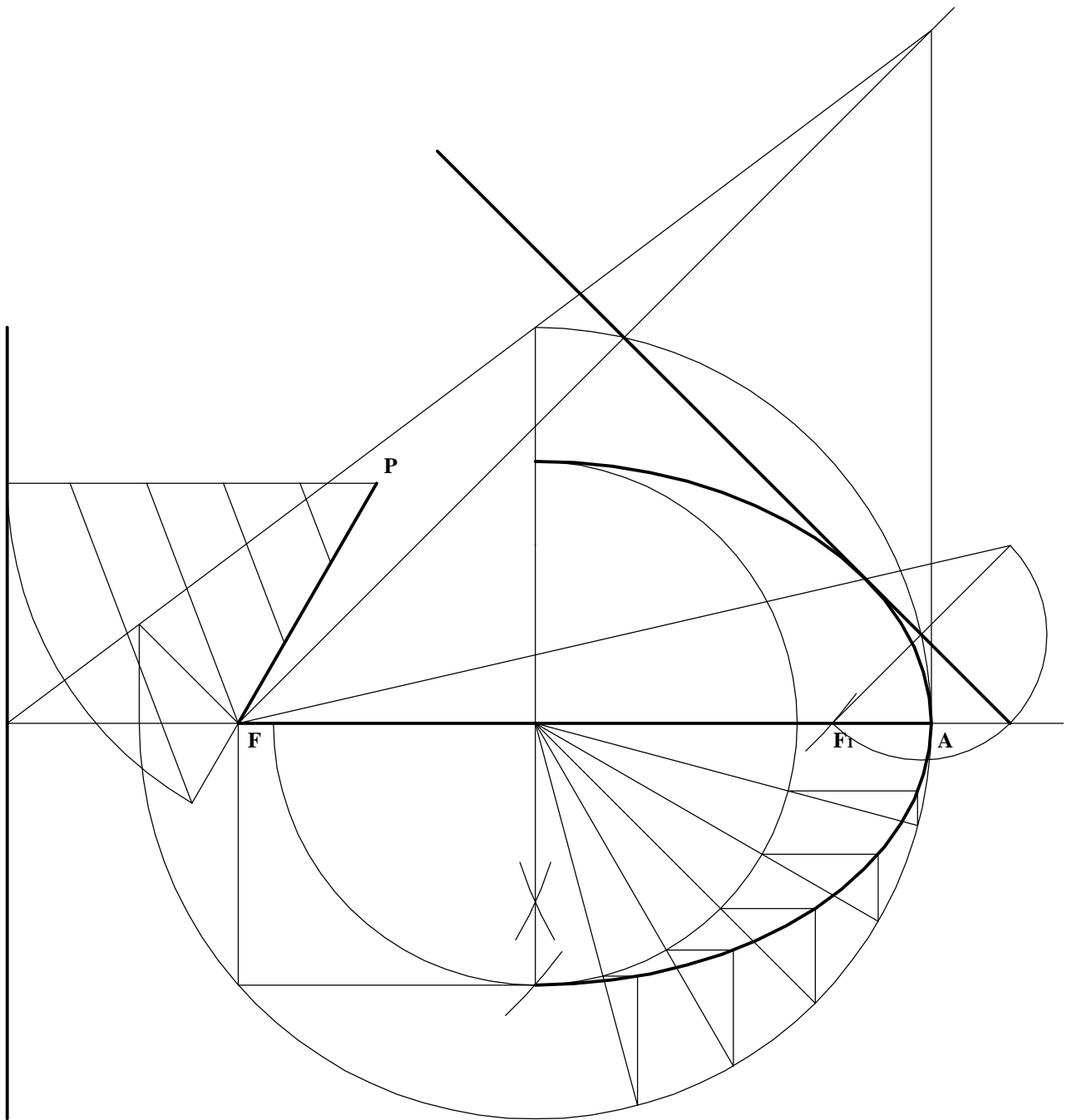


TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.

MARKING SCHEME.

QUESTION 5.

SCALE: N/A DATE: JUNE 2004.



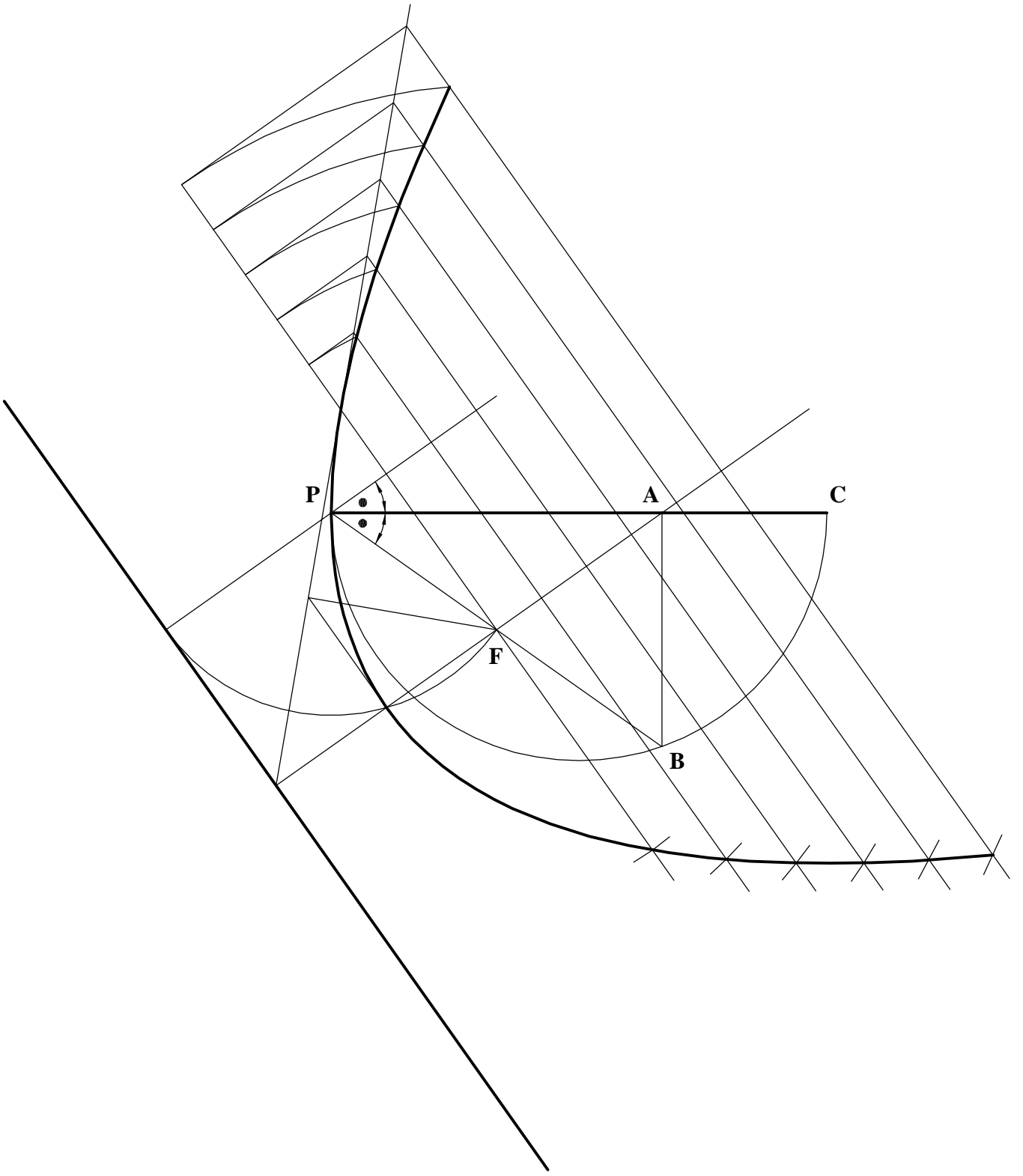
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MARKING SCHEME.

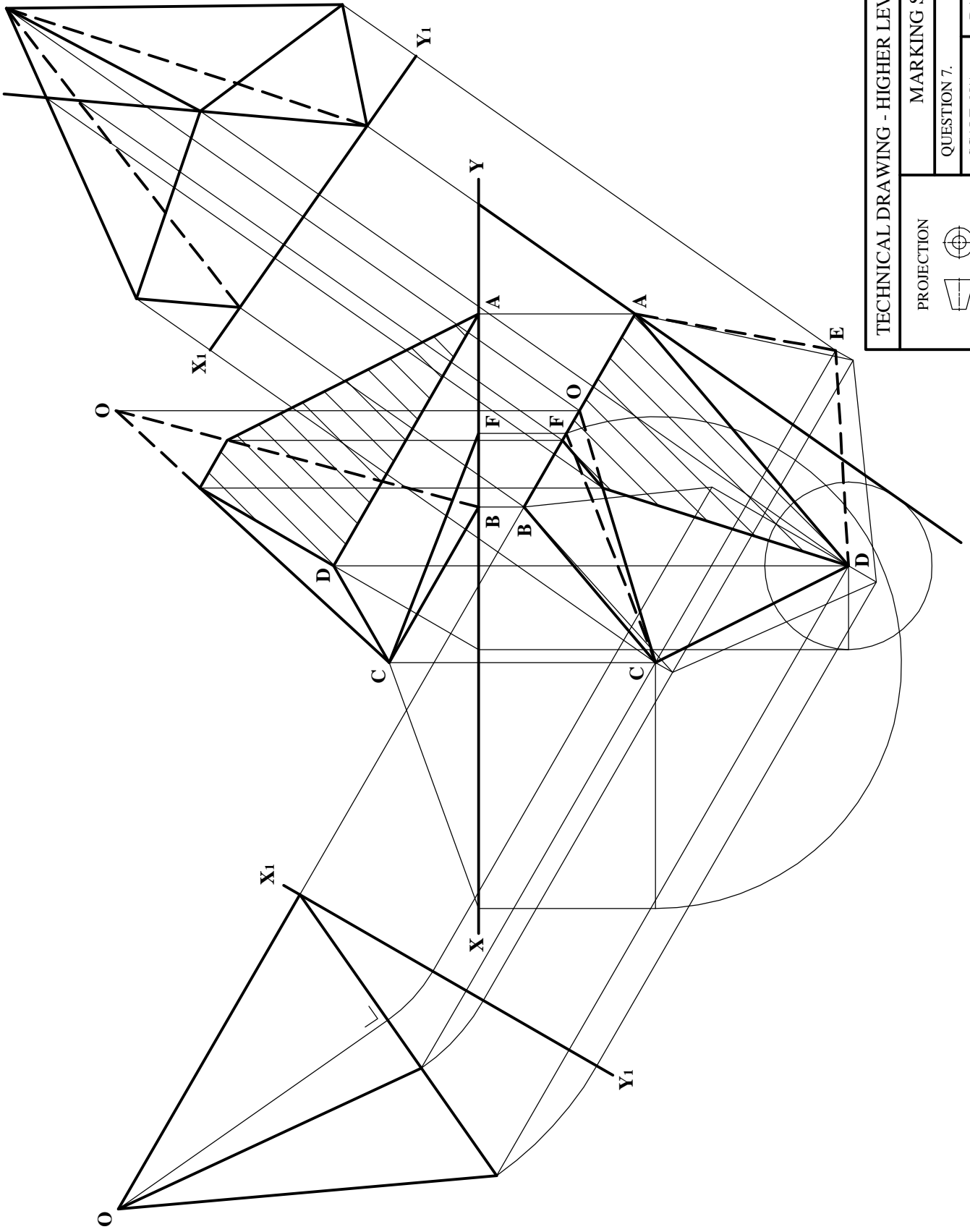
QUESTION 6(a).

SCALE: N/A

DATE: JUNE 2004.



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
	MARKING SCHEME.
	QUESTION 6(b).
	SCALE: 1:1. DATE: JUNE 2004.



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.

MARKING SCHEME.

QUESTION 7.

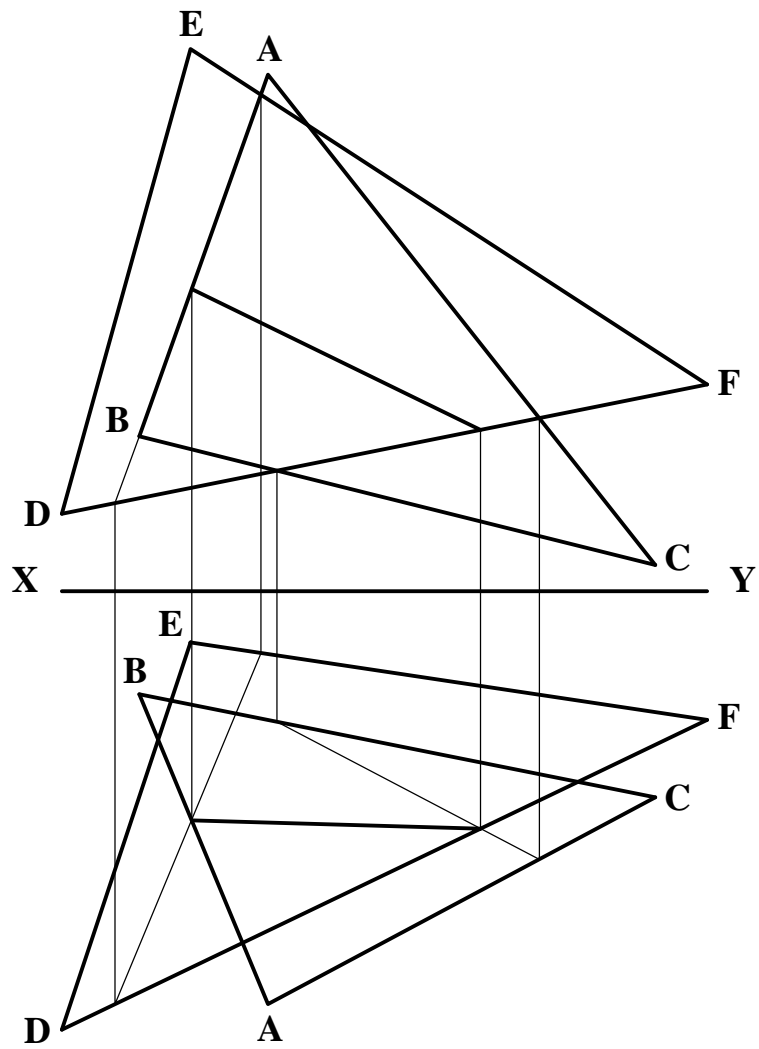
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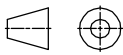
PROJECTION

