



STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

1997

INDUSTRY STUDIES

2 UNIT

METAL AND ENGINEERING STRAND

SECTION II

(30 Marks)

*Total time allowed for Sections I and II—One hour and a half
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page and page 13.
- Questions 1 and 2 are COMPULSORY.
- Attempt ONE question from Questions 3, 4, and 5.
- Answer the questions in the spaces provided in this paper.
- Board-approved calculators may be used.

QUESTION 1. This question is COMPULSORY. (12 marks)

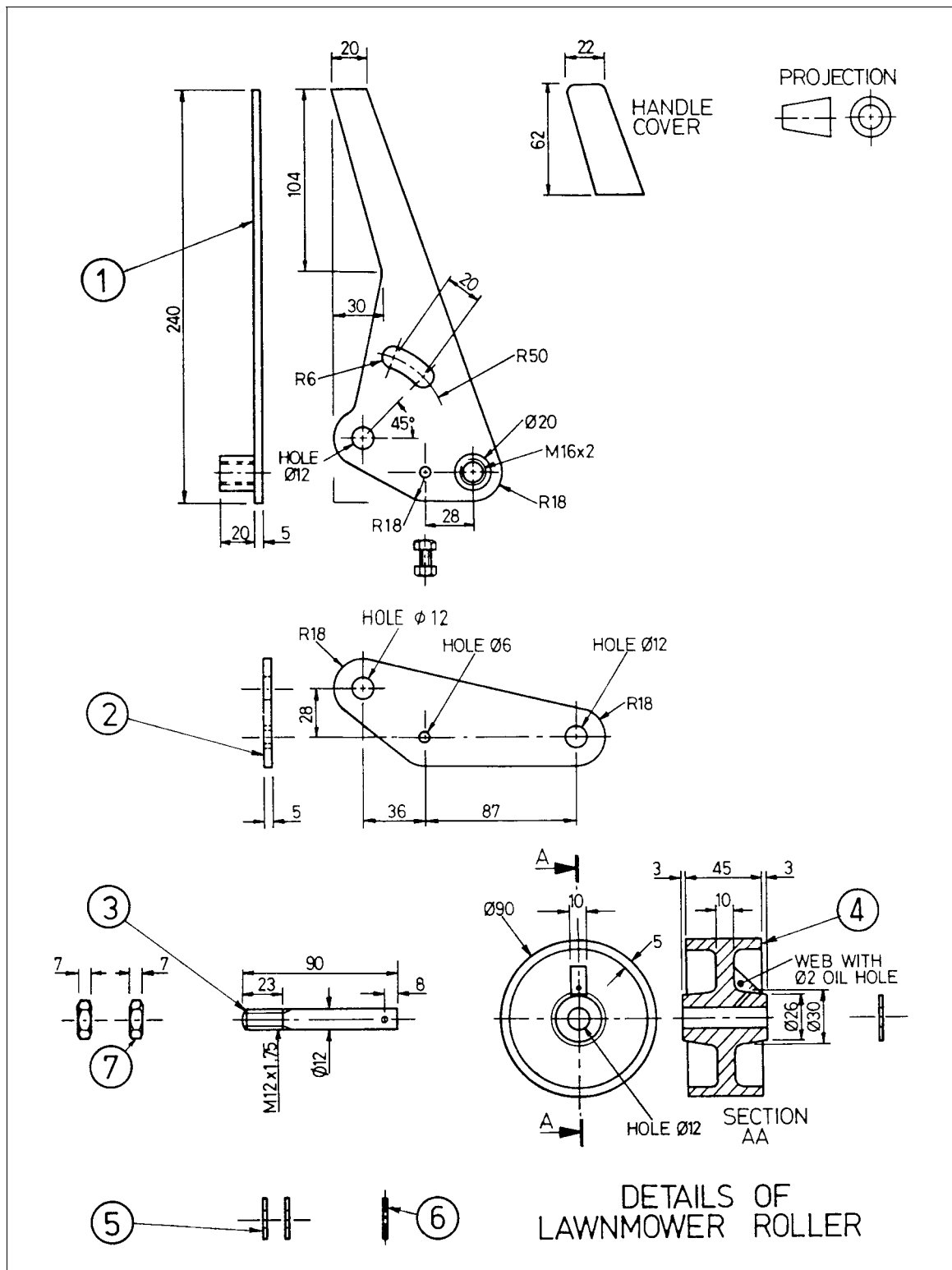


FIG. 1

'Graphical communications Bk 2', A Yarwood, Nelson 1979.

