Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2008

Technical Drawing

Paper II(A) – Ordinary Level (Engineering Applications)

(200 Marks)

Monday 16 June
Afternoon, 2.00 - 5.00

Instructions

(a) *Ensure that you have received examination paper M82(L) which accompanies this paper.*
(b) *Answer question 1 and **two** other questions.*
(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.*

Note: **The following drawings are shown on examination paper M.82(L) which accompanies this paper: Fig. 1, Fig. 5(a), Fig. 5(b), and Fig. 5(c).**

1. Details of an Adjustable Table Vice are shown in Fig. 1 with a parts list tabulated below.

PART	NAME	REQUIRED
1	Support Base	1
2	Fixed Jaw	1
3	Moving Jaw	1
4	Adjusting Screw	1
5	Clamping Screw	1
6	Set Screw	1

(a) Assemble the parts and draw, full size, the views listed below. The jaws should be 50mm apart and the vice in its lowest position. ***(Hidden detail need not be shown)***

(i) a sectional elevation on plane A-A;
(ii) a plan projected from (i).

(b) Insert the following on your drawing:

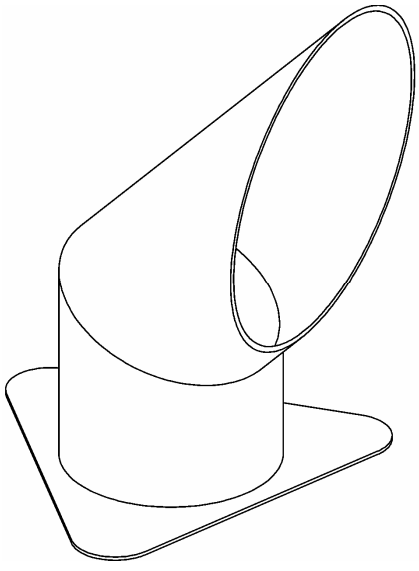
(i) Title:- ADJUSTABLE TABLE VICE;
(ii) ISO projection symbol;
(iii) Four principal dimensions. **(100 marks)**

2. Fig. 2 shows the elevation and plan of two cylindrical pipes, of 60mm diameter. The lower pipe is centrally located on an equilateral triangular base plate as shown.
A pictorial view is also given.
The pictorial view shows material thickness which may be ignored for the purposes of your drawing.

(a) Draw the given elevation and plan.

(b) Draw a surface development of the cylindrical pipe with C-C as the seam line.

(50 marks)



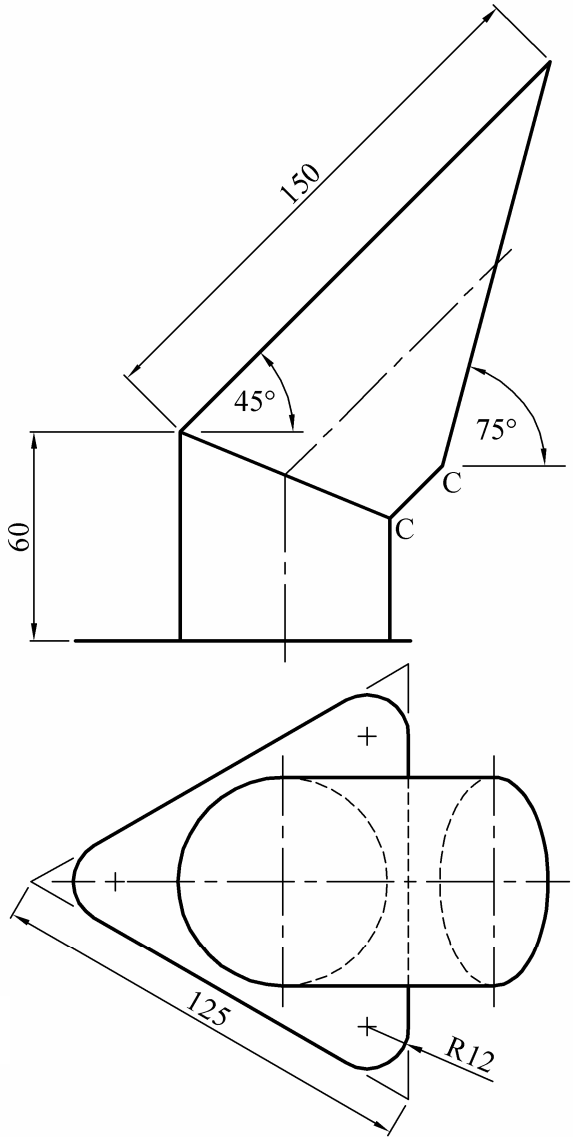


Fig. 2

3. **(a)** A radial plate cam has a minimum radius of 40mm and a camshaft diameter of 24mm. The cam rotates in a clockwise direction and imparts the following motion to an inline knife-edge follower:

0° to 60° Rise 12mm with uniform velocity;

60° to 240° Rise 48mm with uniform acceleration and retardation;

240° to 270° Dwell;

270° to 360° Fall 60mm with simple harmonic motion.