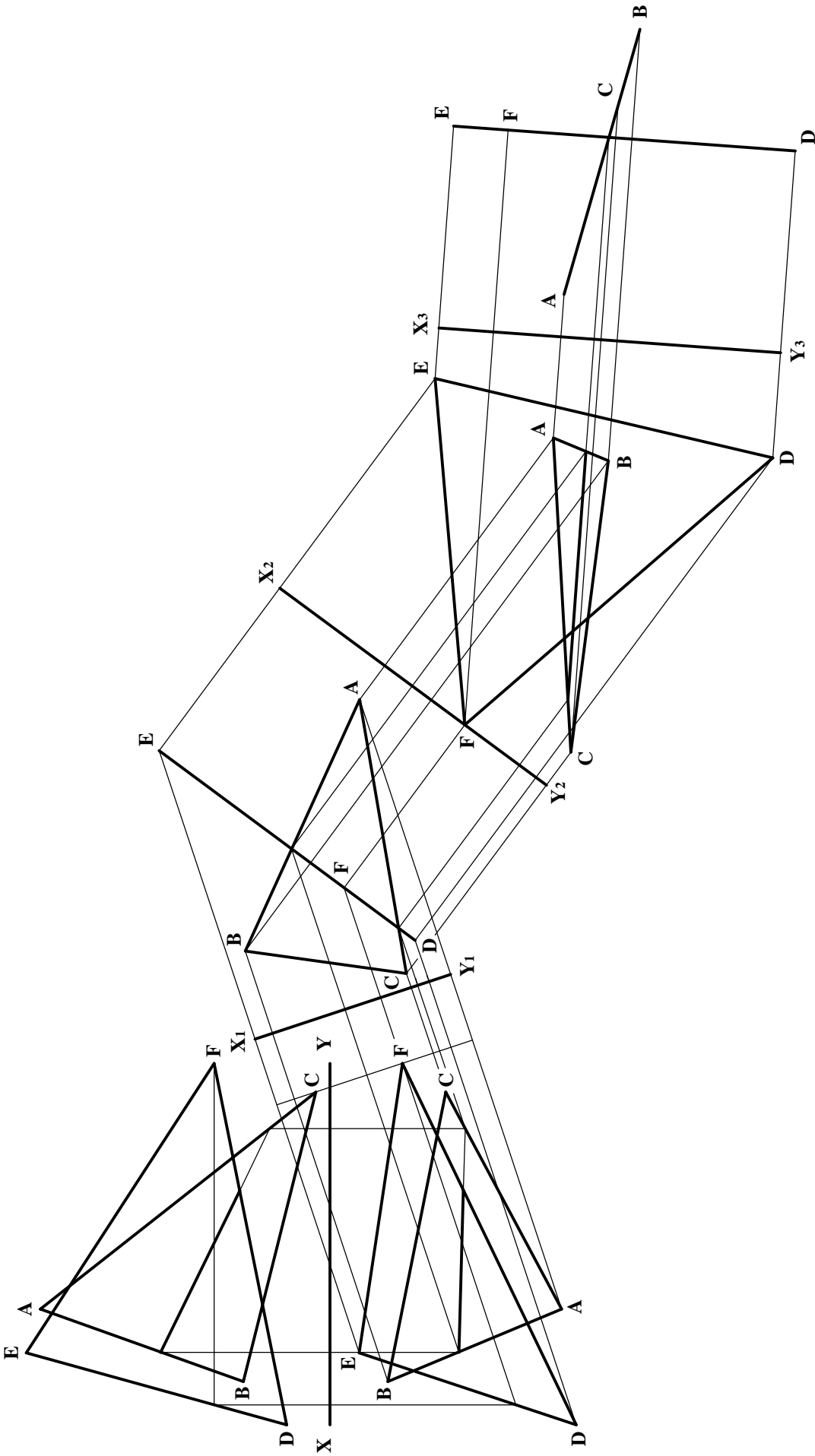


Appendix 1

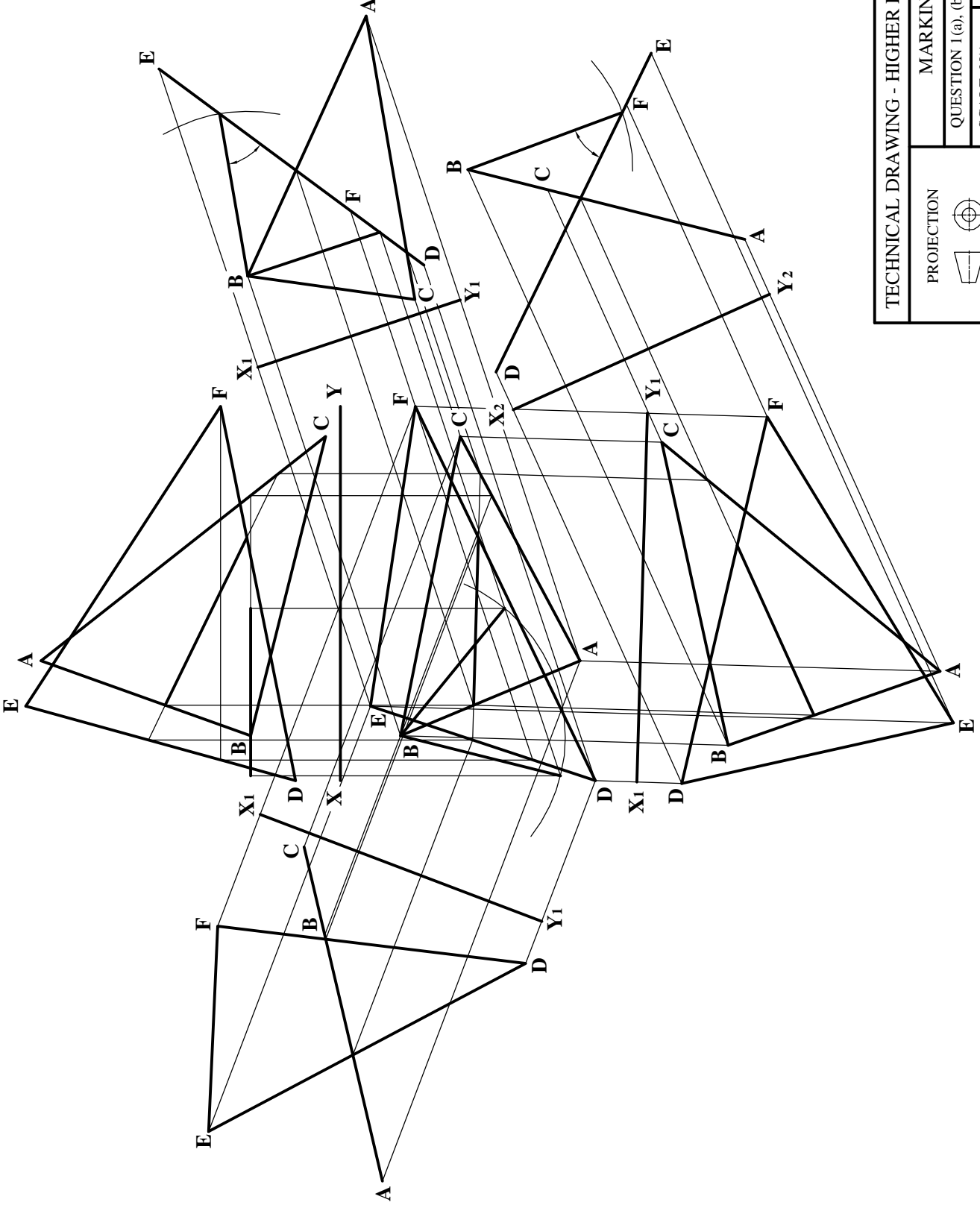
Sample of Alternative Solutions



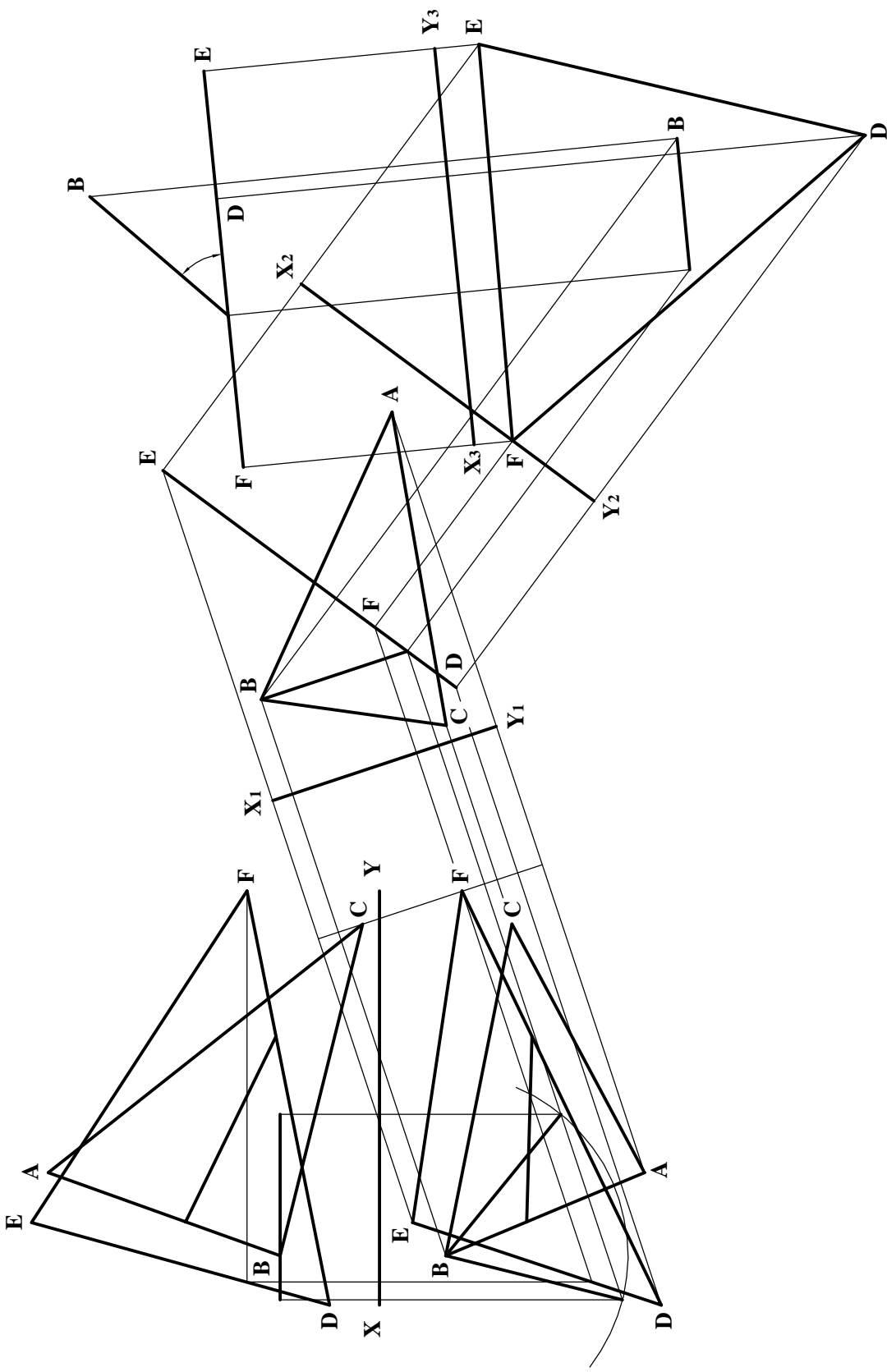
TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
PROJECTION	MARKING SCHEME.
	QUESTION 1(a).
SCALE: 1:1.	DATE: JUNE 2004.



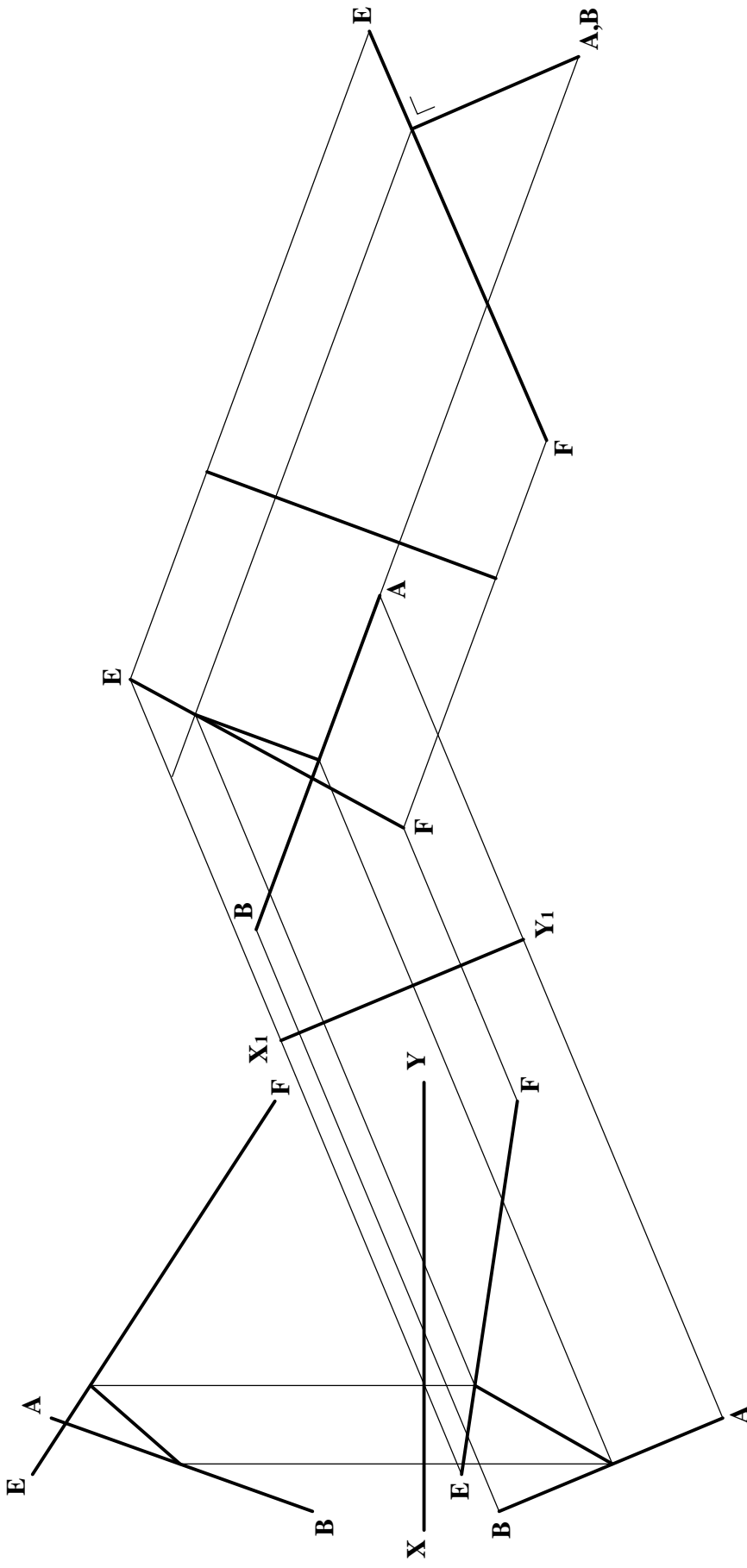
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PROJECTION	MARKING SCHEME.
QUESTION 1(a) & (b).	SCALE: N/A.
DATE: JUNE 2004.	



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
PROJECTION	MARKING SCHEME.
QUESTION 1(a), (b) & (c).	SCALE: N/A.
DATE: JUNE 2004.	



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
PROJECTION	MARKING SCHEME.
QUESTION 1(c).	
SCALE: N/A.	DATE: JUNE 2004.



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.

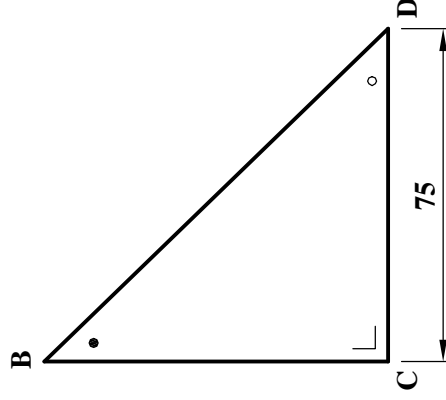
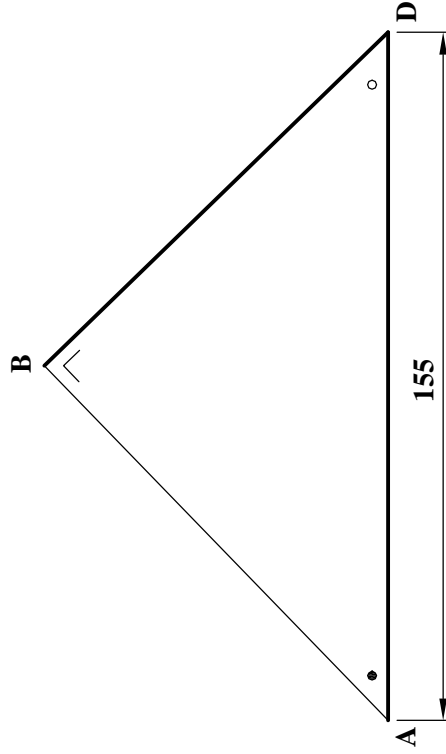
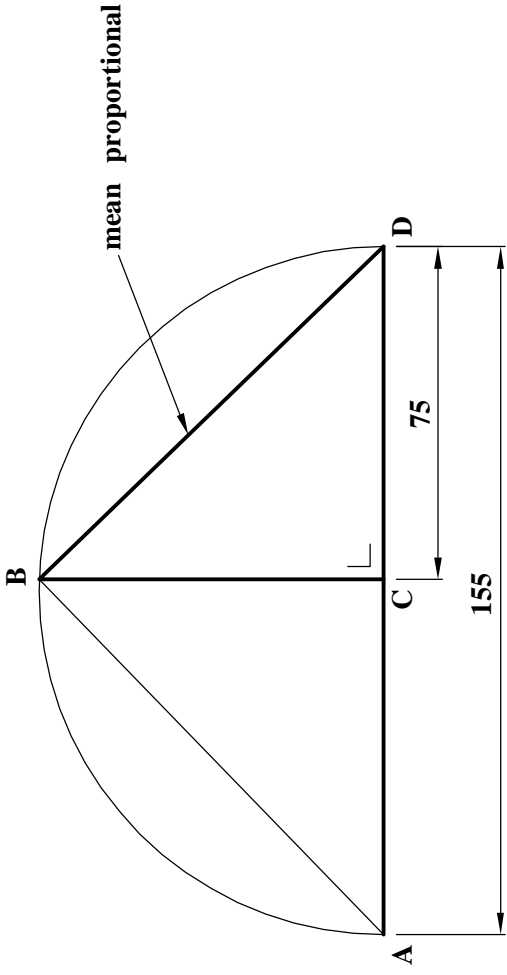
MARKING SCHEME.

QUESTION 1(d)

SCALE: N/A. DATE: JUNE 2004.

PROJECTION





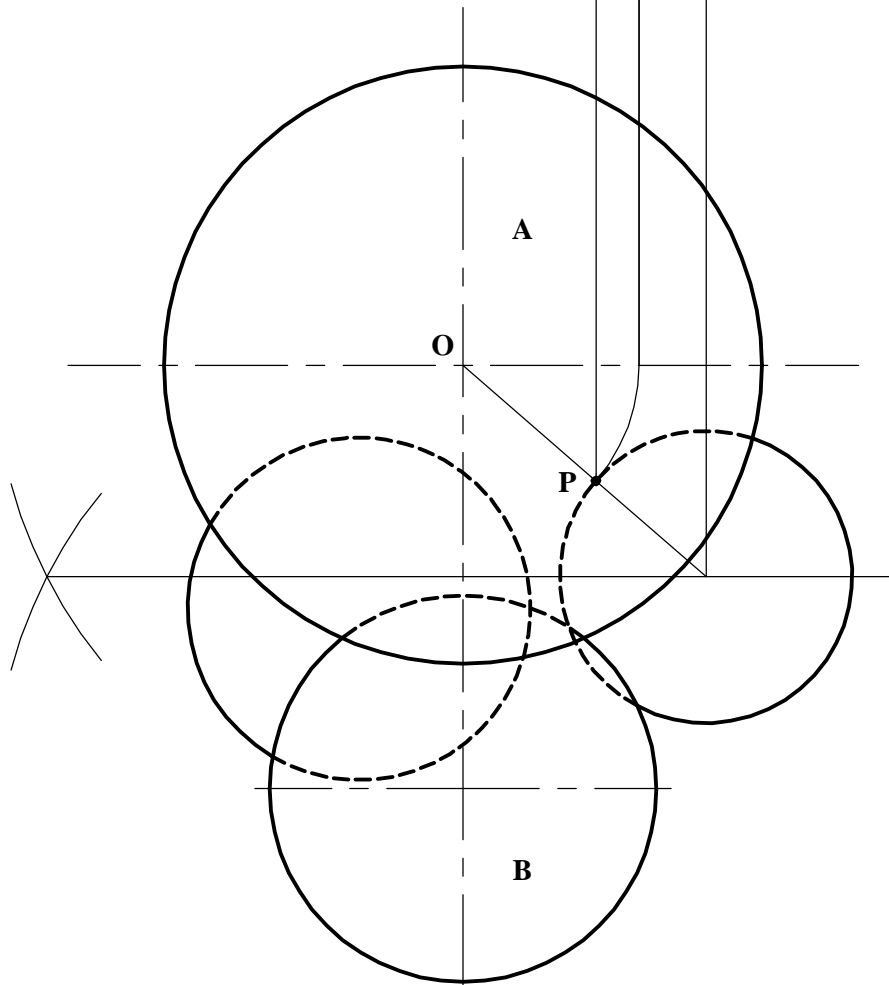
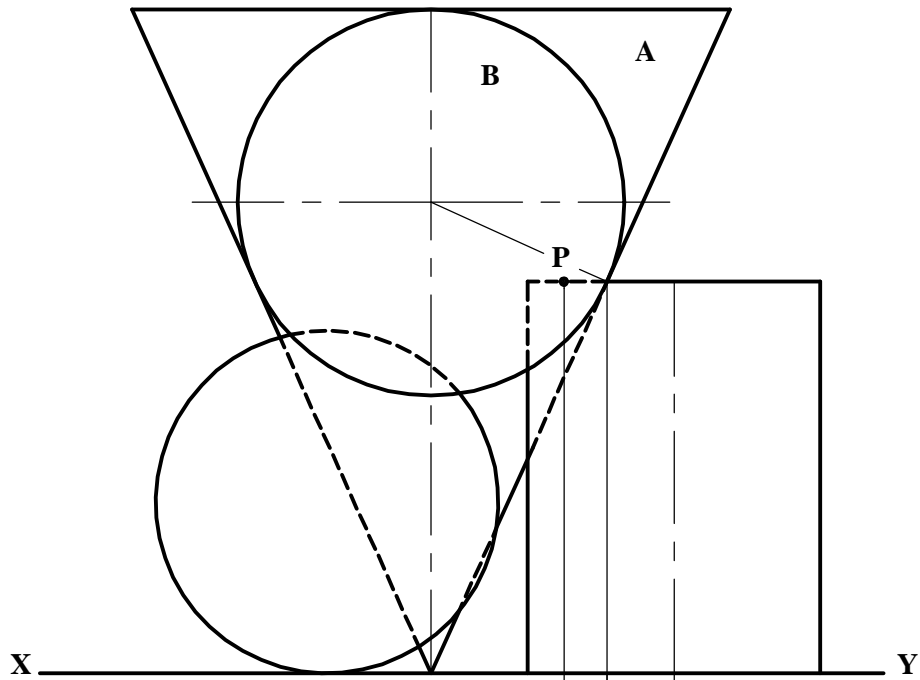
AD : BD = BD : CD

