LEAVING CERTIFICATE EXAMINATION, 1988

TECHNICAL DRAWING - HIGHER LEVEL

PAPER II (A) - ENGINEERING APPLICATIONS

200 marks

THURSDAY, 23 JUNE - MORNING 9.30 to 12.30

INSTRUCTIONS

(a) Answer four questions.
(b) 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) Candidates should work on one side of the paper only.
(g) The Examination Number should be written on each drawing sheet used.
(h) All dimensions are in millimetres.

1. Details of a PIPE FLARING TOOL are given in Figure 1 with the parts list tabulated below.

INDEX	PART	REQUIRED
1	Body	1
2	Half Die	2
3	Die Lock Nut	1
4	Punch	1
5	Pressure Screw	1
6	Handle	1

(a) Draw an elevation of the assembly showing the *working parts* in section and flaring a copper pipe. Pipe dimensions: Outside diameter 15 mm, Inside diameter 12 mm.

(b) Balloon reference the parts of the drawing and add the title FLARING TOOL ASSY.

(c) With the aid of a sketch describe how the pipe is locked in the die.

2. Fig. 2 shows a grain feed system and the *true shape* of the opening at the bottom of the hopper.

(a) Draw to scale 1 : 10 the following:

(i) The given view of the transition piece only.
(ii) A plan projected from (i).
(iii) An end elevation.
(iv) A one piece development of the transition piece with the seam at the shortest edge.
(v) The minimum size of rectangular sheet that will contain the development and indicate the dimensions.

(b) Sketch freehand a safe edge suitable for sheetmetal work.

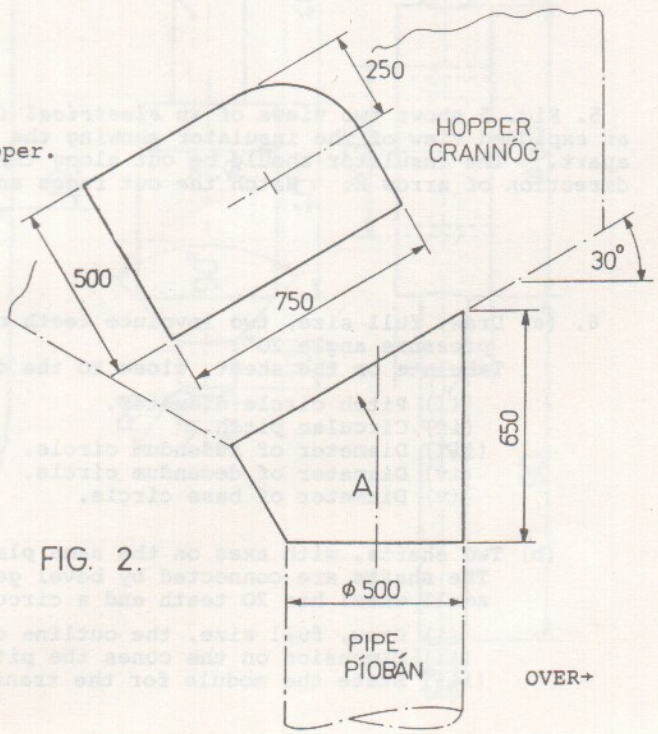


FIG. 2.

OVER→

3. (a) Fig. 3 shows the block (1), bush (2) and shaft (3) of a bearing assembly. The figure also includes a plain scale. Make separate detailed drawings of each of the components. The drawings should be twice full size and fully dimensioned to the scale provided. Limits of size should be given on the toleranced dimensions and the surfaces to be machined should show the symbol for machining. Add the title to each component.

Table of limits and fits is supplied.

(b) Sketch freehand the following standard steel sections.

(i) Angle section.
(ii) Tee section.
(iii) Channel section.

4. (a) A profile of two threads of a buttress screw is shown in Fig. 4. Draw two full threads of the buttress screw. The screw should have a single start right hand thread with an outside diameter of 120 mm.