Draw the profile of the cam.

Include the displacement diagram as part of the solution.

(b) Fig. 3 shows a link mechanism. Crank OA rotates in an anti-clockwise direction about the fixed point O. A and C are pin joints. The end B of the link AB slides horizontally along the rail EF. The link CP is constrained to slide through the fixed pivot D.

(i) Using a line diagram to represent the mechanism, plot the locus of point P for one revolution of the crank OA.

(ii) Draw the profile of a simple machine guard about the mechanism with a minimum clearance of 15mm.

(50 marks)

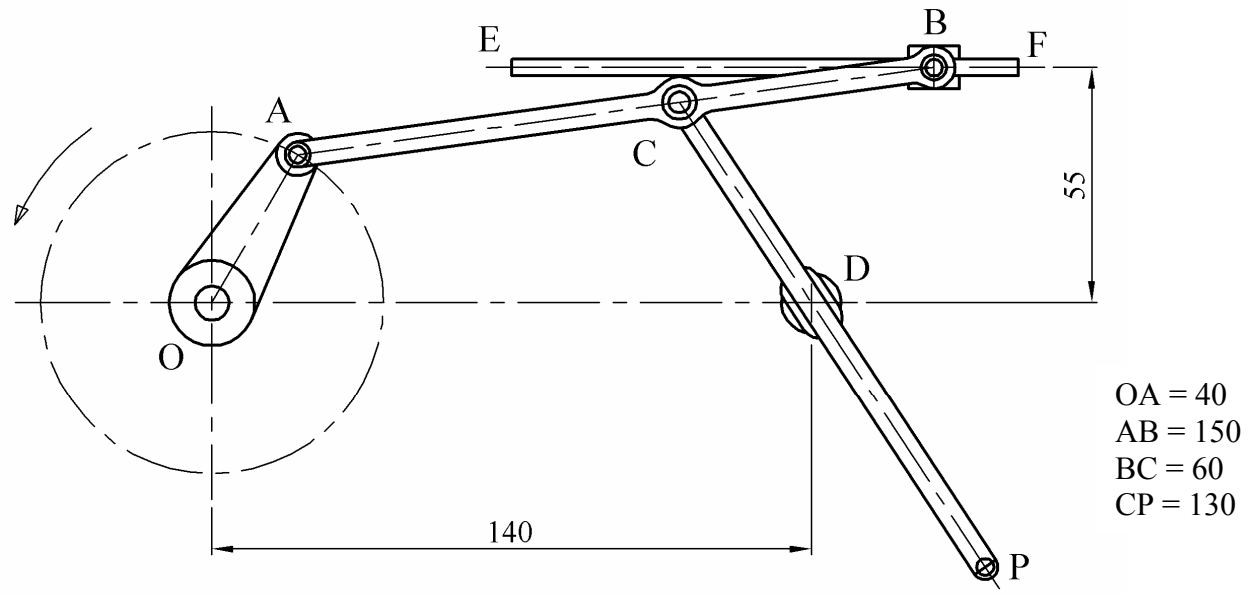


Fig. 3

4. **(a)** Using the data table below make a fully dimensioned drawing of the machine part in Fig. 4(a), showing all specifications.

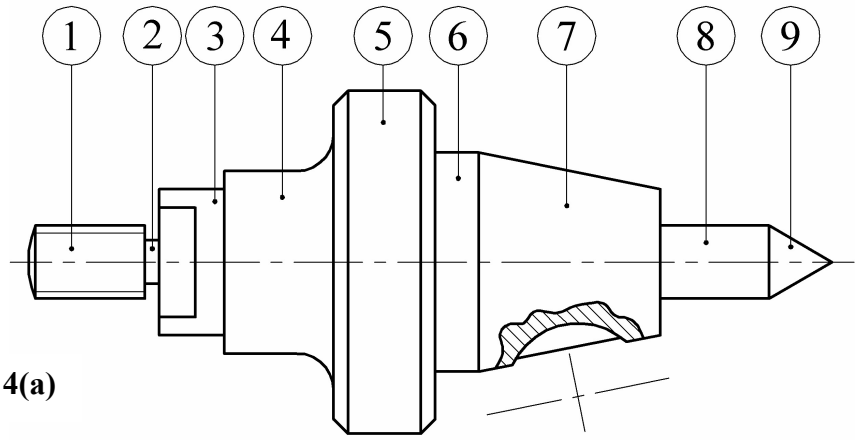


Fig. 4(a)

1	Screwthread Metric 20, Pitch 2.5, Length 30
2	Undercut 4 x 4
3	Diameter 40, Length 18, Flat 30 x 10 long
4	Diameter 50, Length 30, Fillet radius 10
5	Diameter 94, Length 28, Chamfer 4 x 4, Finish diamond knurl
6	Diameter 60, Length 12
7	Minimum diameter 40, Length 50, Woodruff keyway diameter 40 and depth 8 – mid length
8	Diameter 20, Length 30
9	Taper included angle 60º

(b) Fig. 4(b) shows a part section through a portion of a pump.