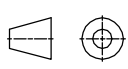
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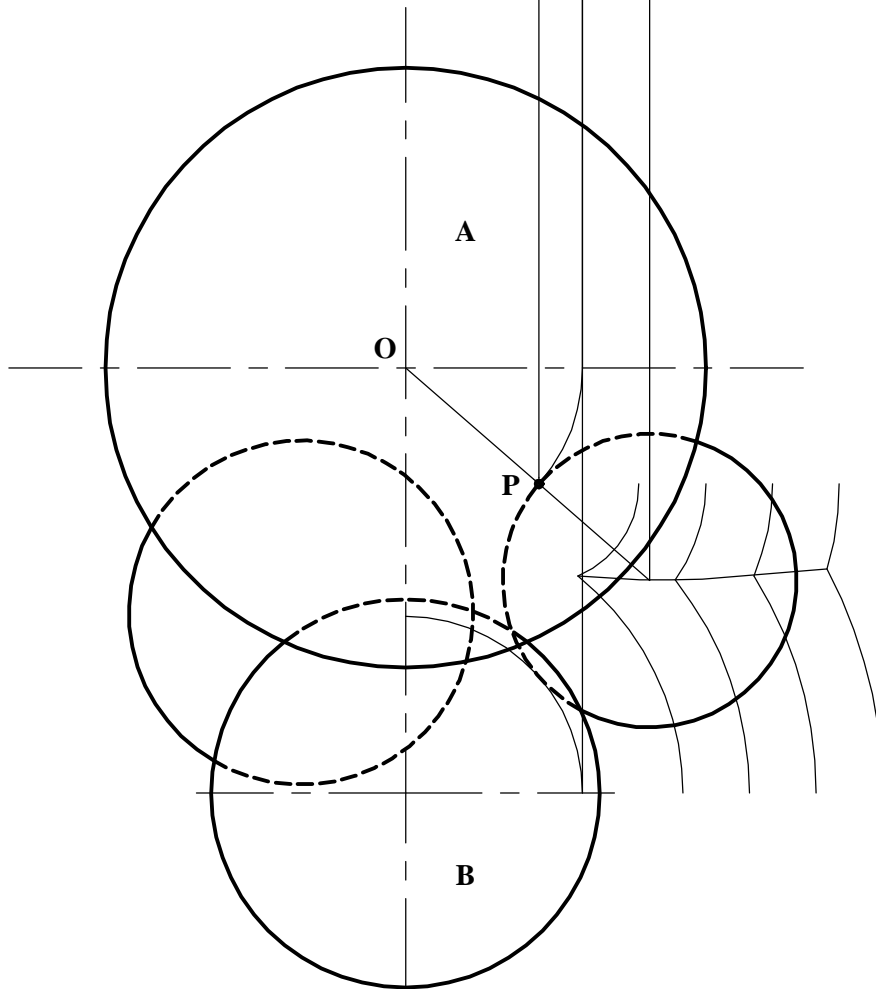
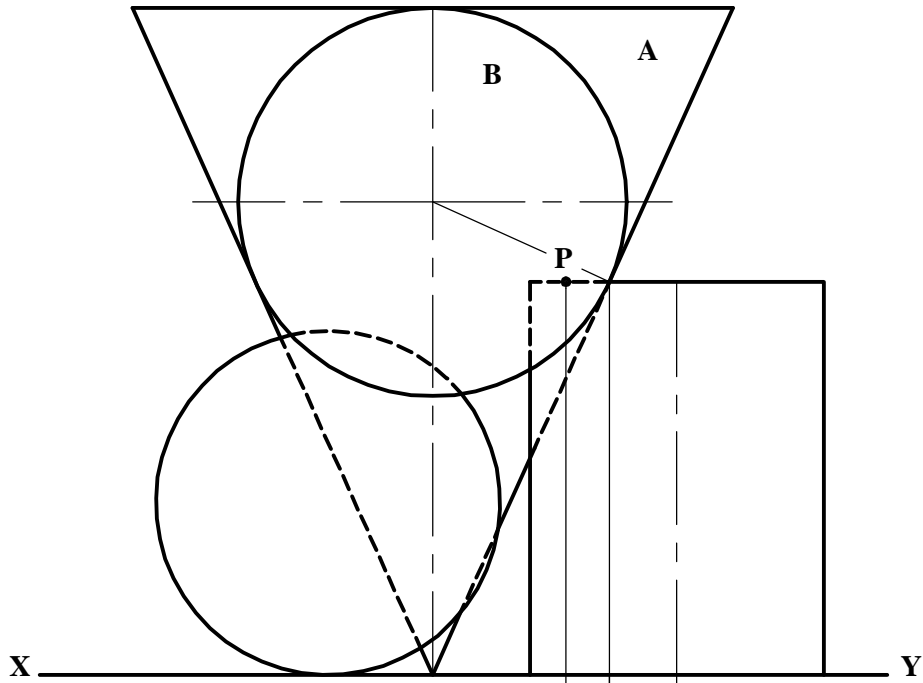
MARKING SCHEME.

QUESTION 2(a): mean proportional

SCALE: N/A. DATE: JUNE, 2004.

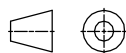


TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
PROJECTION	MARKING SCHEME.
	QUESTION 3(c).
SCALE: N/A.	DATE: JUNE 2004.



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.

PROJECTION

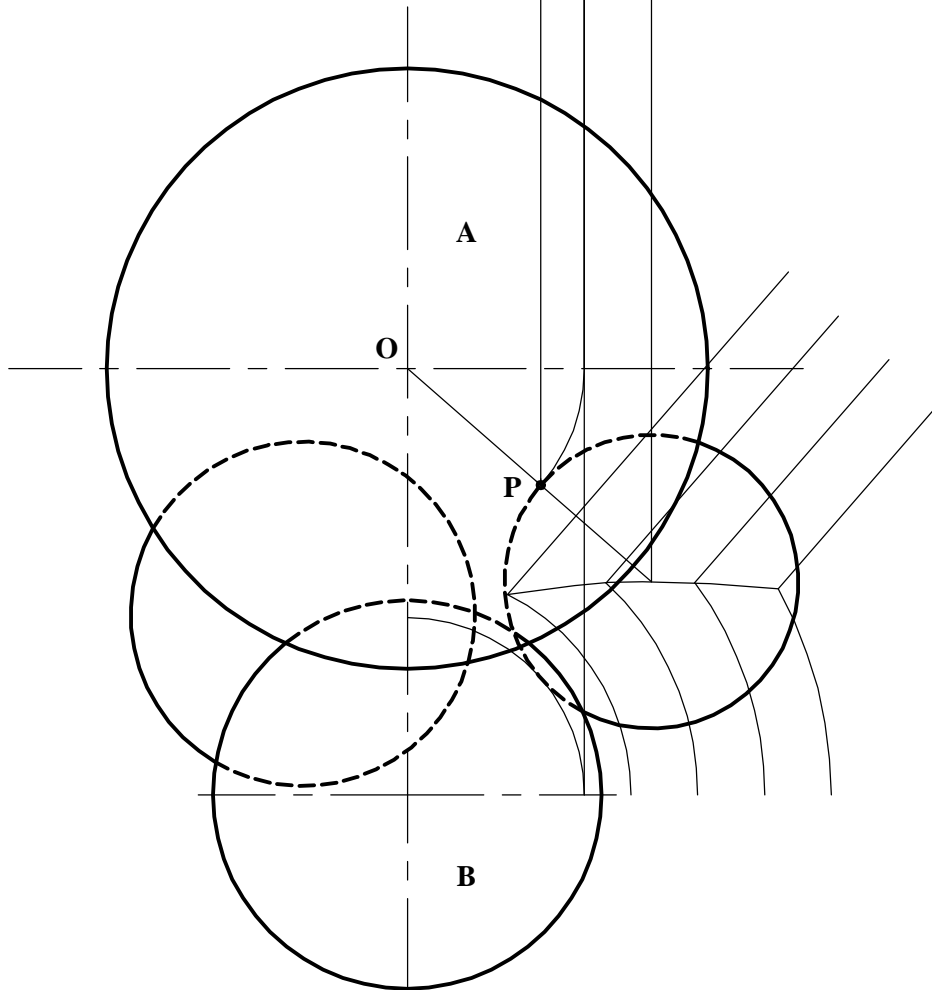
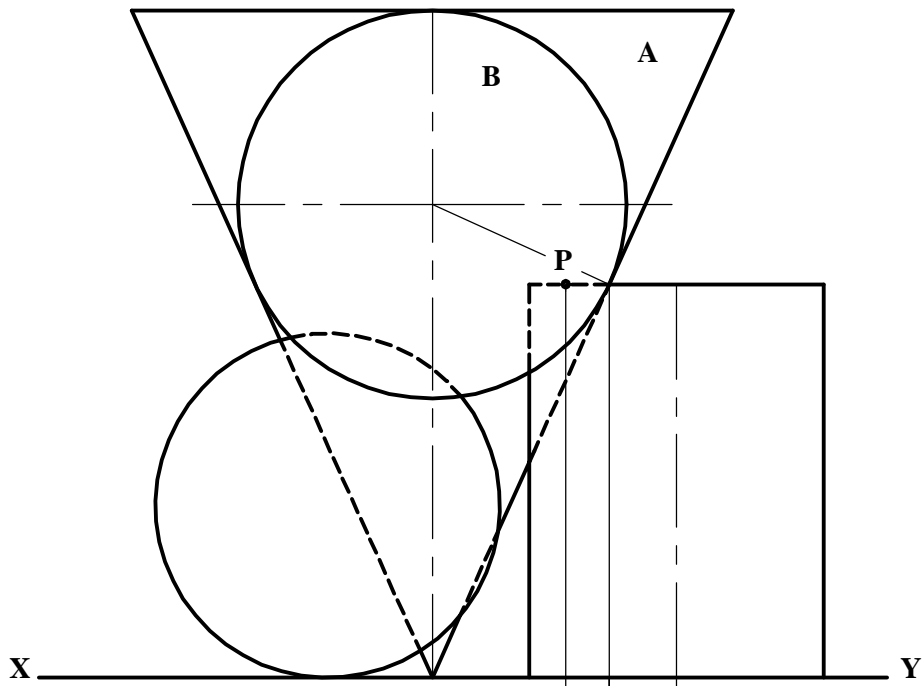


MARKING SCHEME.

QUESTION 3(c).

SCALE: N/A.

DATE: JUNE 2004.



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.

PROJECTION

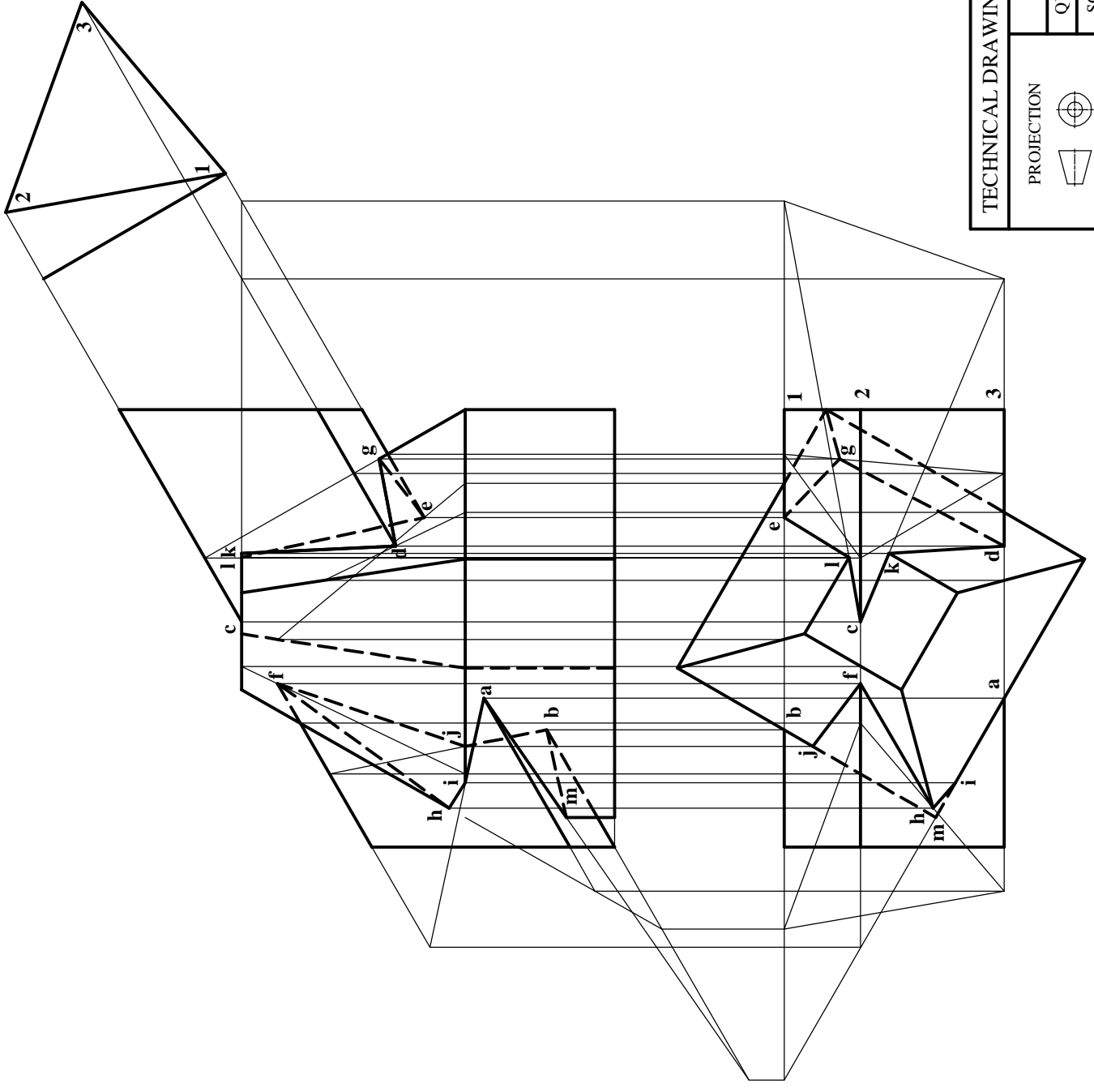


MARKING SCHEME.