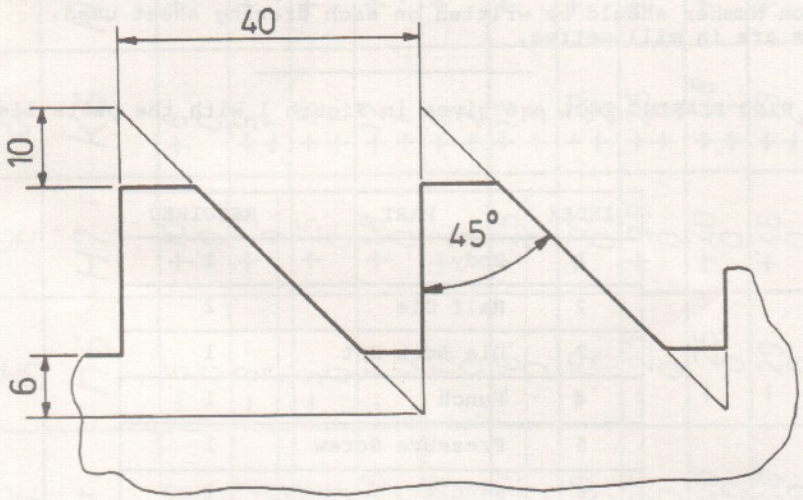


FIG. 4.

(b) Sketch freehand the following methods of joining copper pipes.

(i) Soldered capillary joint.
(ii) Compression joint.

With the aid of a short note, explain how each joint is made leakproof.

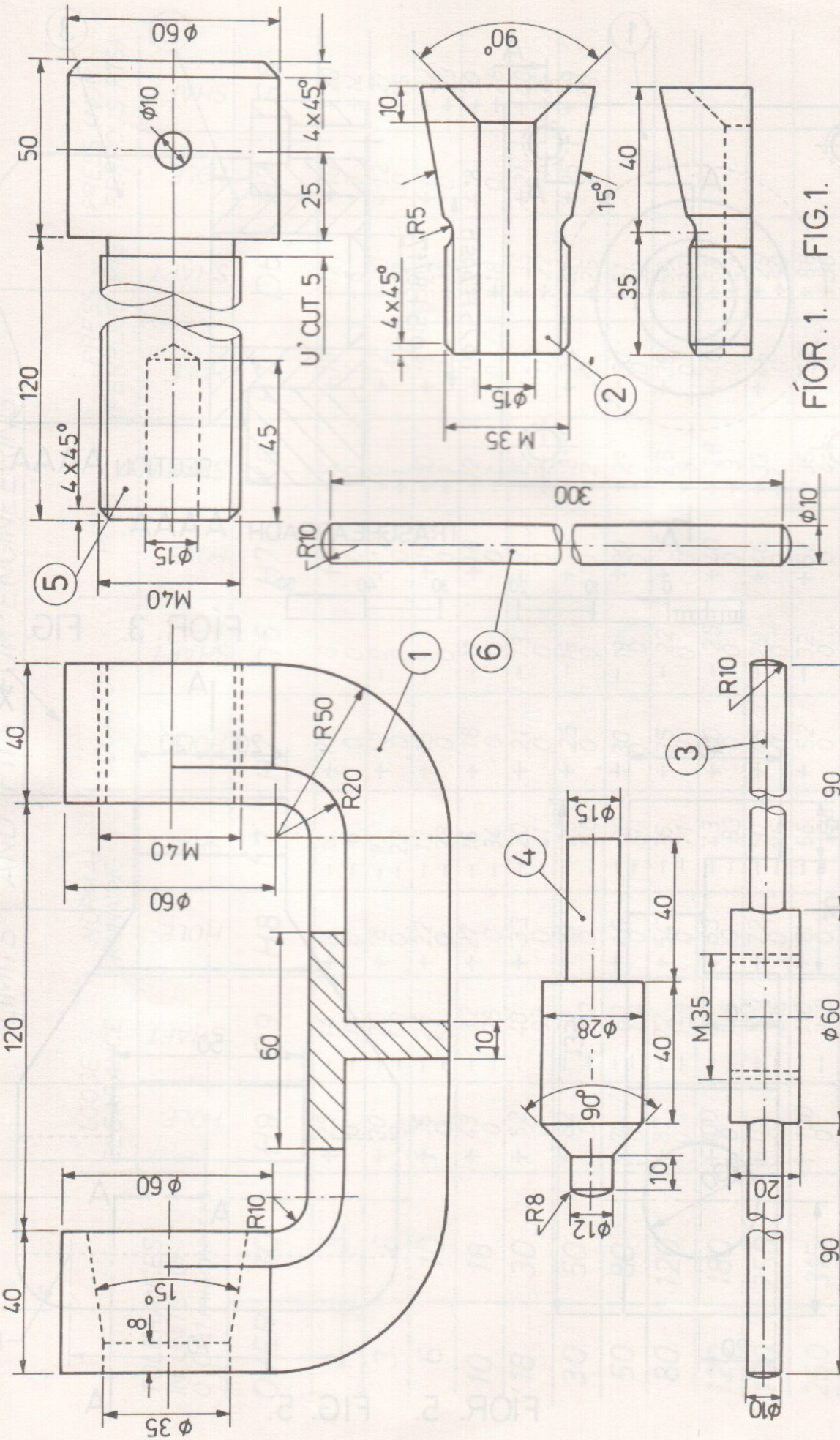
5. Fig. 5 shows two views of an *electrical insulator* in first angle projection. Draw an exploded view of the insulator showing the two parts in *isometric projection* and 75 mm apart. The insulator should be cut along the planes AAAA shown in figure and be viewed in direction of arrow X. Hatch the cut faces and add the title INSULATOR.