QUESTION 1. (Continued)

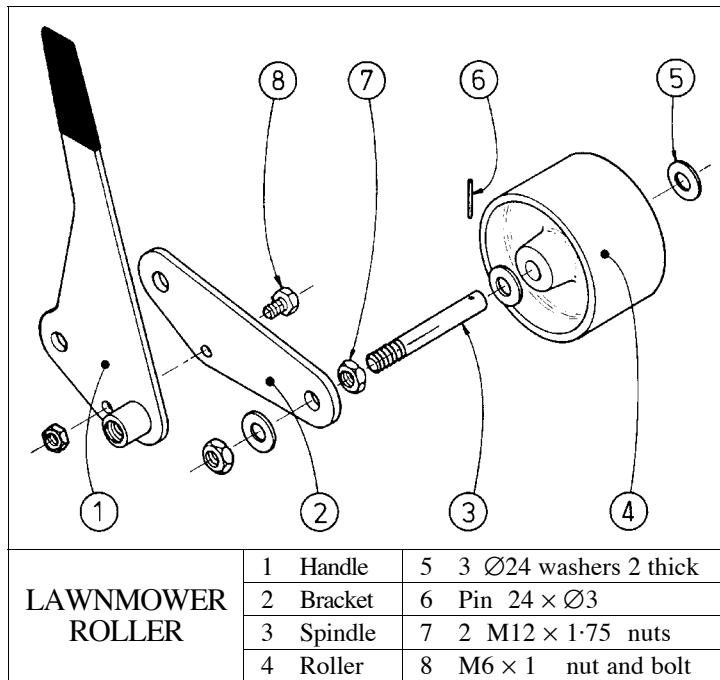


FIG. 2



FIG. 3

'Graphical communications Bk 2', A Yarwood, Nelson 1979.

- (a) Two mechanical drawings of a lawnmower roller are shown in Figure 1 on page 2 and Figure 2 above.

Using the table provided below, name the most technically correct tools that could be used to disassemble Items 3 and 6; Items 2, 3, and 7; and Items 1, 2, and 8.

Items	Tools used for disassembly
3 and 6 Spindle and pin
2, 3, and 7 Bracket, spindle, and two nuts

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QUESTION 1. (Continued)

(b) Figure 1 on page 2 and Figure 2 on page 3 are two types of mechanical drawings.

- Name the type of mechanical drawing in each.
- Briefly state the purpose of this type of mechanical drawing.

(i) IN FIGURE 1

1. Type of mechanical drawing

.....

2. Purpose of this drawing type

.....

(ii) IN FIGURE 2

1. Type of mechanical drawing

.....

2. Purpose of this drawing type

.....

(c) The spindle (Item 3, Figure 2) on page 3 was measured with a micrometer. The reading on the micrometer is as shown in Figure 4.

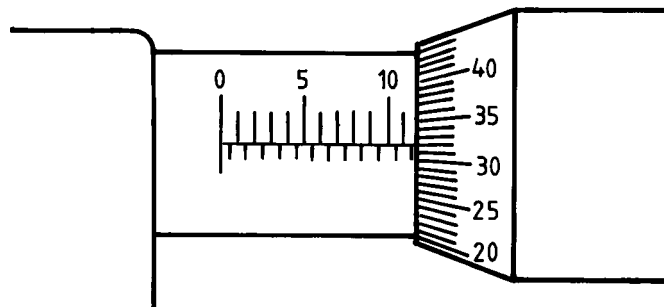


FIG. 4

Determine the actual diameter of the spindle.

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QUESTION 1. (Continued)

- (d) The bracket (Item 2, Figure 2) on page 3 is shown in Figure 5.