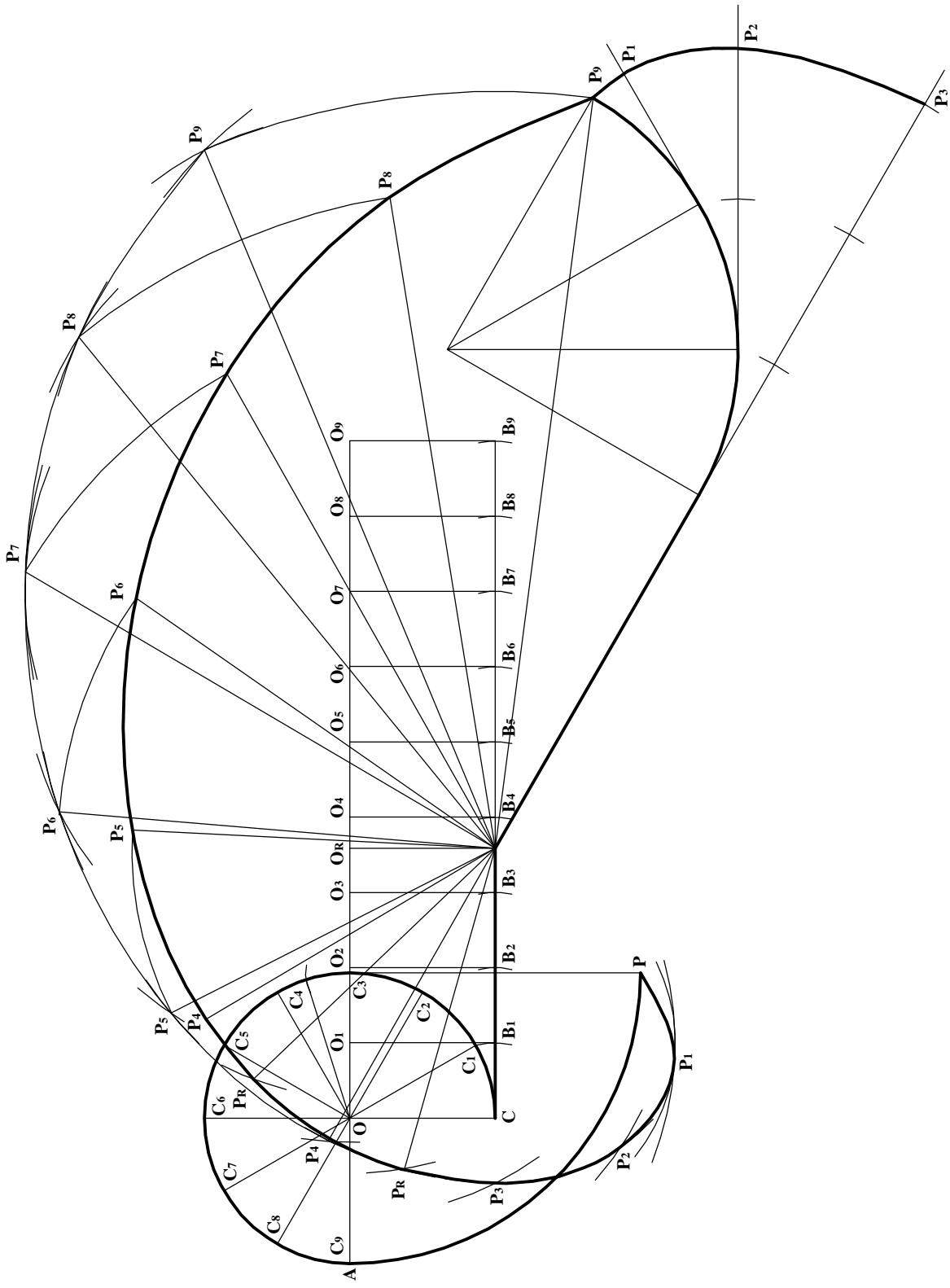
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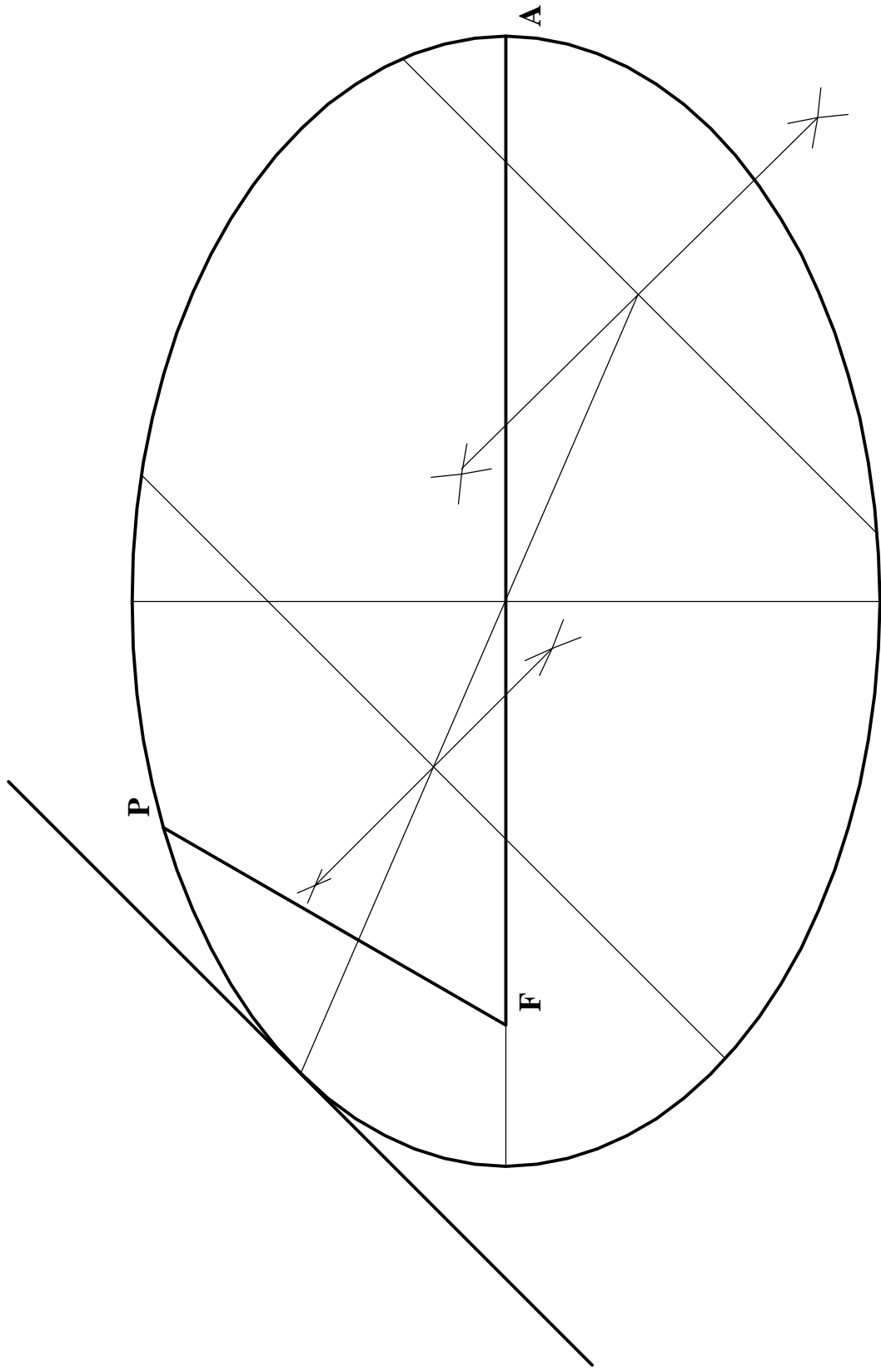
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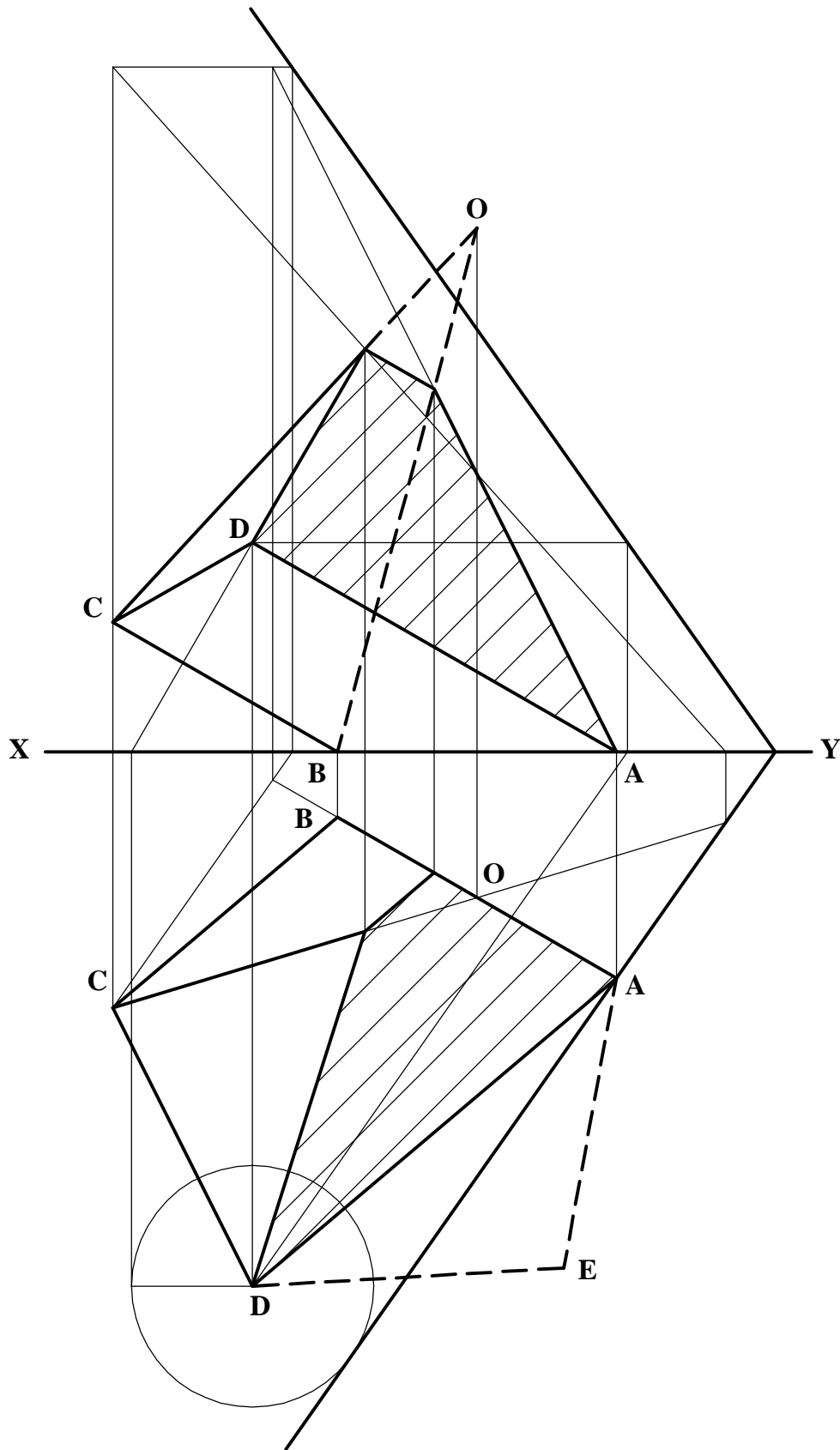
TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
PROJECTION	
MARKING SCHEME.	
QUESTION 4.	
SCALE: N/A.	DATE: JUNE 2004.



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
MARKING SCHEME.	
QUESTION 5.	
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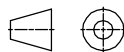


TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.	
MARKING SCHEME.	
QUESTION 6(a)(ii).	
SCALE: 1:1.	DATE: JUNE 2004.



TECHNICAL DRAWING - HIGHER LEVEL - PAPER 1.

PROJECTION



MARKING SCHEME.

QUESTION 7(a) - cut surface

SCALE: N/A.

DATE: JUNE 2004.



Leaving Certificate Examination 2004

Technical Drawing

Higher Level

Paper II(A)

Engineering Applications

Marking Scheme & Sample Solutions

MARKING SCHEME: QUESTION 1

(a)	ASSEMBLY	6
(b)	SECTIONAL ELEVATION A-A	27
(c)	ADDITIONAL REQUIREMENTS	10
(d)	MODIFICATION	<u>7</u>
TOTAL		50 Marks

ASSEMBLY	(6)	NUT	3
Shaft in bracket	1	Three faces on nut	1
Bearing on shaft	1	Curves on faces	1
Pulley on bearing	1	Component not hatched	1
Distance piece	1		
Nut and washer on shaft	1	AJUSTING SCREW	3
Adjusting screw fully in bracket	1	Tommy bar	1
		Thread convention and chamfer	1
SECTIONAL ELEVATION	(27)	Component not hatched	1
BRACKET	7		
Bottom recess area	1	ADDITIONAL REQUIREMENTS (10)	
Webs and support web	1	Centre lines	2
Slot	1	Parts item referenced	3
Top area and boss	1	(Leaders; Terminations; Numbers)	
Fillets	1	Title supplied	2
Correct areas hatched & neat	2	(F=1; G=2)	
		Overall presentation	3
SHAFT	4	(F=1; G=2; Ex=3)	
Head and chamfer	1		
Body diameters	1	MODIFICATION	(7)
M24 threads & chamfers	1	Suitable method suggested	2
Component not hatched	1	Method shown in sketch	2
		Sketch presentation	3
BEARING	2	(F=1; G=2; Ex=3)	
Top and bottom areas	1		
Correct areas hatched & neat	1		
PULLEY	4		
Top and bottom rim areas	1		
Boss and web areas	1		
Fillets	1		
Correct areas hatched & neat	1		
DISTANCE PIECE	2		
Top and bottom areas	1		
Correct areas hatched & neat	1		
WASHER	2		
Washer outline	1		
Component not hatched	1		

MARKING SCHEME: QUESTION 2

(a)	CAM & DISPLACEMENT DIAGRAM	30
(b)	MECHANISM	<u>20</u>
	TOTAL	50 Marks

CAM	(30)	MECHANISM	(20)
DISPLACEMENT DIAGRAM	13	LAYOUT	5
Twelve appropriate divisions	1	Centre lines	1
Correct height	1	Cranks AB & CD	1
Dwell	1	Links BE & DE	1
U.A.R construction	3	Link EF	1
U.A.R curve drawn & correct	1	Gear circles correct	1
S.H.M construction	3		
S.H.M curve drawn & correct	1		
Identification system	1	LOCUS	12
Presentation	1	Circle AB divided into 12 parts	1
		Rotation AB correct	1
		Circle CD divided into 6 parts	1
CAM PROFILE	17	Rotation CD correct	1
Correct rotation	2	Location of points E	2
Angular divisions 0° to 360°	1	Locus drawn & correct	3
Intermediate angles used	1	Locus indexed	1
Nearest approach correct	1	Presentation	2
Heights projected and swung	1		
Roller followers drawn	2	STROKE OF PISTON	3
Dwell arc drawn/correct	1	Location of points for F	
U.A.R drawn/correct	2	1	
S.H.M drawn/correct	2	Stroke of piston F 85 ±2mm	1
Camshaft	1	Dimension	1
Identification system	1		
Presentation	2		

MARKING SCHEME: QUESTION 3

(a)	GIVEN VIEWS	5
(b)	TRUE LENGTHS	13
(c)	DEVELOPMENT	24
(d)	SHEETMETAL JOINTS	8
	TOTAL	50 Marks

GIVEN VIEWS	(5)	SHEETMETAL JOINTS	(8)
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Elevation correct	2	FIRST JOINT	4
Plan correct	2	Suitable joint provided	1
Centre lines	1	Sketch detail correct	1
		Correct title	1
		Sketch presentation	1

TRUE LENGTHS	(13)		
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Surface divided into triangles	2	SECOND JOINT	4
True lengths	8	Suitable joint provided	1
T/L layout	2	Sketch detail correct	1
Identification system	1	Correct title	1
		Sketch presentation	1

DEVELOPMENT	(24)		
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Total area correct (17 triangles)	17		
One piece development	1		
Seam correct	2		
Curve drawn	1		
Identification system	1		
Presentation	2		

MARKING SCHEME: QUESTION 4

(a)	MACHINE DRAWING	42
(b)	ADDITIONAL REQUIREMENTS	<u>8</u>
	TOTAL	50 Marks

MACHINE DRAWING	(42)	END ELEVATION	10
SECTIONAL PLAN	16	Projected correctly	2
Centre lines	1	Base flange area	1
Flange outline	1	Ø96mm x 42mm cylinder	1
Six Ø10 mm holes	1	Ø126 cylinder	1
Ø126 mm circle	1	Ø80 x 8 mm spigot	1
Ø110 mm circle	1	Stepped surface correct	1
Ø40 mm circle	1	Fillets	1
Ø64 mm circle	1	Centre lines	1
Stepped wall thickness	1	Presentation	1
Ø8 mm hole	1	ADDITIONAL REQUIREMENTS (8)	
Ø20 mm hole	1	(i) Four dimensions	4
Ø96 mm circle	1	(ii) Projection symbol	2
Fillets	1	(iii) Title: Gearbox Cover	2
Correct areas hatched	2		
Presentation	2		
 SECTIONAL ELEVATION	 16		
Centre lines	1		
Flange left & right	1		
Ø10 mm flange holes	1		
Left wall thickness	1		
Ø40 mm hole	1		
Ø64 mm boss area & depth	1		
Ø55 mm counter bored hole	1		
Ø80 mm x 8mm spigot	1		
Top & side wall thickness	1		
Ø20 mm hole	1		
Ø30 mm boss	1		
Fillets	1		
Correct areas hatched	2		
Presentation	2		

MARKING SCHEME: QUESTION 5

(a)	FLANGED COUPLING	16
(b)	ISOMETRIC DRAWING	24
(c)	PIPE FITTINGS	<u>10</u>
	Total	50 Marks

FLANGED COUPLING (16)

Any type of flanged coupling acceptable

Sectional freehand sketch provided	2
Left half coupling details	2
Right half coupling details	2
Coupling fastenings (Bolts, washers, nuts)	2
Securing of coupling on shafts	2
Correct areas hatched	2
Sketch scale & proportion	2
Sketch presentation	2

ISOMETRIC DRAWING (24)

ISOMETRIC SURFACES 16

Front angle iron section	1
Front angle iron surfaces	2
Front plate outline	4
Channel iron	3
Stiffening plate	3
Rear plate	2
Rear angle iron	1

VIEW DETAILS 8

Isometric drawing provided	1
Correct viewpoint	1
Construction of curves	3
Accuracy	1
Presentation	2

PIPE FITTINGS (10)

90° ELBOW 3

Elbow provided	1
Complete shape description	1
Sketch neatness/proportion	1

TEE JUNCTION 3

Tee junction provided	1
Complete shape description	1
Sketch neatness/proportion	1

CROSS 3

Cross provided	1
Complete shape description	1
Sketch neatness/proportion	1

LABELLING/PRESENTATION 1

MARKING SCHEME: QUESTION 6A

(a)	BEVEL GEAR DRAWING	20
(b)	GEAR AND RACK	<u>30</u>
	TOTAL	50 Marks

BEVEL GEAR DRAWING	(20)	GEAR AND RACK	(30)
		SPUR GEAR ELEVATION	14
Centre line	1	Pitch circle	1
Pitch circle diameter	1	Addendum circle	1
Pitch cone angle	1	Dedendum circle	1
Back cone angle	2	Tangent (calculation) for base circle	1
Addendum	2	Tooth thickness	1
Dedendum	2	Construction of tooth profile	3
Face width	2	(involute curve or any recognised approximate method acceptable)	
Bore diameter	1	Root radii drawn	1
Hub diameter	1	Second tooth drawn	2
Fillets	1	Centre lines & pitch circle	1
Full shape description	1	Presentation	2
Accuracy	1		
Correct areas hatched	2	RACK	10
Presentation	2	Pitch line	1
		Addendum height correct	1
		Dedendum height	1
		Tooth thickness	1
		Pressure angle	1
		Three teeth drawn	3
		Teeth correctly meshing	1
		Presentation	1
		TABLE OF GEAR VALUES	6
		Calculations & formulae	1
		Table drawn	1
		Data (6 x 1/2 mark each)	3
		Presentation	1