6. (a) Draw, full size, two involute teeth of a gear wheel with 20 teeth, module 10 mm and pressure angle 20°.
Tabulate on the sheet, close to the drawing, the following values for the gear wheel.

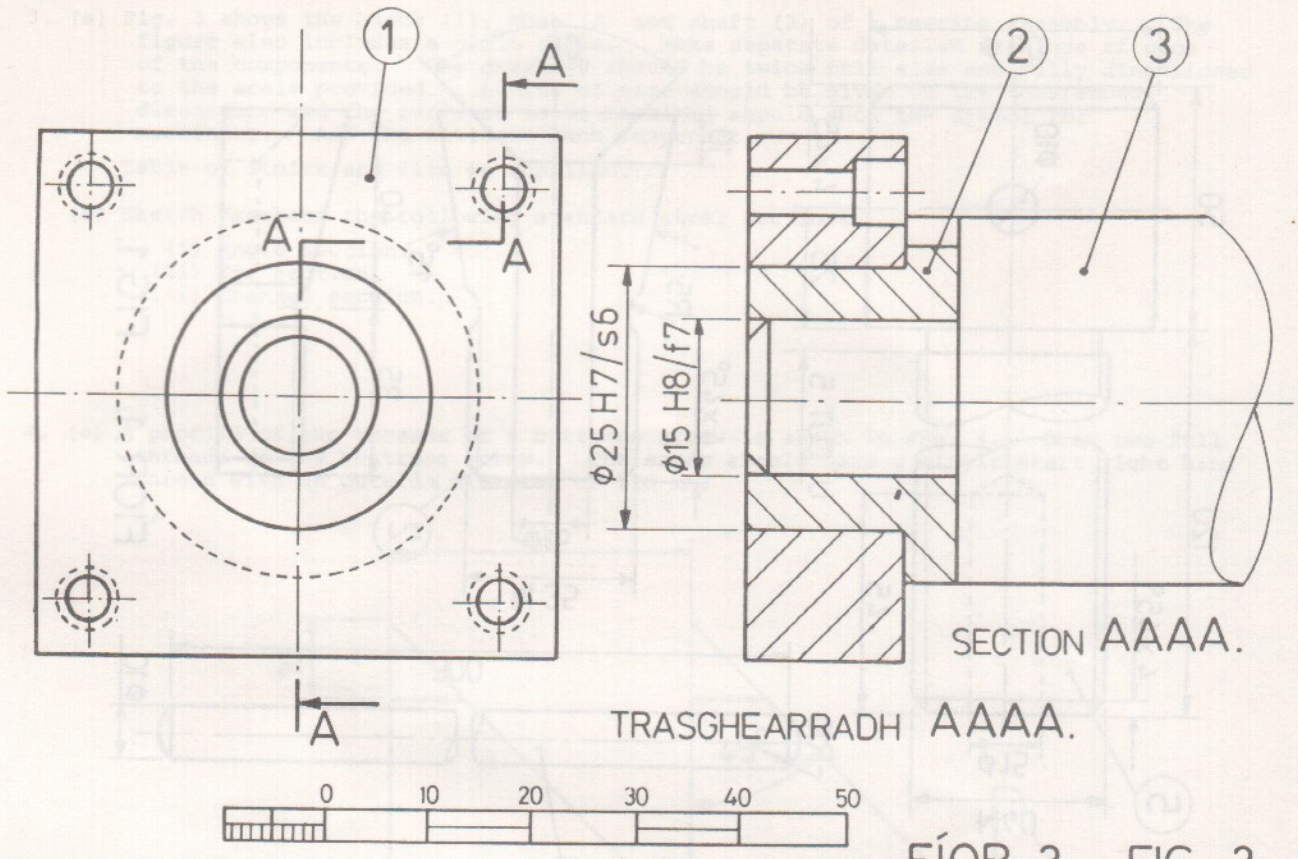
(i) Pitch circle diameter.
(ii) Circular pitch.
(iii) Diameter of addendum circle.
(iv) Diameter of dedendum circle.
(v) Diameter of base circle.