(i) Draw a parts list, in table format, which includes the item number and name for each of the parts 1, 2, 3, 4 and 5.

(ii) Explain, with the aid of freehand sketches, the operation of the pump.

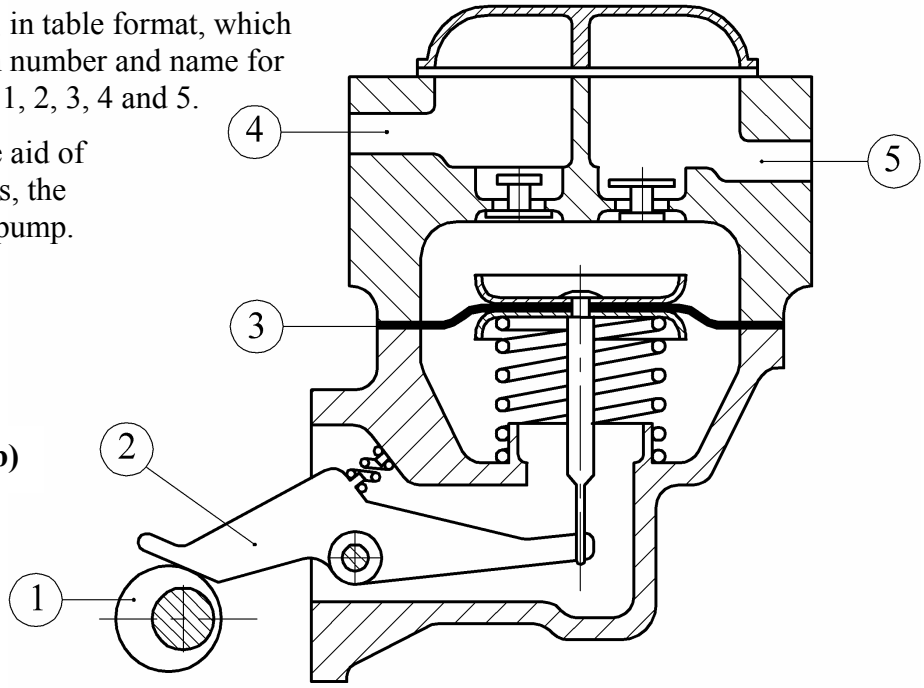


Fig. 4(b)

(c) Using large freehand sketches, explain the following engineering terms:

(i) Ball-bearing; (ii) Roller-bearing; (iii) Bush.

(50 marks)

5. Answer **SECTION A** ***or*** **SECTION B** but not both.

SECTION A

(a) Fig. 5(a) shows the elevation and end elevation of a machine casting. Draw an isometric view of the casting with the shaded portion in front of the section plane A-A removed. Point P is to be the lowest point on the drawing.

(b) Using large freehand sketches illustrate the following:

(i) Counterbore;
(ii) Slotted hole;
(iii) Blind hole.

(50 marks)

OR

SECTION B

(a) List **six** Computer Aided Drawing commands necessary to produce the drawing in Fig. 5(b).

(b) By means of sketches and a short note, explain the following CAD commands:

(i) Copy; (ii) Trim; (iii) Spline.

(c) An object is shown in Fig. 5(c) as a wireframe representation. Draw a large freehand isometric sketch of the object with all hidden lines removed.

(d) Draw, full size, the object that would be displayed on a traditional CAD system when the following commands are executed:

(All points (X,Y) are specified using absolute co-ordinates. The origin (0,0) is located at the lower left corner of the display)

- A rectangle is drawn with its lower left corner at (20,20) and its upper right corner at (180,220). The rectangle is then exploded.
- The upper two corners of the rectangle are filleted with a 20mm radius.
- The baseline of the 'rectangle' is offset 160mm in an upward direction.
- A circle, of 100mm diameter, is drawn with its centre point at (100,110) and is then offset 15mm inwards.
- A circular arc is drawn to pass through points A, B and C having the following co-ordinates:

  A (150,70) B (170,110) C (150,150)
- Points A and C are joined to the centre of the 100mm circle using two straight lines. The portion of the lines between the 100mm circle and the centre of the circle are trimmed.
- A rectangle is drawn with its lower left corner at (140,30) and its upper right corner at (166,50).
- Three lines DE, EF and FG are drawn using the following co-ordinates:

  D (40,200) E (40,190) F (80,190) G (80,200)
- These three lines are mirrored about the axis DG.
- A circle, of 20mm diameter, is drawn with its centre point at (100,200).
- Inside this circle a polyline, with a width of 2mm, is drawn from the point (100,210) to the centre of the circle.
- This circle and polyline is duplicated three times in a rectangular array consisting of one row and three columns. There is a 30mm array distance between the columns.

(50 marks)

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