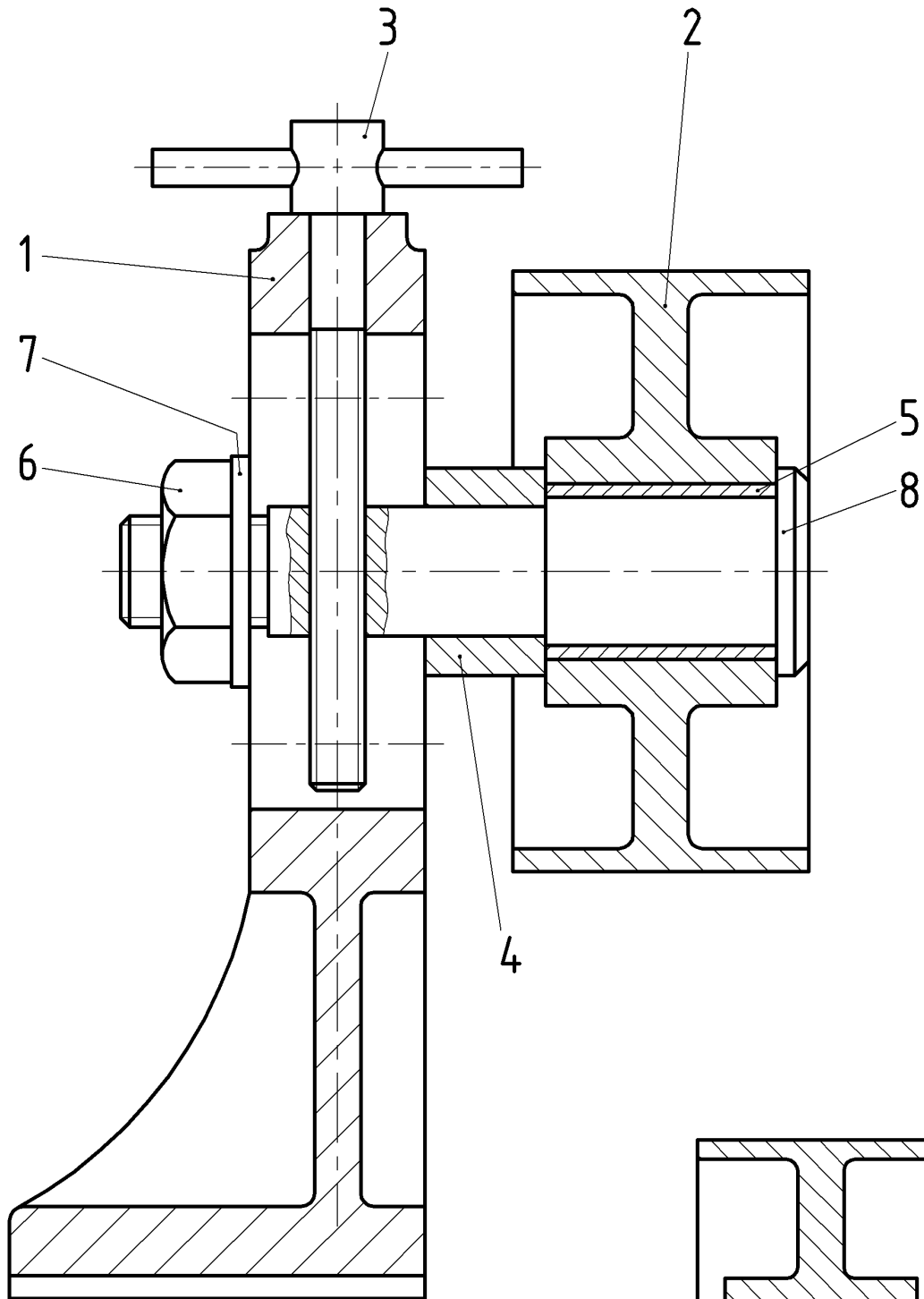
MARKING SCHEME: QUESTION 6B

(a)	SHORT CAD QUESTIONS	12
(b)	TERMINOLOGY PAIRINGS	15
(c)	SOLID MODELLING	12
(d)	CAD DRAWING	<u>11</u>
	Total	50 Marks

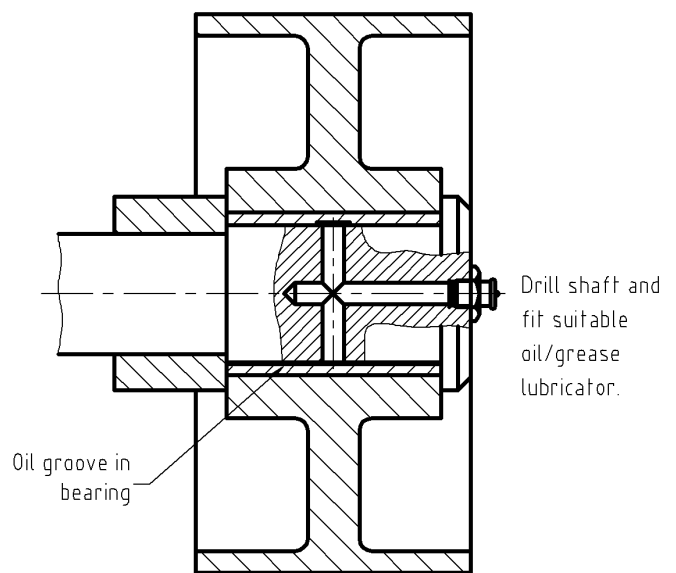
		5		
SHORT CAD QUESTIONS	(12)		CAD PROFILE	(11)
(i)	Two appropriate hardware upgrades	2	Sheet size	1
			Four lines	2
			Mirror	1
(ii)	Three plotters/printers	2	Arc	1
			Circumscribed circle	1
(iii)	Text font, Text style	2	Polygon	1
			Hole	1
(iv)	Baseline dimensioning	2	Array	1
			Presentation	2
(v)	Three zoom commands	2		
(vi)	Menu customisation	2		
(vii)	Zigzag, Phantom, Dot lines	2		
(viii)	Hyperlink explained	2		
	<i>(Maximum 12 marks)</i>			

CAD COMMAND PAIRS	(15)
(i)	Line / Polyline 3
(ii)	Linear / aligned dimensions 3
(iii)	Revolved / Ruled surface 3
(iv)	Paperspace / Modelspace 3
(v)	Torus / Dome 3

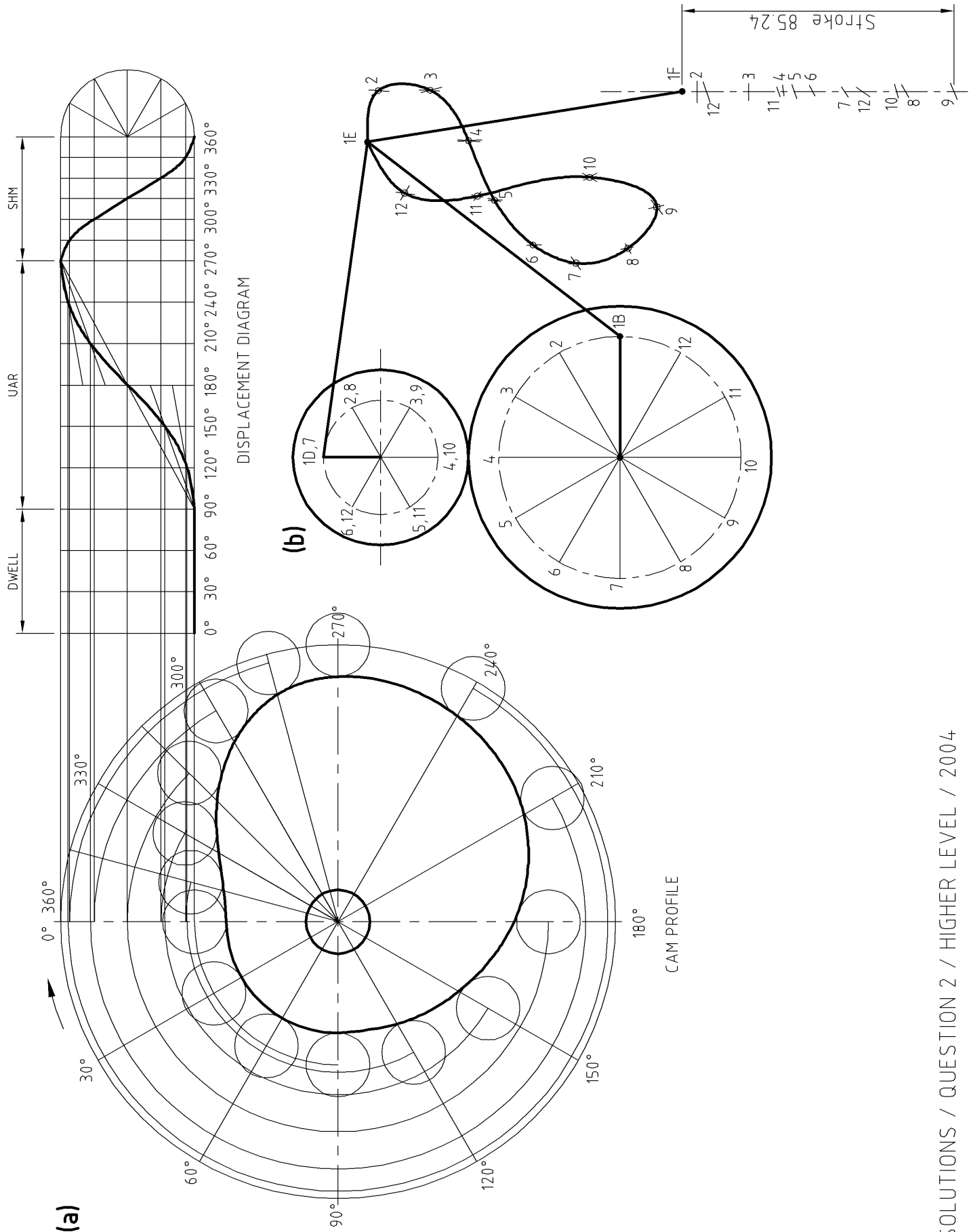
SOLID MODELLING	(12)
(i)	Subtraction correct 3
(ii)	Union correct 3
(iii)	Intersection correct 3
	Clarity of explanation/sketches 3



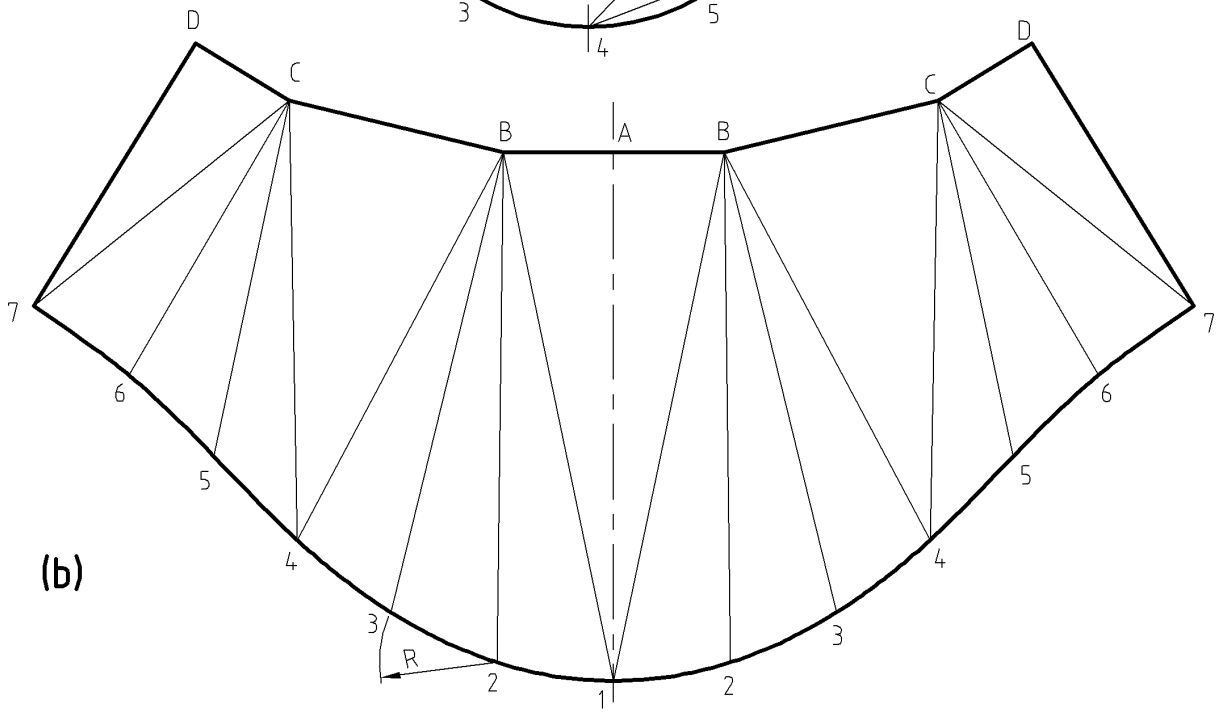
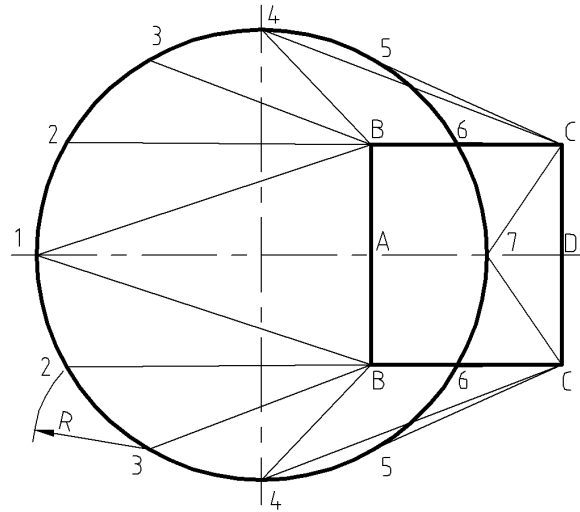
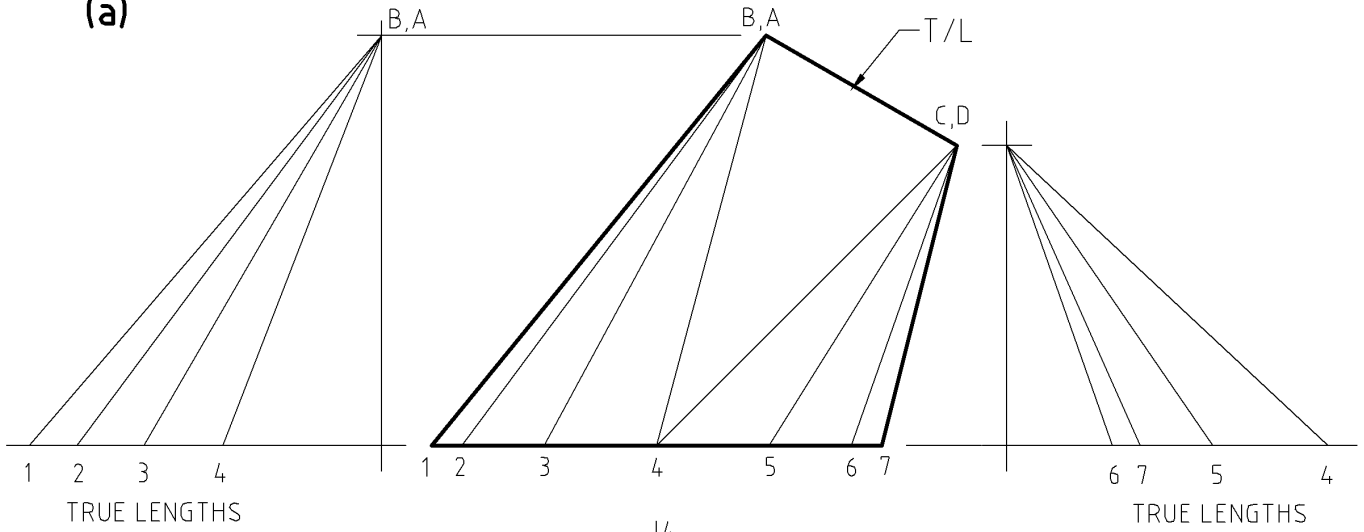
ADJUSTABLE PULLEY



MODIFICATION



(a)