(b) Two shafts, with axes on the same plane, are set at an angle of 90° to each other. The shafts are connected by bevel gears with a velocity ratio of 2 : 3. The small wheel has 20 teeth and a circular pitch of 15·7 mm.

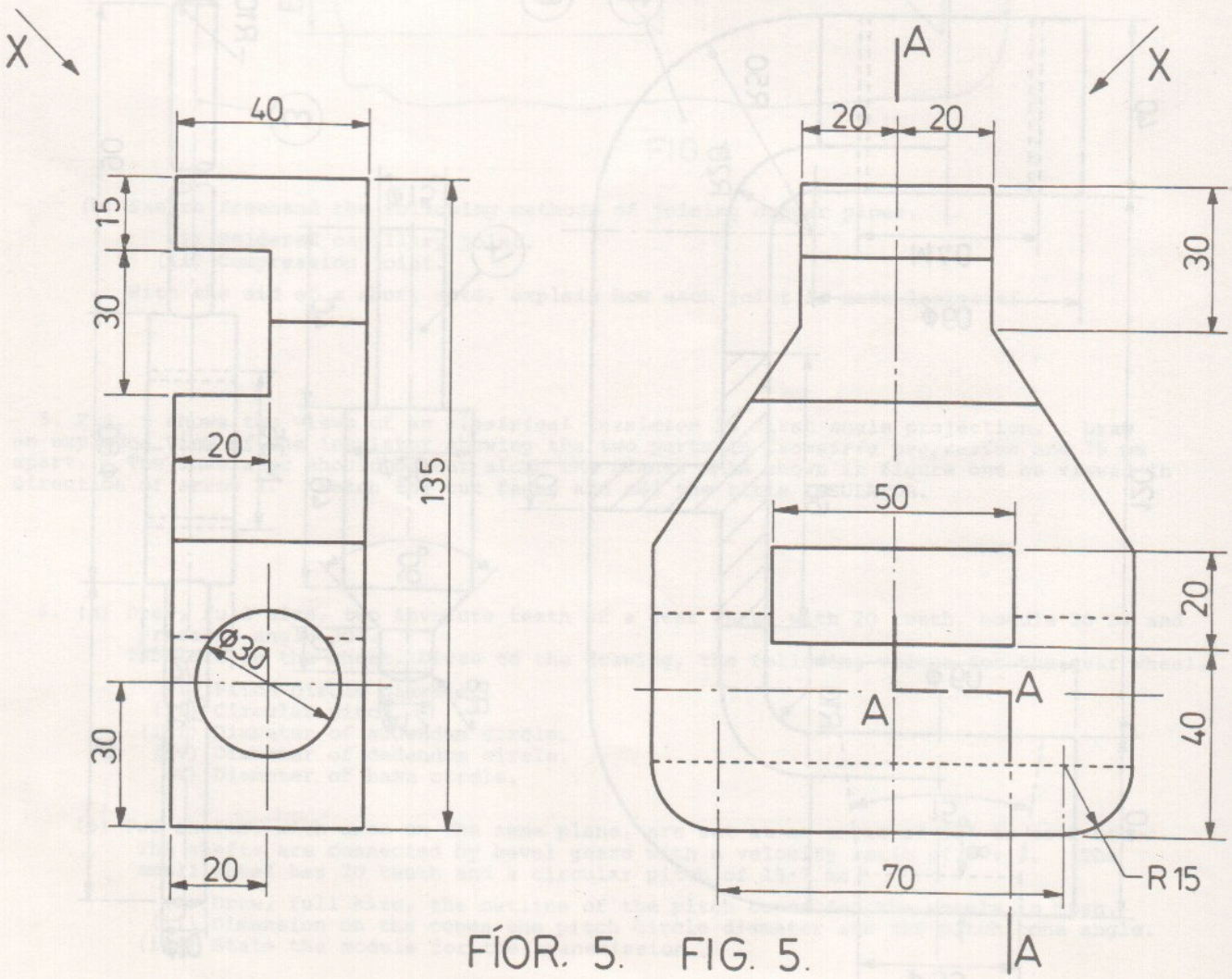
(i) Draw, full size, the outline of the pitch cones for the wheels in mesh.
(ii) Dimension on the cones the pitch circle diameter and the pitch cone angle.
(iii) State the module for the transmission.