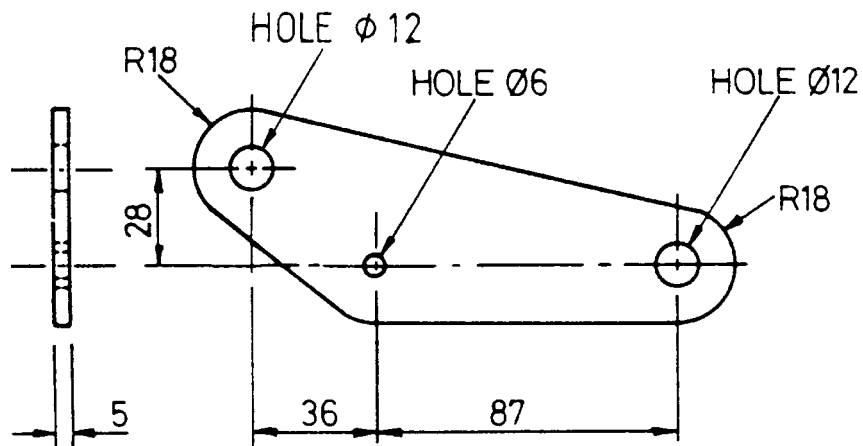


FIG. 5

The bracket has been bent beyond repair and a new item is to be manufactured.

- (i) Indicate the minimum material size needed to manufacture this item.

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- (ii) The tools and equipment available for marking out this item comprise blue stain, engineer's square, scribe, rule, centre punch, dividers, and ball-pein hammer. List the appropriate steps in marking out this item using these tools and equipment.

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QUESTION 1. (Continued)

(iii) The hand and power tools available to make the bracket include:

- hacksaw
- files
- twist-drill set
- bench drill
- machine vice
- clamps
- bolts
- cutting fluid
- radius gauges
- jigsaw.

Using the most suitable tools and equipment above, list the steps to manufacture the bracket.

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QUESTION 2. This question is **COMPULSORY**. (6 marks)

- (a) A shaft and hole, as shown in Figure 6, are to be manufactured to the following sizes.

Shaft $\varnothing 16.000$	-0.033 -0.075
Hole $\varnothing 16.000$	$+0.043$ -0.075

Using the information provided, complete the chart below and specify the type of components.

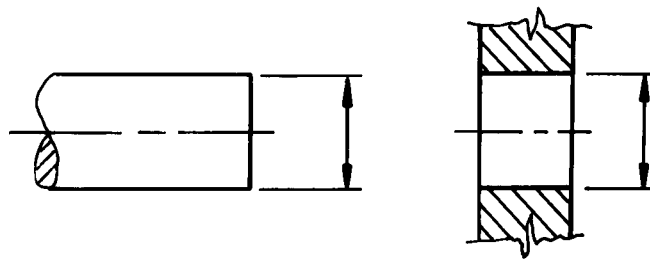


FIG. 6

	<i>Shaft</i>	<i>Hole</i>
Nominal size =		
Basic size =		
Upper limit =		
Lower limit =		
Tolerance =		

Type of fit between the components

QUESTION 2. (Continued)

- (b) Standard symbols are used to indicate surface finish. Three examples are shown below.



Figure 7 is a drawing of a cast bracket. Surfaces A, B, C, and D are to be machined, while surface E is to have no metal removed.

Place the correct symbol on the appropriate surface in accordance with AS1100 Drawing Standards.