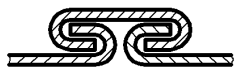


DEVELOPMENT

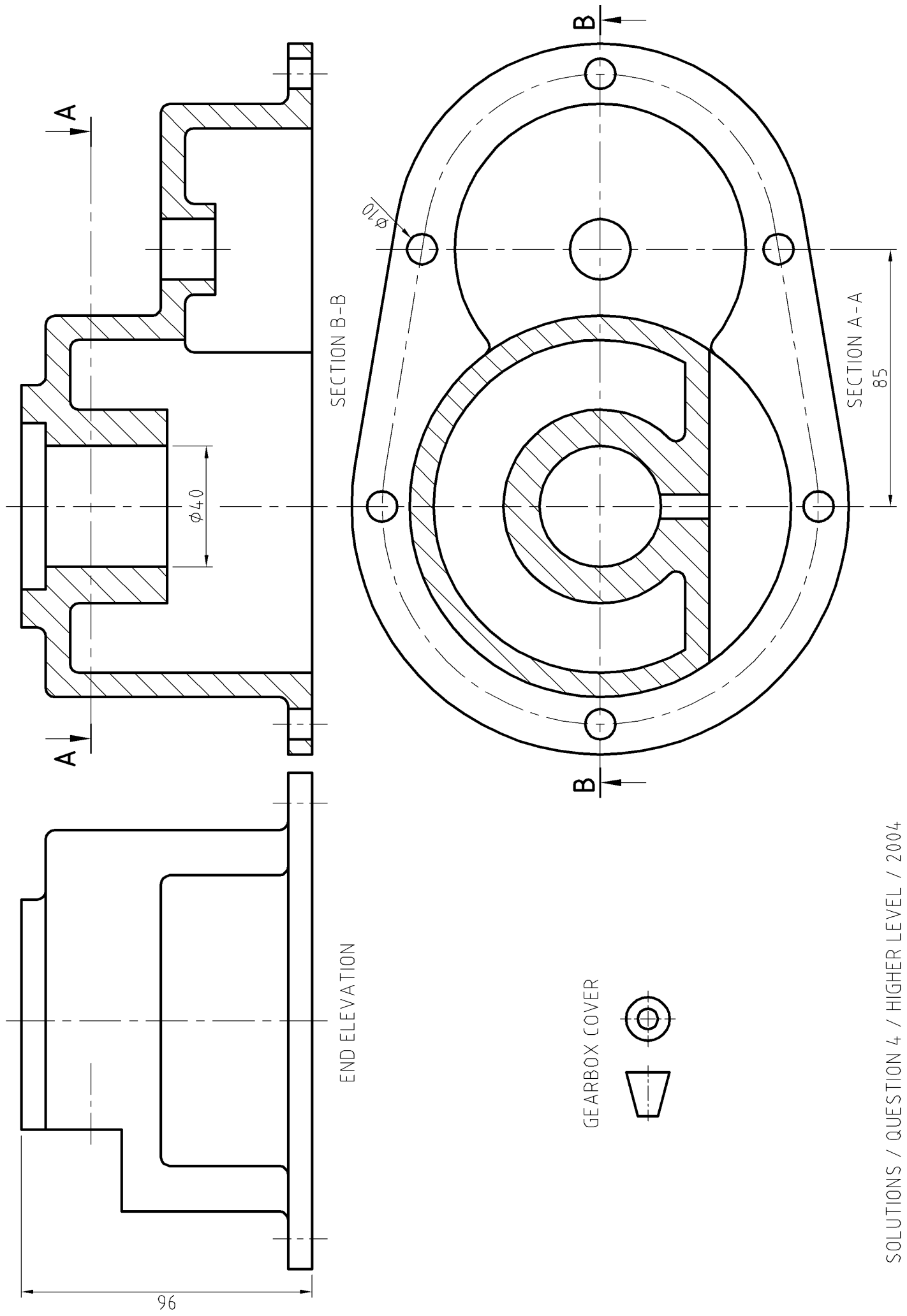
(b)



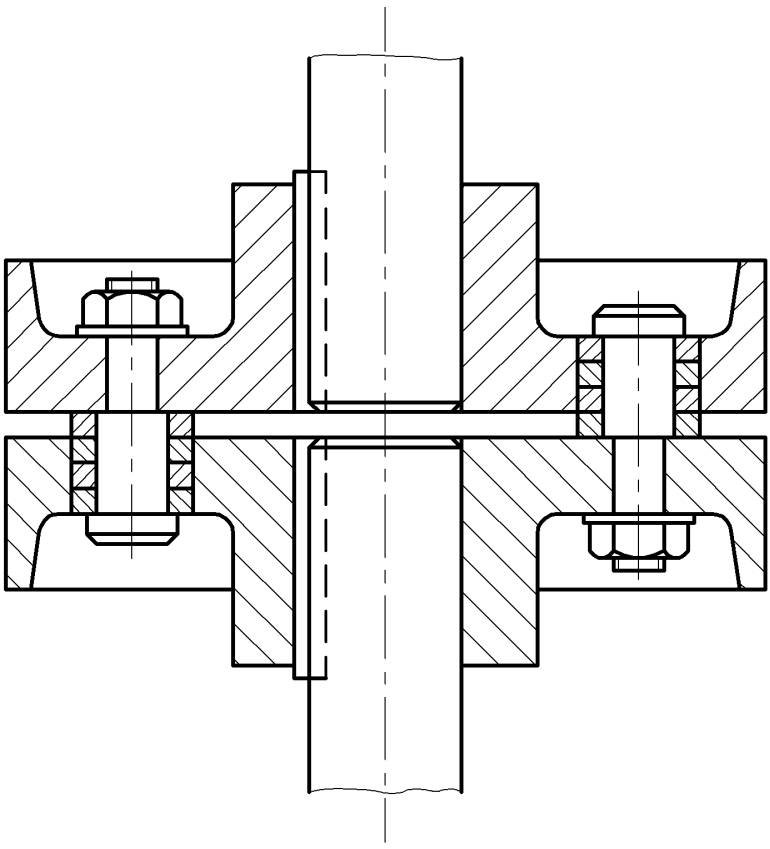
(i) Soldered Lap joint



(ii) Double grooved seam etc

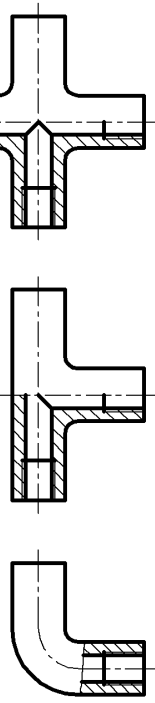


(a)



FLANGED COUPLING
(Flexible Type)

(c)

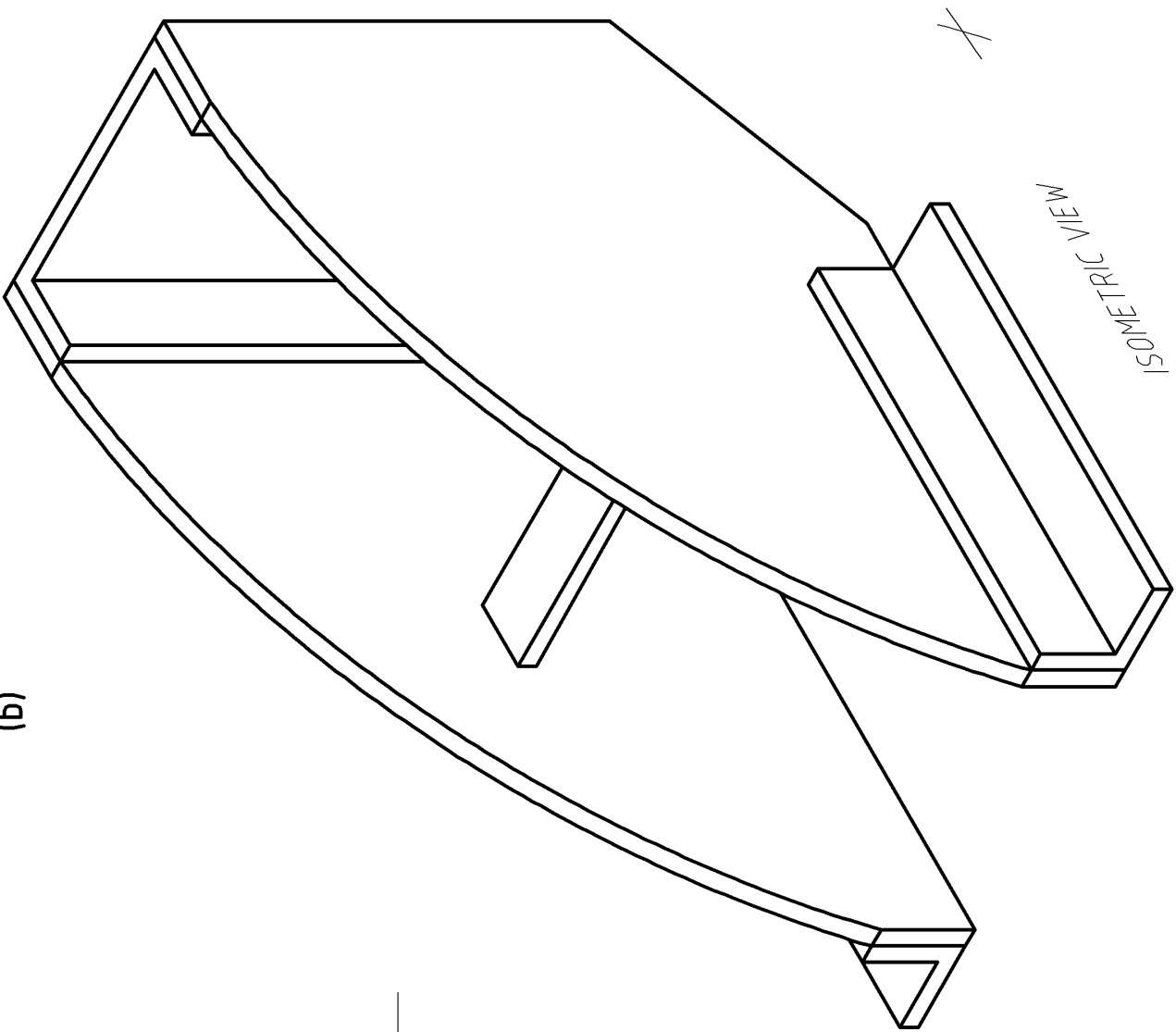


(i) 90° ELBOW

(ii) TEE

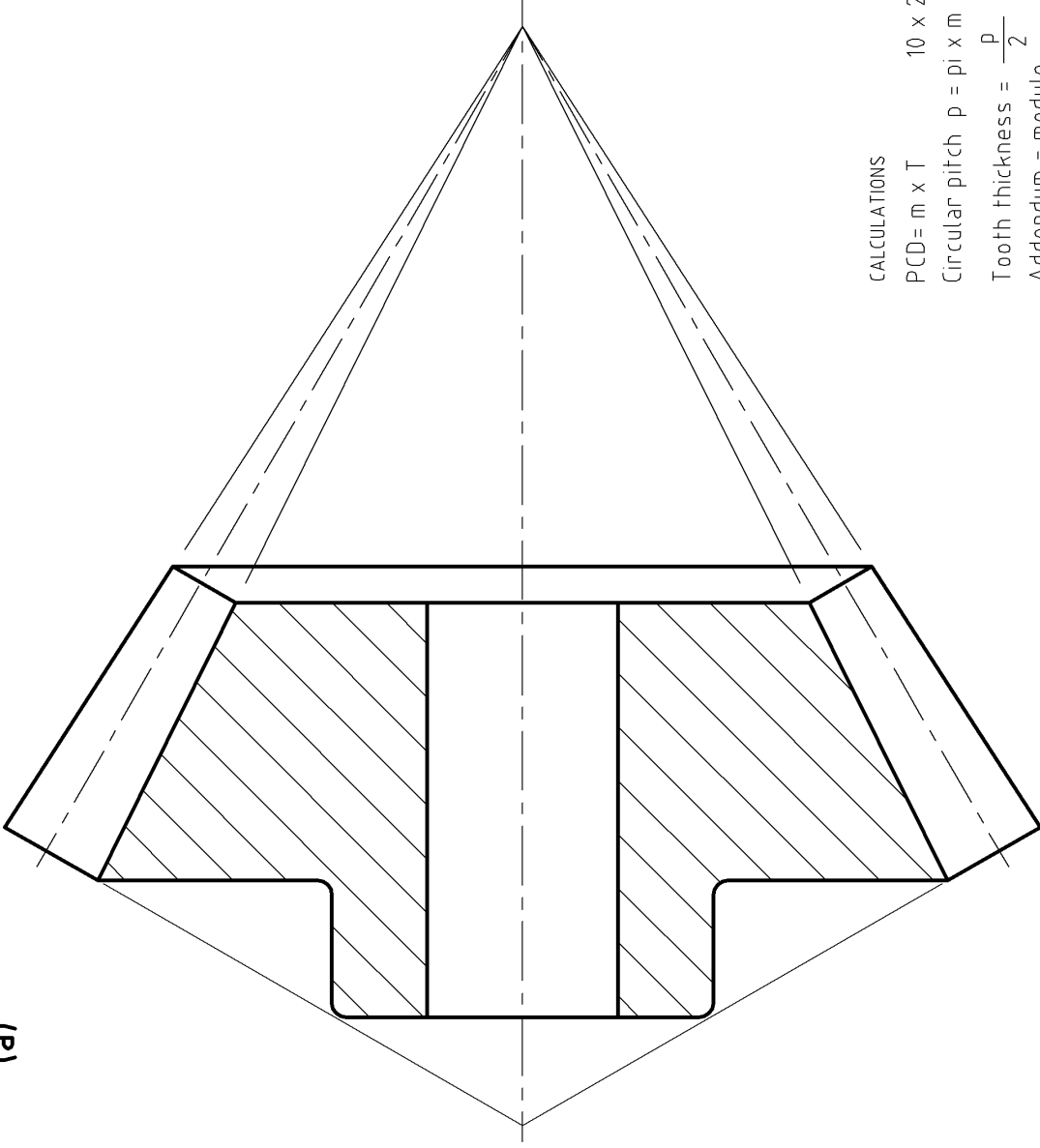
(iii) CROSS

(b)

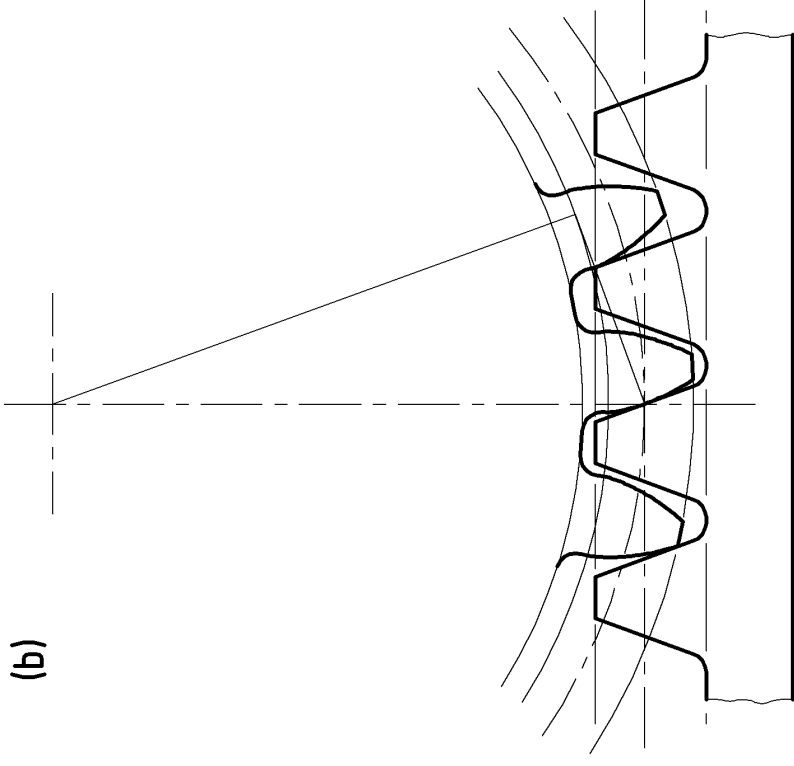


ISOMETRIC VIEW

(a)



(b)



CALCULATIONS

$$PCD = m \times T \quad 10 \times 24 = 240 \text{ mm}$$

$$\text{Circular pitch } p = \pi \times m \quad 3.142 \times 10 = 31.42 \text{ mm}$$

$$\text{Tooth thickness} = \frac{p}{2} = \frac{31.42}{2} = 15.71 \text{ mm}$$

$$\text{Addendum} = \text{module} = 10 \text{ mm}$$

$$\text{Dedendum} = 1.25 \times \text{module} = 1.25 \times 10 = 12.25 \text{ mm}$$

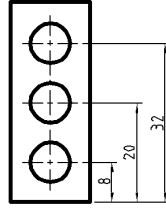
$$\text{Base circle} = \text{Cos } 20^\circ \times PCD = 0.939 \times 240 = 225.5 \text{ mm}$$

SPUR GEAR TABLE	
PITCH CIRCLE DIAMETER	240
ADDENDUM CIRCLE DIAMETER	260
DEDENDUM CIRCLE DIAMETER	215
BASE CIRCLE DIAMETER	225.5
CIRCULAR PITCH	31.42
TOOTH THICKNESS	15.71

- (a) (i) Common hardware upgrades: RAM upgrade; Install a larger hard disk; Install a CD writer; Fit a higher resolution monitor e.g. a 20" TFT display; New motherboard; Processor upgrade; Install a graphics card, modem, network card etc.
- (ii) Laser printer, Ink jet plotter/printer, Pen plotter, Electrostatic plotter.

(iii) Text font is the typeface such as Times New Roman, by changing effects like obliquing angle, width factor you create a new text style which is based on the original Times New Romans font.

Exam E x a m

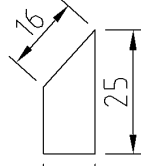


(iv) Baseline dimensioning .

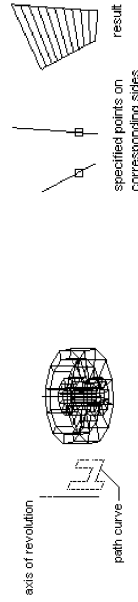
- (b) (i) Polylines are multisegmented lines and can be treated as a single unit.



- (ii) Linear dimensions can be horizontal or vertical. With aligned dimensions, the dimension line is parallel to the line between the extension line origins.



- (iii) Revolved surface creates a revolved surface about a selected axis. Ruled Surface creates a surface mesh between two objects.



- (v) You typically design your drawing in model space and prepare it for plotting in paper space.

(iv) Torus is donut shaped

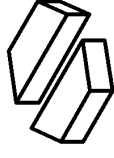


Dome is a semi-sphere

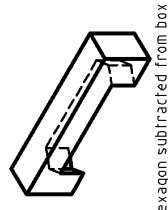


(c)

(i) Subtraction

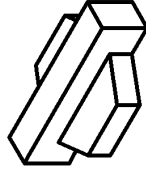


Box subtracted from hexagon



Hexagon subtracted from box

(ii) Union



(iii) Intersection



(v) Zoom Commands: Real time, Previous, Window, Dynamic, Scale, Centre, In, Out, All, Extents.

(vi) If the standard menus in CAD do not contain the commands you use most often, you can customise them or add menus with the commands and macros you need.