ø60
ø10
4x45°
50
25
U' CUT 5
120
4x45°
45
ø15
M40
5
90°
10
R5
15°
40
4x45°
35
ø15
M 35
2
300
R10
ø10
6
1
R50
R20
40
M40
ø60
120
60
10
ø60
R10
40
15°
8
ø 35
ø15
4
40
ø28
40
90°
10
R8
ø12
R10
3
90
M35
ø60
20
90
ø10

FIOR. 1. FIG. 1.



FÍOR. 3. FIG. 3.



FÍOR. 5. FIG. 5.

LIMITS AND FITS FOR ENGINEERING

TOLERANCES IN UNITS OF 0.001 millimetres		LOOSE CLEARANCE		NORMAL RUNNING		LOCATION		PUSH		PRESS (FERROUS PTS)		PRESS (NON FERROUS PTS)	
		HOLE	SHAFT	HOLE	SHAFT	HOLE	SHAFT	HOLE	SHAFT	HOLE	SHAFT	HOLE	SHAFT
OVER	TO	H9	e9	H8	f7	H7	h6	H7	k6	H7	p6	H7	s6
—	3	+25 0	−14 −39	+14 0	−6 −16	+10 0	−6 0	+10 0	+6 0	+10 0	+12 +6	+10 0	+20 +14
3	6	+30 0	−20 −50	+18 0	−10 −22	+12 0	−8 0	+12 0	+9 +1	+12 0	+20 +12	+12 0	+27 +19
6	10	+36 0	−25 −61	+22 0	−12 −28	+15 0	−9 0	+15 0	+10 +1	+15 0	+24 +15	+15 0	+32 +23
10	18	+43 0	−32 −75	+27 0	−16 −34	+18 0	−11 0	+18 0	+12 +1	+18 0	+29 +18	+18 0	+39 +28
18	30	+52 0	−40 −92	+33 0	−20 −41	+21 0	−13 0	+21 0	+15 +2	+21 0	+35 +22	+21 0	+48 +35
30	50	+62 0	−50 −112	+39 0	−25 −50	+25 0	−16 0	+25 0	+18 +2	+25 0	+42 +26	+25 0	+59 +43
50	80	+74 0	−60 −134	+46 0	−30 −60	+30 0	−19 0	+30 0	+21 +2	+30 0	+51 +32		
80	120	+87 0	−72 −159	+54 0	−36 −71	+35 0	−22 0	+35 0	+25 +3	+35 0	+59 +37		
120	180	+100 0	−84 −185	+63 0	−43 −83	+40 0	−25 0	+40 0	+28 +3	+40 0	+68 +43		
180	250	+115 0	−100 −215	+72 0	−50 −96	+46 0	−29 0	+46 0	+33 +4	+46 0	+29 +50		
250	315	+130 0	−110 −240	+81 0	−56 −108	+52 0	−32 0	+52 0	+36 +4	+52 0	+88 +56		
315	400	+140 0	−125 −265	+89 0	−62 −119	+57 0	−36 0	+57 0	+40 +4	+57 0	+98 +62		