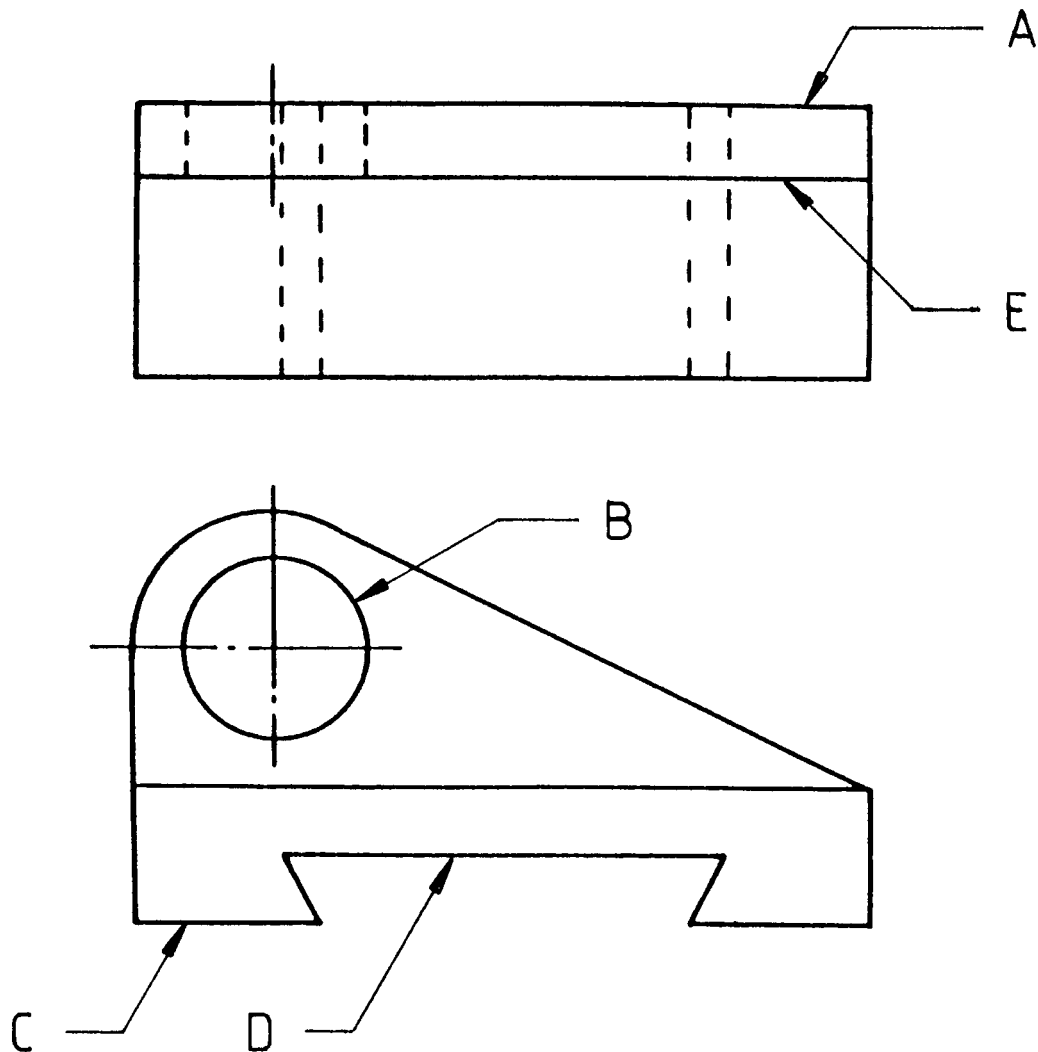


FIG. 7

QUESTION 2. (Continued)

- (c) From the pictorial sketches in Figures 8, 9, and 10, complete each corresponding welding symbol on the drawings provided.

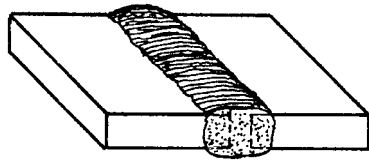


FIG. 8

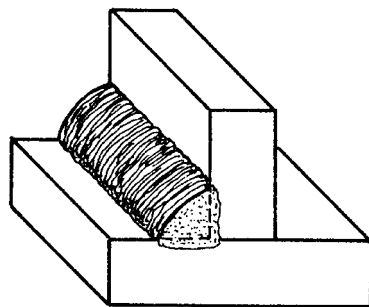
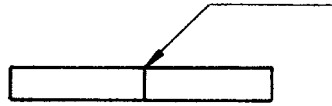