(vii) Lintypes:



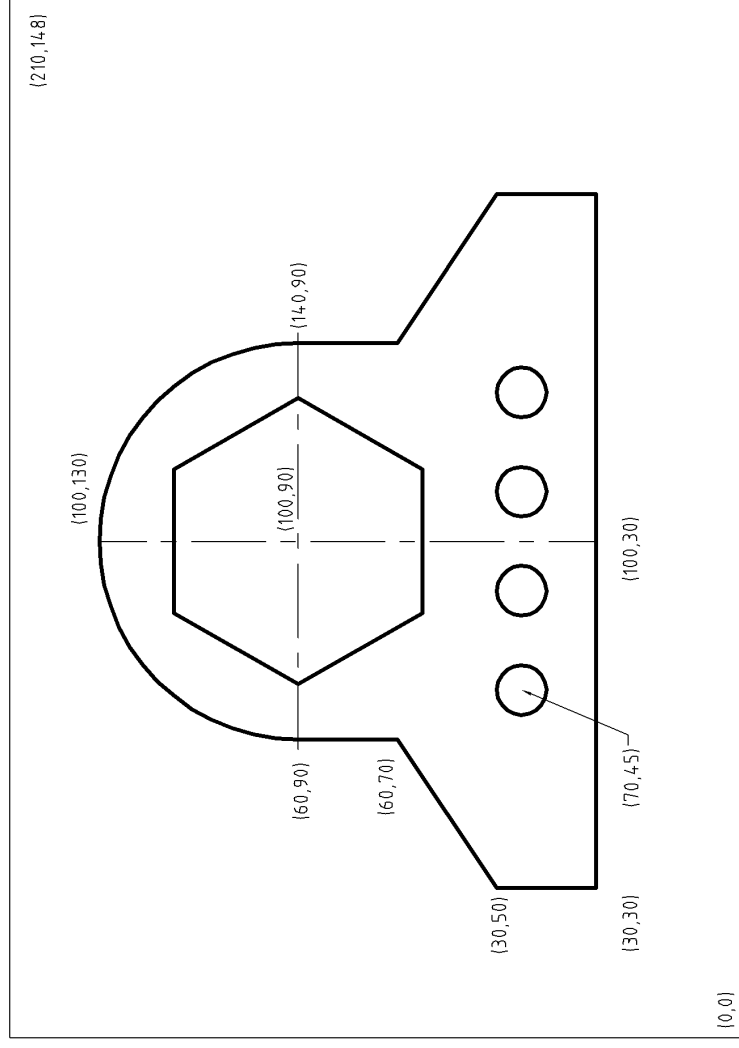
Zigzag

Phantom

Dot

(viii) Hyperlink: is a piece of text or an object defined in a web drawing and clicking it performs an action such as moving to a different part of the same drawing or displaying a new page/web site etc.

(d)





Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2004

Technical Drawing

Paper 2B – Higher Level

(Building Applications)

***Marking Scheme &
Sample Solutions***

(Other valid solutions are acceptable and marked accordingly)

QUESTION 1

	MARKS
1. Draw the given plan	2
2. Position spectator and plan of picture plane.....	2
3. Plan of vanishing points	2
4. Ground line, horizon line, vanishing points in elevation(1, 1, 2).....	4
5. Projection lines from plan to spectator.....	1
6. Perspective of base lines of main structure (2, 2).....	4
7. Measure and apply heights 1, 2, 3 (1, 4, 4)	9
8. Determine auxiliary vanishing points 1 and 2 (or alternative).....	6
9. Draw lines in perspective vanishing to AVP1	3
10. Draw line in perspective vanishing to AVP2.....	2
11. Complete perspective of blocks A, B, C (2, 2, 2).....	6
12. Determine base lines of block D.....	2
13. Construction to determine points on curves	4
14. Complete perspective of block D.....	3

TOTAL...50

QUESTION 2

(a) Plan and Elevation of Roof Surfaces (32)	MARKS
1. Set up given outline and dimensions in plan and elevation	3
2. Draw edge view of surface E.....	4
3. Transfer heights to edge view, determine points 1 and 2 in plan.....	4
4. Draw surface A in elevation and plan (1, 2).....	3
5. Construction to determine surface C in plan	6
6. Complete plan and elevation of surfaces B and C.....	3
7. View showing true length of line of intersection between C and D..	3
8. Construction to determine trace of surface D in plan	4
9. Complete plan and elevation of surface D	2
(b) Development of surface C (7)	
10. Construction to determine true widths for development	5
11. Draw development of surface C	2
(c) Dihedral Angle between Surfaces A and B (11)	
12. View showing true length of line of intersection between A and B..	5
13. Construction to find dihedral angle.....	5
14. Indicating dihedral angle	1

TOTAL... 50

QUESTION 3

GIVEN VIEWS (8)		MARKS
1.	Draw the given plan and elevation.....	6
2.	Draw light rays in plan and elevation	2

PLAN (30)

3.	Draw outline shadow cast by cylinder in plan	2
4.	Draw outline shadow cast by cone	6
5.	Construction and drawing of shadow cast by sphere.....	8
6.	Complete shadows cast on ground	2
7.	Determine area of shade on cone	4
8.	Construction to determine area of shade on sphere	6
9.	Complete areas of shade	2

ELEVATION (12)

10.	Determine line of shade on cone in elevation	2
11.	Determine line of shade on sphere	3
12.	Construction to determine area of shade and shadow on cylinder	5
13.	Complete area of shade and shadow on cylinder	2

TOTAL..50

QUESTION 4

Part (a) (40)	MARKS
1. Set up base circle in plan, plan of entrance	2
2. Set up base line and elevation of entrance	2
3. Construction to determine throat circle in plan	4
4. Construction to determine throat height in elevation	7
5. Construction to determine hyperbolic curves in elevation	9
6. Draw hyperbolic curves, complete top of structure.....	5
7. Determining points on elliptical curves in plan.....	7
8. Complete plan	4
 Part (b) (10)	
9. Determine true lengths for development.....	4
10. Combine true lengths with widths from plan	4
11. Draw development	2
TOTAL...50	

QUESTION 5

(a) Set up, Dip, Strike and Thickness of Stratum (33) MARKS

1. Outline of bore-holes in plan, points A and B in elevation 4
2. Bore-hole A in elev., points 3 and 4 in elev. and plan (3, 2, 2) 7
3. Bore-hole B in elev., points 1 and 2 in elev. and plan (3, 2, 2)..... 7
4. Draw lines 1, 3 and 2, 4 on headwall and footwall in plan (1, 1) 2
5. Draw lines 1, 3 and 2, 4 on headwall and footwall in elev. (1, 1)..... 2
6. Determine a plane parallel to line in elevation..... 3
7. Determine the plane in plan..... 3
8. Determine strike in plan 2
9. Direction of auxiliary elevation, dip and thickness (1, 1, 1)..... 3

(b) Altitudes at which bore-hole reaches surfaces of stratum (17)

10. Draw the plan of westerly bore-hole..... 1
11. Determine vertical section through the stratum..... 5
12. Set up bore-hole at 45° to the stratum..... 5
13. Construction to determine required altitudes 5
14. Indicating altitudes 1

TOTAL...50

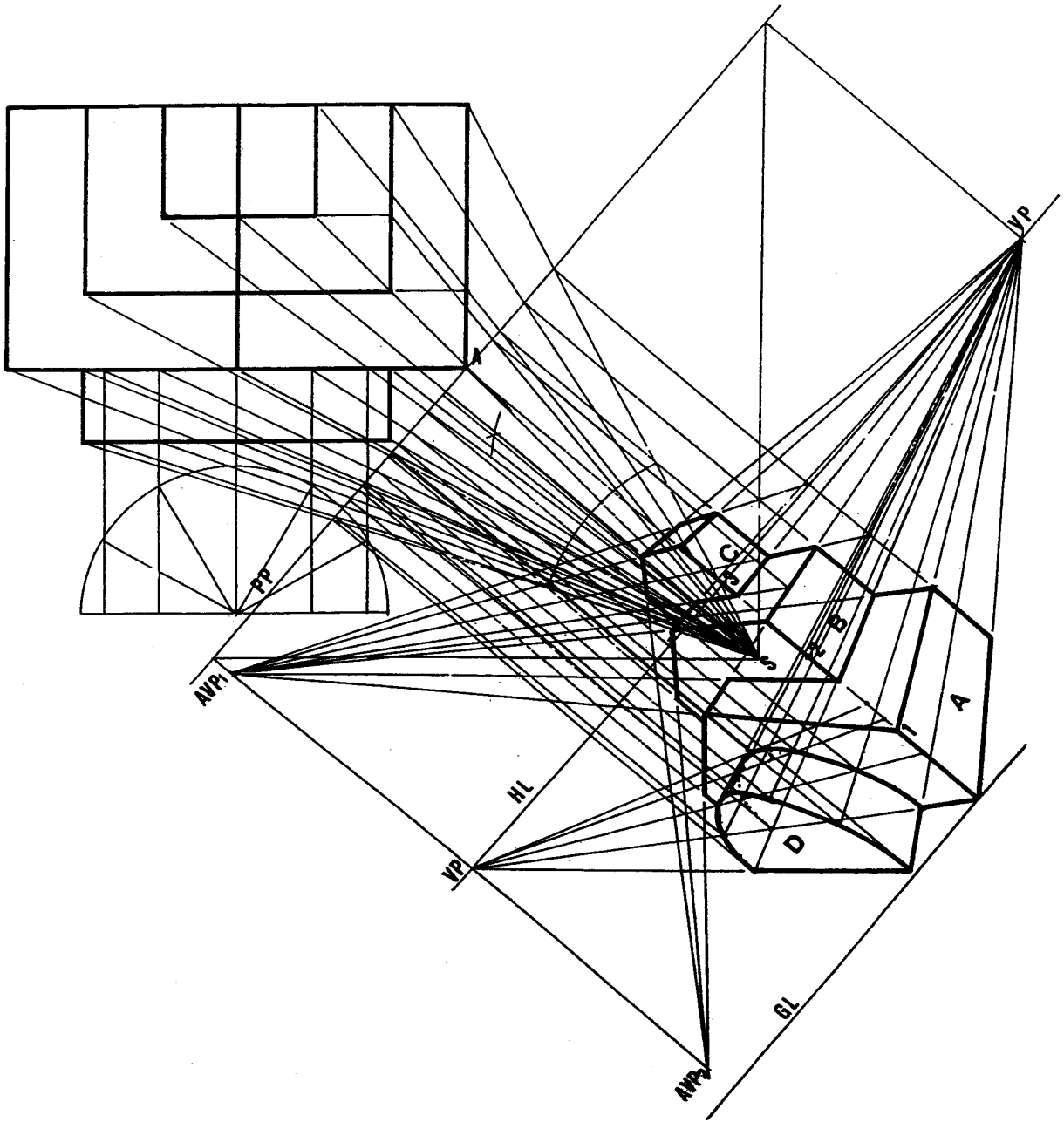
QUESTION 6

Part A (23) - Plan and Elevation	MARKS
1. Draw the given outline plan, set up outline elev. of ABCD	4
2. Draw elements on ABCD in plan, and project to elev. (2, 3)	5
3. Extend elements on ABCD to circular perimeter in plan	3
4. Method for determining perimeter curve in elevation.....	6
5. Complete elevation	5
 Part B (9) - True Shape of Section S-S	
6. Project at right angles to S-S, set up XY line.....	2
7. Determine heights from elevation, measure in auxiliary view	4
8. Draw curve.....	3
 Part C (12) – Traces of Plane Director	
9. Plane parallel to element in plan.....	3
10. Plane parallel to element in elevation	3
11. Determine horizontal trace	3
12. Determine vertical trace	3
 Part D (6) – Angle between Traces of Plane Director	
13. Construction to determine the required angle	5
14. Indicating true angle.....	1
TOTAL...50	

QUESTION 7

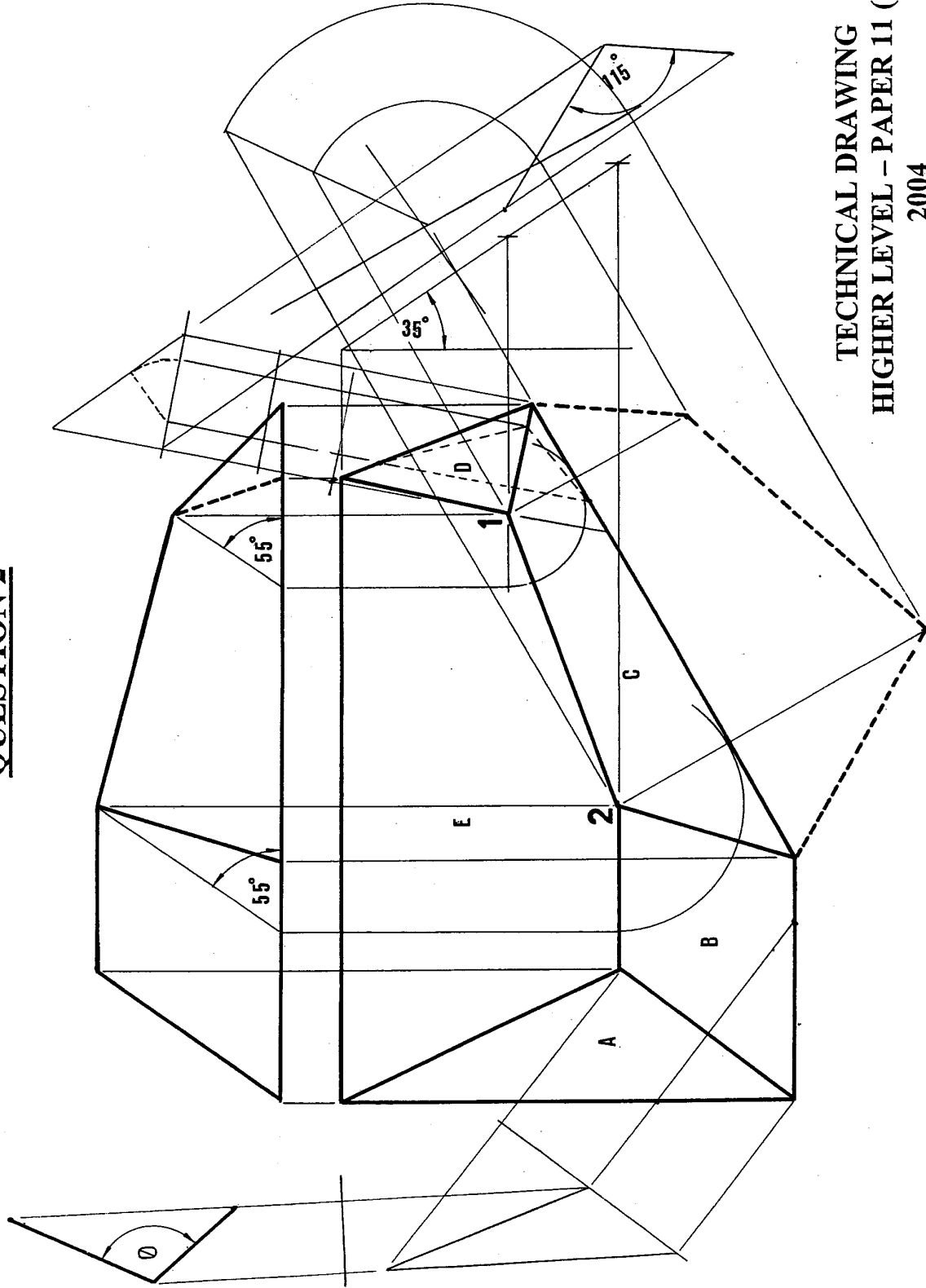
Earthworks between A and B – Level (7)	MARKS
1. Parallel lines at 10 m intervals.....	2
2. Intersections with contours, drawing curves	5
Main roadworks between B and D – Embankments (9)	
3. Determine arcs rad. 20 m at 65 m level, draw tangents from B.....	3
4. Drawing parallel lines at 10 m intervals	3
5. Intersections with contours, drawing curves	3
Main roadworks between B and D – Cuttings (11)	
6. Determine arcs rad. 15 m at B, draw tangents from 65 m level.....	3
7. Determine parallel lines at 7.5 m intervals.....	3
8. Intersections with contours, drawing curves	3
9. Constructions to determine intersections of cut and fill curves	2
Parking Area (23)	
10. EDGE AT B - Parallel lines at 7.5 m intervals.....	2
11. Intersections with contours, drawing curve.....	2
12. EDGE AT C – Determine arc at 55 m level, tang from 65 m level ..	3
13. Parallel lines at 7.5 m intervals	2
14. Intersection with contours, drawing curve	3
15. EDGE PAR. TO ROAD – Arc at 55 m level, tang from 65 m level.	3
16. Parallel lines at 7.5 m intervals	2
17. Intersections with contours, draw curve.....	3
18. Construction to determine intersection of cutting curves	3
TOTAL...50	

