



Leaving Certificate Examination 2008

Technical Drawing
Paper II(A) – Higher Level
(Engineering Applications)

(200 Marks)

Monday 16 June
Afternoon, 2.00 - 5.00

Instructions

- (a)*** Ensure that you have received examination paper M84(L) which accompanies this paper.
- (b)*** Answer **any four** questions. All questions carry equal marks.
- (c)*** Drawings and sketches should be in pencil unless otherwise stated.
- (d)*** Where dimensions are omitted they may be estimated.
- (e)*** Credit will be given for neat orderly presentation of work.
- (f)*** Work on one side of the paper only.
- (g)*** Your Examination Number should be written on each drawing sheet used.
- (h)*** First or third angle projection may be used.

NOTE: All drawings are shown on examination paper M84(L) which accompanies this paper.

1. Details of a lathe tailstock are given in Fig. 1 with the parts list tabulated below.
- (a) Draw a full size sectional elevation A-A showing the parts fully assembled and with surface B of the barrel (part 2) projecting 20mm out from surface A from the body (part 1).
 - (b) Insert item reference numbers to identify the parts and add the title LATHE TAILSTOCK.
 - (c) Make a neat freehand sketch of a special spanner that could be used to tighten the end cover (part 6).

PART	NAME	REQUIRED
1	BODY	1
2	BARREL	1
3	M10 WASHER	1
4	M10 NUT	1
5	LEADSCREW	1
6	END COVER	1
7	HANDWHEEL	1
8	CENTRE	1
9	BUTTON	1

2. (a) Draw the profile and displacement diagram for a plate cam rotating in a clockwise direction and imparting the following motion to an in-line roller follower of 20mm diameter:
- 0° to 90° rise 40mm with simple harmonic motion;
 - 90° to 150° dwell;
 - 150° to 270° fall 40mm with uniform acceleration and retardation;
 - 270° to 360° dwell.
- The nearest approach of the roller centre to the camshaft centre is 45mm.
The camshaft diameter is 25mm.
- (b) In the mechanism shown in Fig. 2 the crank OA rotates at a constant speed in a clockwise direction about the fixed point O. The link AB is attached to the crank QB which oscillates about the fixed point Q. The link CD is connected to the link AB and is also connected to the crank PD which oscillates about the fixed point P. All joints are pin joints.
- Draw, full size, the given mechanism, and plot the locus of point C and point E during one complete revolution of crank OA.

3. The projections of a sheet metal transition piece, used to connect a square duct to an irregular pentagonal duct, are shown in Fig. 3.
- (a) Draw the given views and produce a one-piece surface development of the transition piece with the seam at S-S.
 - (b) Measure and state the value of the fold angle between surfaces X and Y.
 - (c) Make a neat freehand sketch of each the following:
 - (i) A safe edge suitable for sheet metal work;
 - (ii) A method of stiffening sheet metal panels.
4. (a) The projections of a hand vice are shown in Fig. 4.
Using isometric scale, draw an exploded isometric view of the vice. The drawing should show clearly how the parts labelled 1, 2 and 3 are assembled.
Make corner X the lowest point. Hidden detail is not required.
- (b) Using a neat, freehand, exploded isometric sketch, suggest a suitable method of connecting the hand screw (part 1) to the sliding jaw (part 2) of the hand vice.
 - (c) On a separate freehand sketch, show how the design of the vice could be modified to ensure that the sliding jaw (part 2) moves parallel to the edge of the vice.
5. The elevation and end elevation of a pump housing are shown in Fig 5.
A pictorial sketch of the housing is also shown.
- (a) Draw the following views (*Hidden detail is not required*):
 - (i) A sectional elevation on A-A;
 - (ii) A sectional end elevation on B-B;
 - (iii) A plan viewed in the direction of arrow C.
 - (b) Insert the following on the drawing:
 - (i) Four leading dimensions;
 - (ii) The appropriate ISO projection symbol;
 - (iii) Title: PUMP HOUSING.

6. Answer SECTION A or SECTION B but not both.

SECTION A

- (a)** Draw, full size, **two** involute teeth of a gear wheel with 24 teeth, module 10 and a pressure angle 20° .

Tabulate on the sheet the following values for the gear wheel:

- Addendum
- Pitch Circle Diameter
- Tooth Thickness
- Dedendum
- Circular Pitch
- Base Circle Diameter

- (b)** A sectional elevation of a water tap, in the closed position, is shown in Fig. 6(a).
- (i) Make a large neat freehand sectional sketch of the assembly showing the tap in the fully open position.
 - (ii) Identify and neatly label on the sketch the following four parts: Washer, Packing, Packing nut, and Handle.
 - (iii) With the aid of a brief note explain how water is prevented from leaking around the spindle (part 8).

OR
SECTION B

- (a) **Briefly** answer any **six** of the following questions.
(*Sketches may be used where appropriate*)
- (i) State **four** advantages that CAD offers over traditional drawing methods;
 - (ii) In CAD, identify the font setting that controls the slant angle of text on a drawing;
 - (iii) Sketch the following CAD linetypes: DASHDOT and ZIGZAG;
 - (iv) CAD provides a number of options for constructing arcs. List three such options and outline the required inputs in each case;
 - (v) Explain briefly, using diagrams, the purpose of 'Object Snap' (OSNAP) in creating a CAD drawing;
 - (vi) Explain, briefly, the purpose of a 'Hyperlink' in an on-line CAD drawing;
 - (vii) Describe **two** possible problems which may arise when downloading CAD files from the Internet;
 - (viii) In CAD, if multiple objects have been selected, moved to a new position and now need to be moved again, which select option would re-select the group of objects?
- (b) Name a CAD package that could be used to produce a 3D solid model of the component shown in Fig. 6(b). Using sketches, where appropriate, briefly outline the various steps involved and the commands used in generating the model.
- (c) With reference to CAD terminology, and using freehand sketches where appropriate, explain the difference between the following:
- (i) **Baseline** dimensioning and **Continued** dimensioning;
 - (ii) **Hatch** and **Gradient**;
 - (iii) **Plot** and **Publish**;
 - (iv) **Freezing** a layer and **Locking** a layer;
 - (v) **Erase** and **Wipeout**.
- (d) Draw, full size, the object that would be displayed on a CAD system when the following commands are executed. The origin (0,0) is located at the lower left corner of the display.
- Sheet size is set. Lower left corner (0,0) and upper right corner (297,210).
 - Five lines AB, BC, CD, DE and EF are drawn using the following absolute coordinates:
A (80,90) B (35,90) C (35,40) D (85,40) E (105,60) F (170,60)
 - The five lines are selected and mirrored about a line. The first point on the mirror line is at (35,110) and the second point is at (170,110). The old object is not deleted.
 - A 3-point arc is drawn. Start point (80,90), second point (100,110), and end point (80,130).
 - A regular polygon is drawn with 6 sides, centre (170,110) and inscribed in a circle of radius 25.
 - Three circles are drawn as follows: Circle 1: centre (170,110), radius 50;
Circle 2: centre (245,110), radius 12;
Circle 3: centre (170,145), Radius 7.
 - Circle 3 is selected and is subjected to a polar (circular) array. The centre point of the array is (170,110) and the fill angle is 360° . Total number of items in the array is 6.
 - A semi ellipse is drawn with a minor axis start point of (170,60) and a minor axis end point of (170,160). The major axis is 200mm long and the semi ellipse passes through the point (270,110) on the major axis.

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