FIG. 9

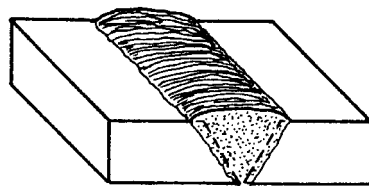
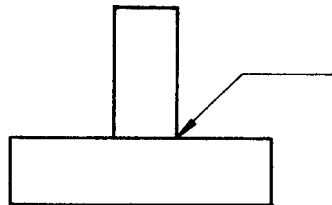
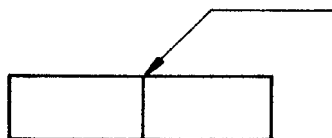


FIG. 10



QUESTION 2. (Continued)

(d) With reference to Figure 11, name each type of line indicated by the letters.

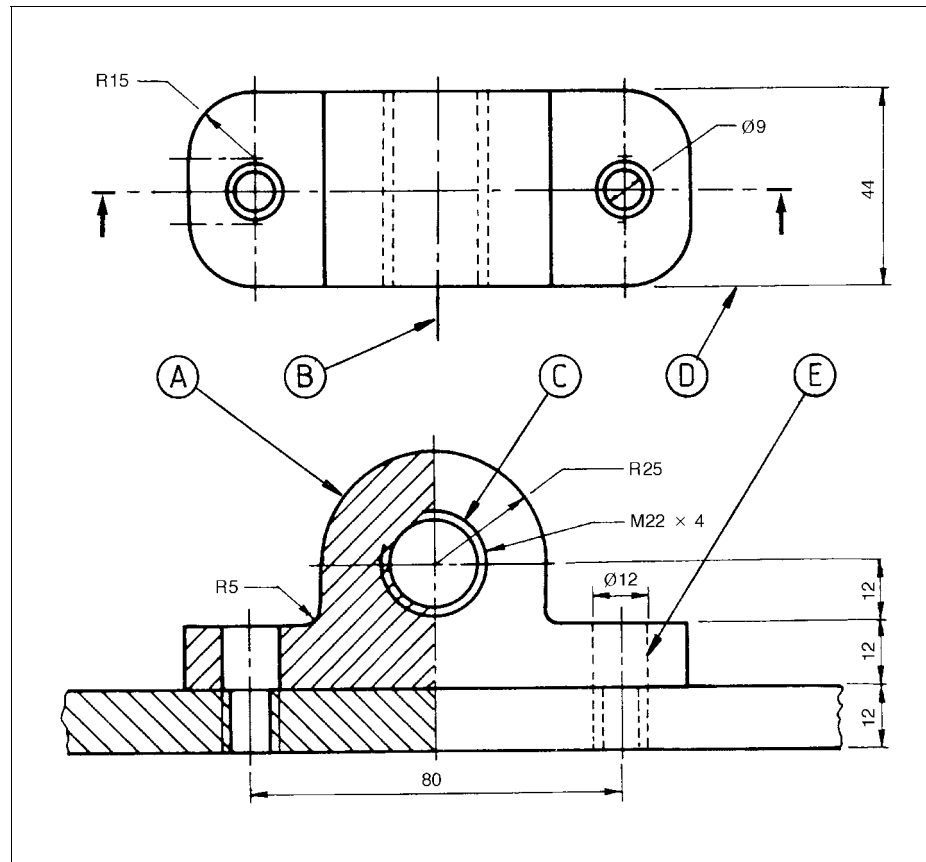


FIG. 11

- A

 B

 C

 D

 E

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INDUSTRY STUDIES
METAL AND ENGINEERING STRAND—SECTION II****CENTRE NUMBER**

QUESTIONS 3, 4, and 5.

Attempt ONE question from Questions 3, 4, and 5.

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Attempt ONE question from Questions 3, 4, and 5.

EITHER

QUESTION 3. (12 marks)

The top and front views of a pipe bracket are shown in Figure 12.

In the space provided below, draw a full-size, freehand, oblique sketch of the pipe bracket when viewed from the direction indicated by the arrow.

The starting-point for the centre line is given below.