QUESTION 1



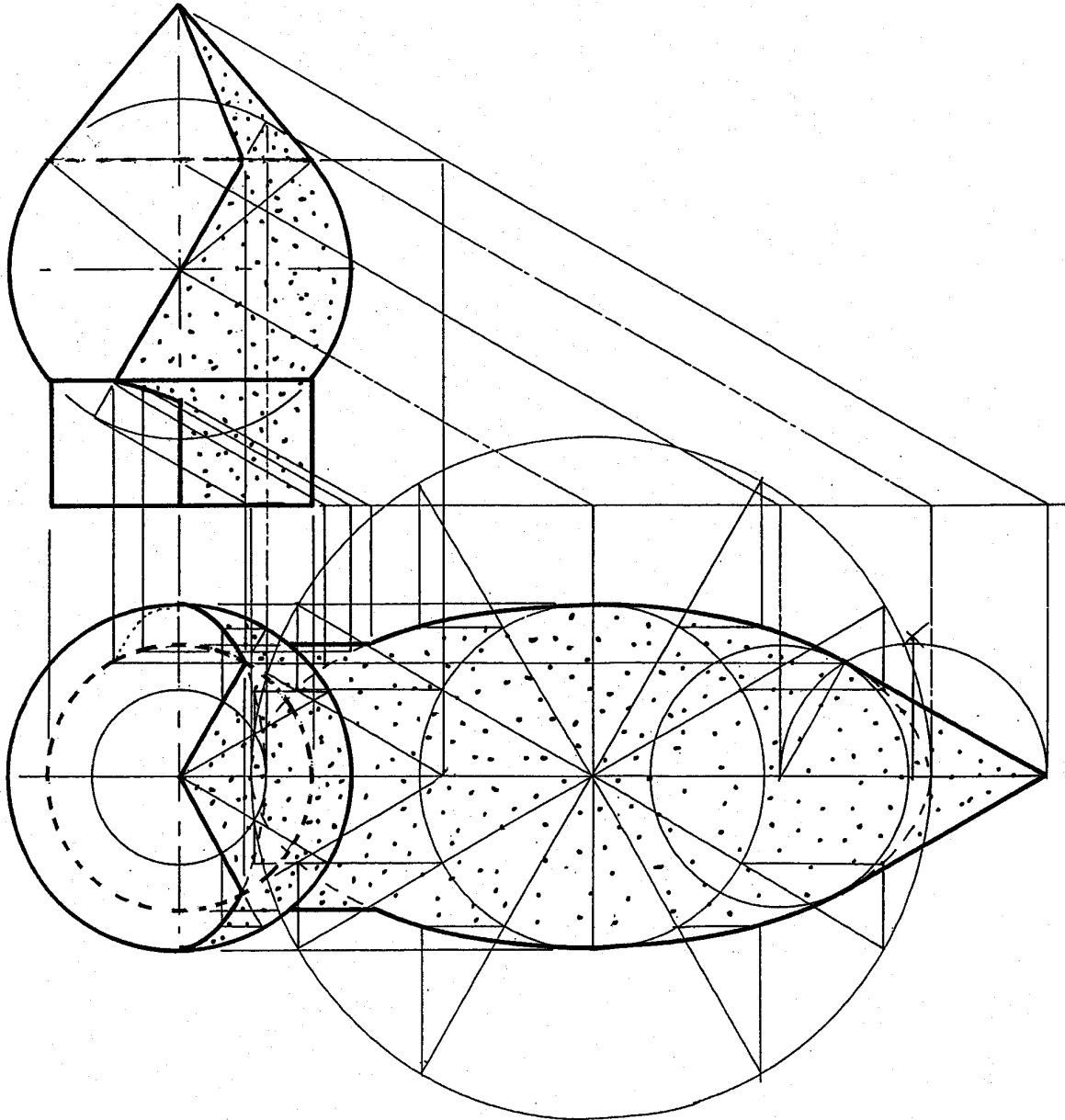
**TECHNICAL DRAWING
HIGHER LEVEL – PAPER 11 (B)
2004**

QUESTION 2



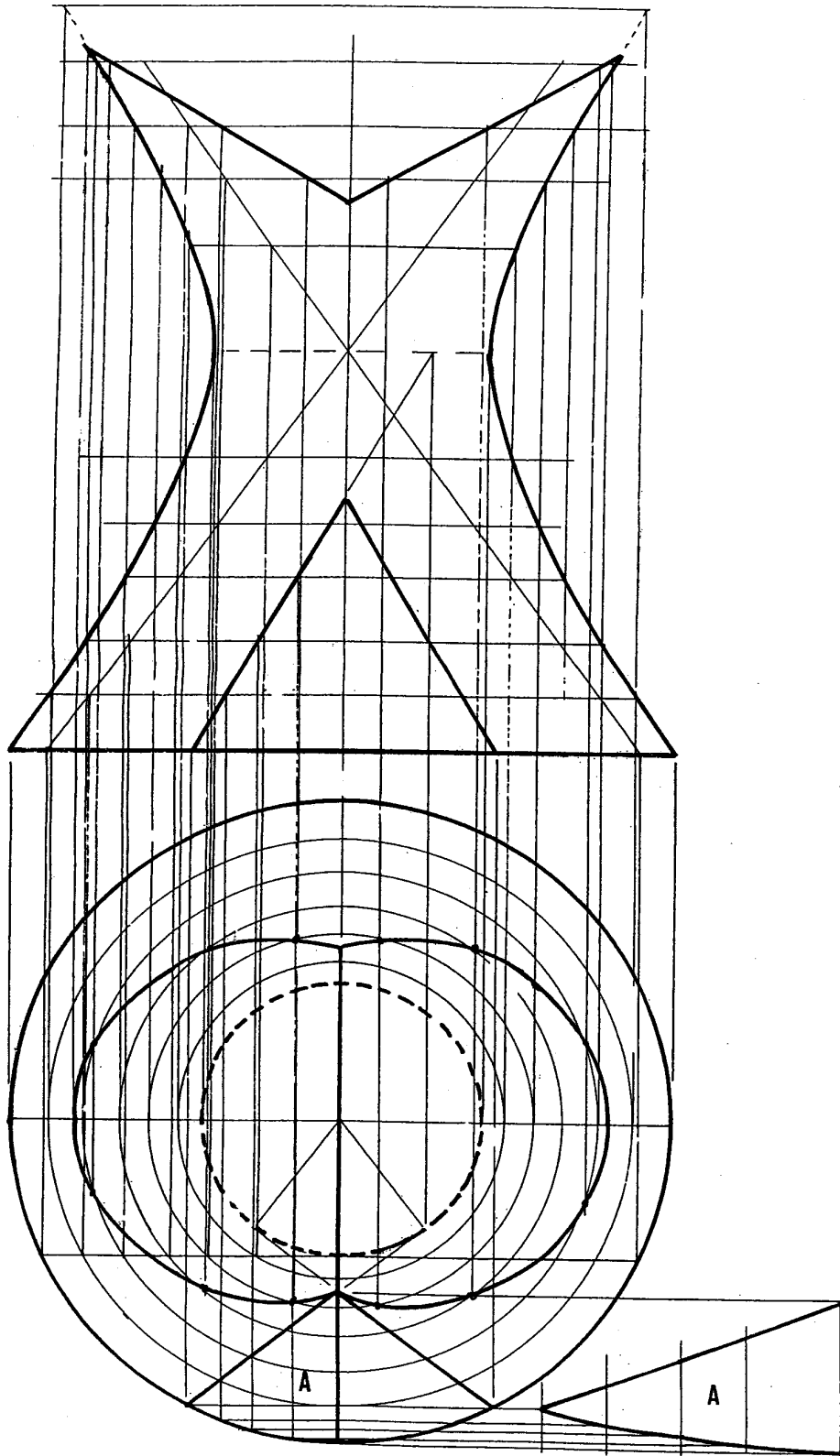
TECHNICAL DRAWING
HIGHER LEVEL – PAPER 11 (B)
2004

QUESTION 3

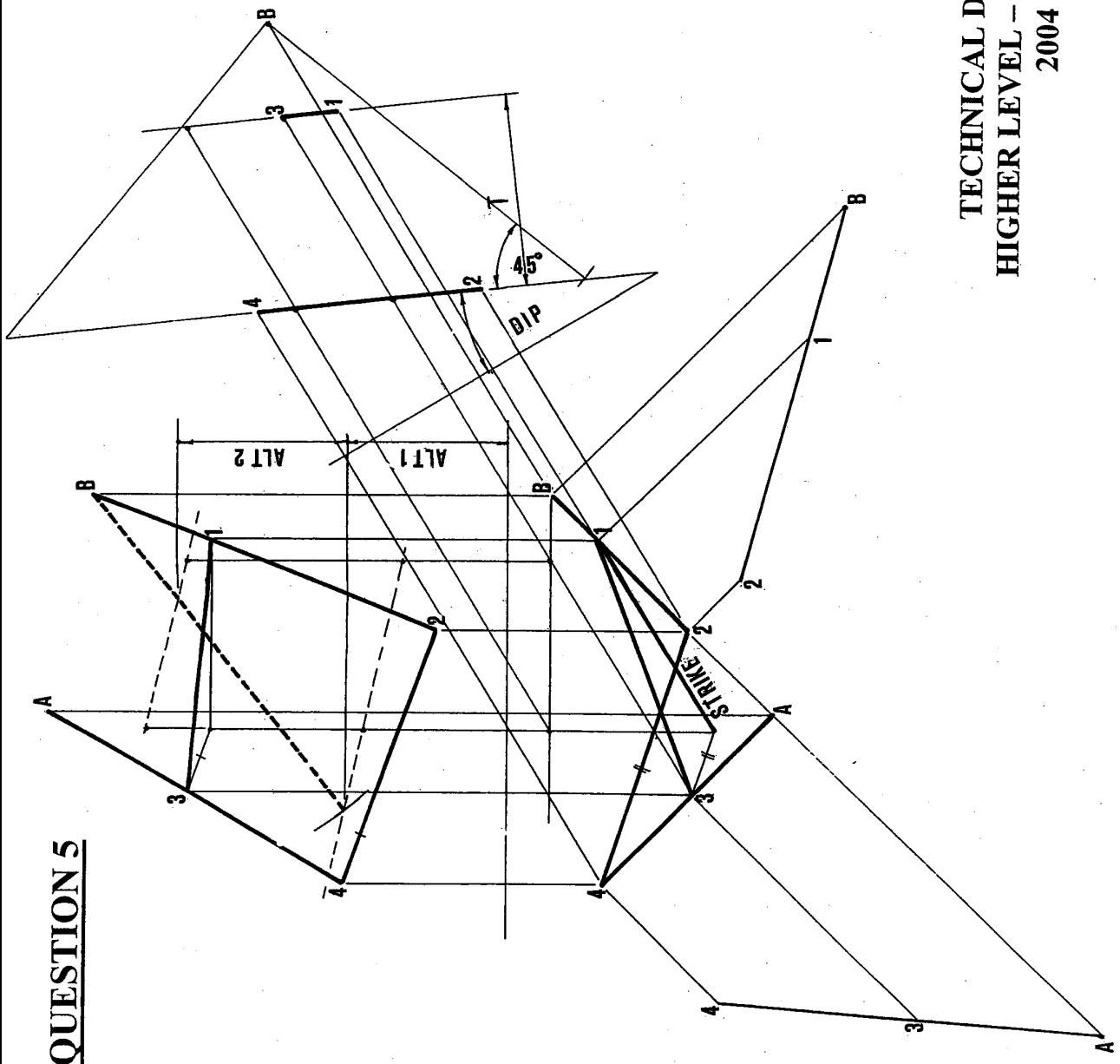


**TECHNICAL DRAWING
HIGHER LEVEL – PAPER 11 (B)
2004**

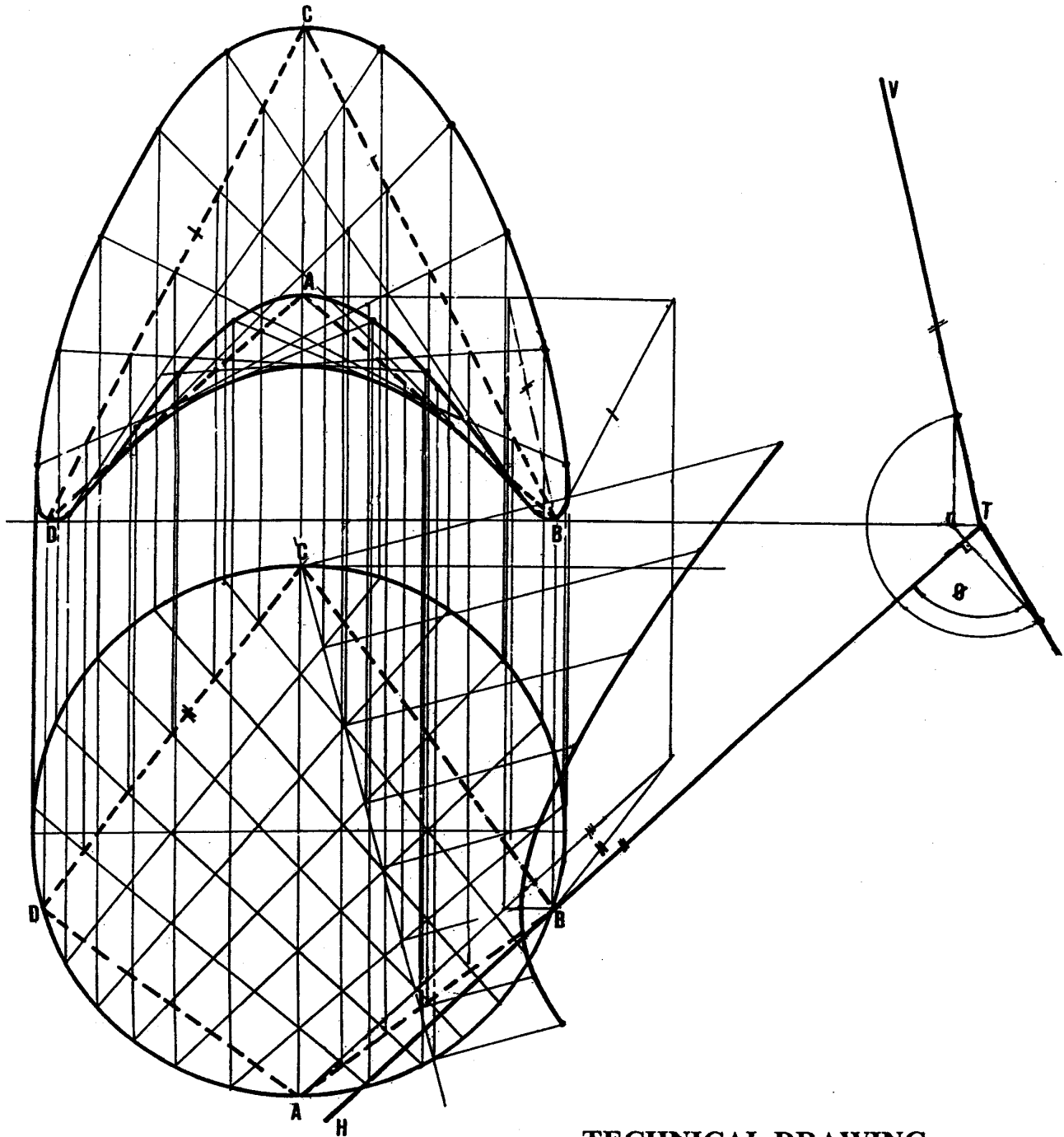
QUESTION 4



QUESTION 5



QUESTION 6

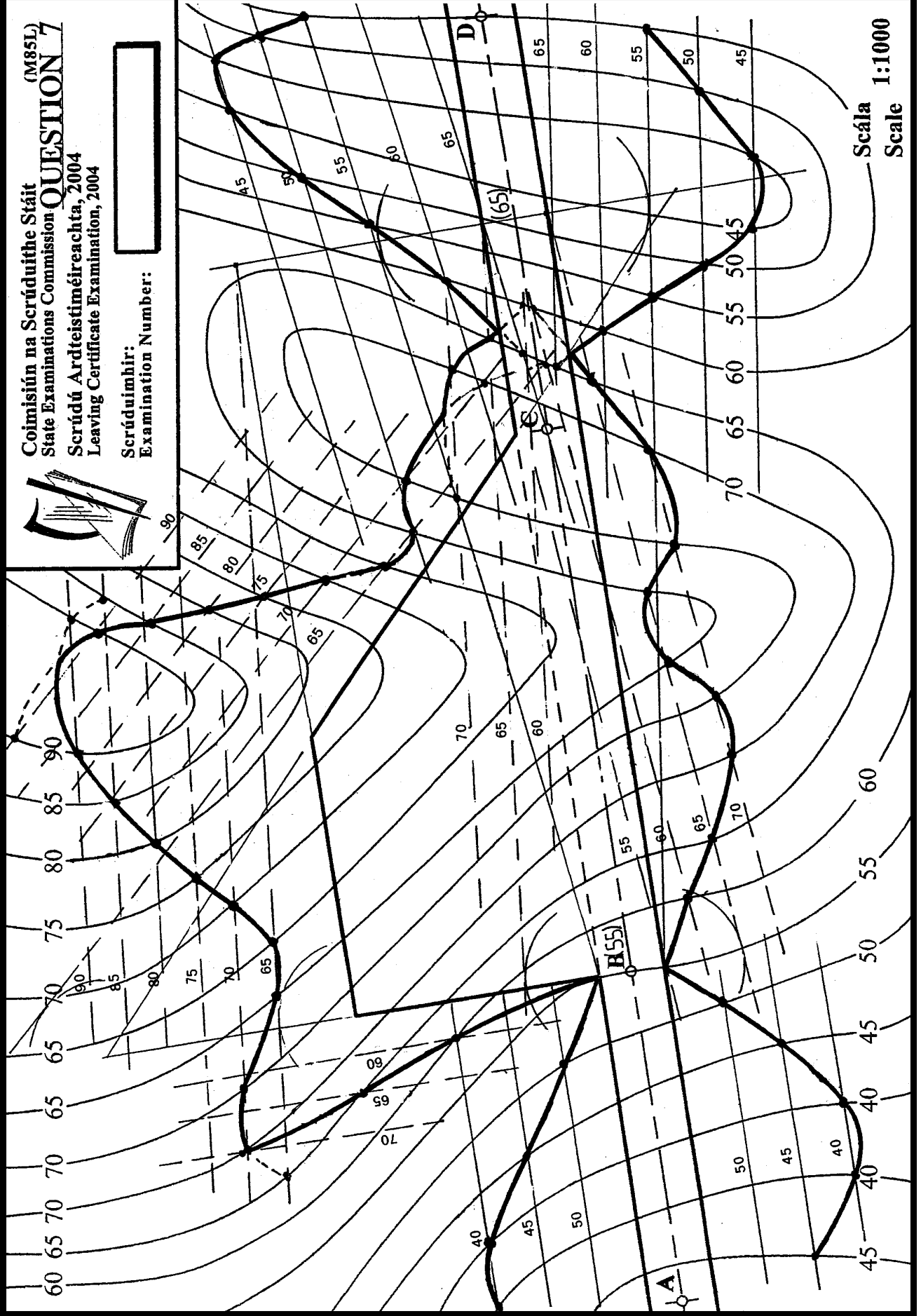


**TECHNICAL DRAWING
HIGHER LEVEL – PAPER 11 (B)
2004**

Coimisiún na Scrúduithe Stáit (M85L)
State Examinations Commission **QUESTION 7**
Scrúdú Ardfeistiméireachta, 2004
Leaving Certificate Examination, 2004



Scrúduitheir:
Examination Number:



Scála 1:1000
Scale