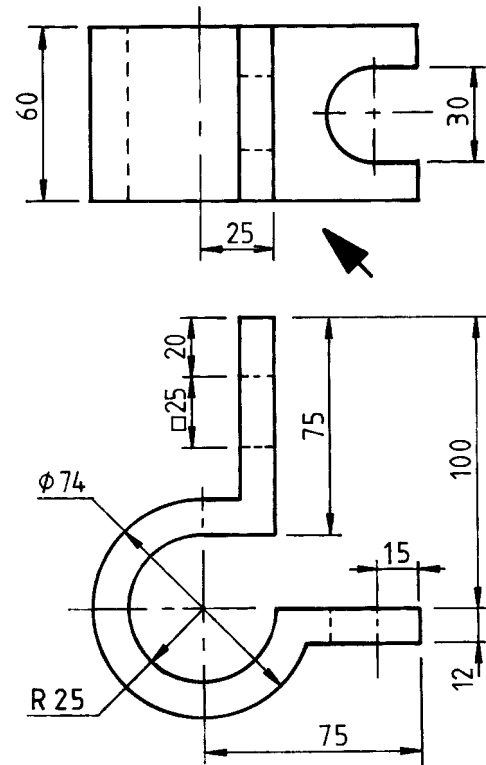
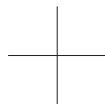


FIG. 12



OR

QUESTION 4. (12 marks)

Details of a template are shown in Figure 13. Using the starting-point A (as shown below), make an accurate full-size drawing of the template. Use correct geometrical construction to locate all centres and limiting points.

NOTE: Construction lines are NOT TO BE ERASED.

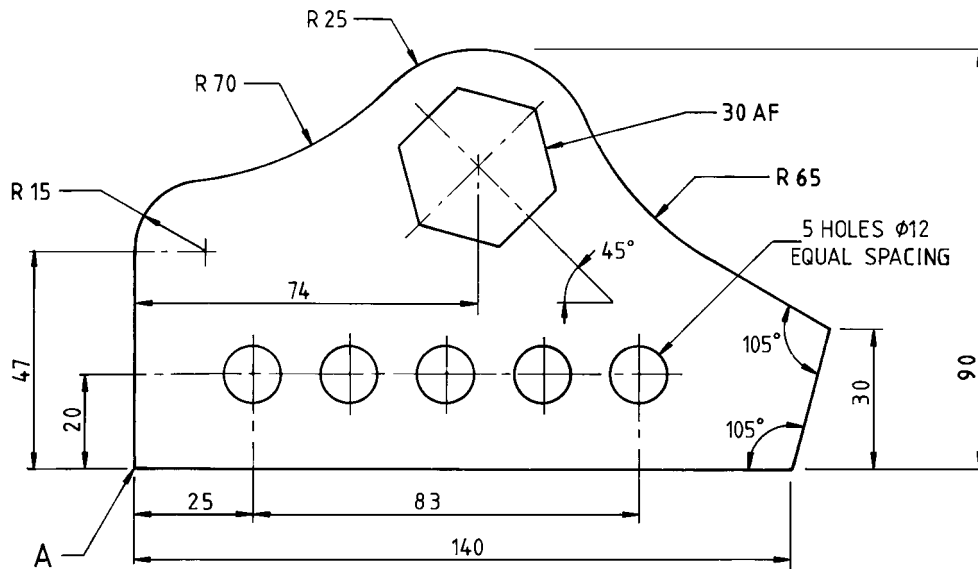
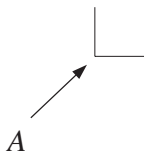


FIG. 13

OR



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QUESTION 5. (12 marks)

Details of a mild steel clapper box are given in Figure 14. In the space provided on page 17, make a freehand drawing to show:

- a front view of the clapper box, viewed in the direction indicated;
- a sectioned side view, section A—A. The section is to pass through the centre of the M8 thread hole, as indicated.

NOTE: The views should be drawn to full size in third-angle orthogonal projection. The centre lines from the M8 thread hole are given.

Use correct dimensioning technique, to show the

- counterbore size;
- M8 thread;
- width of the 13 mm slot.

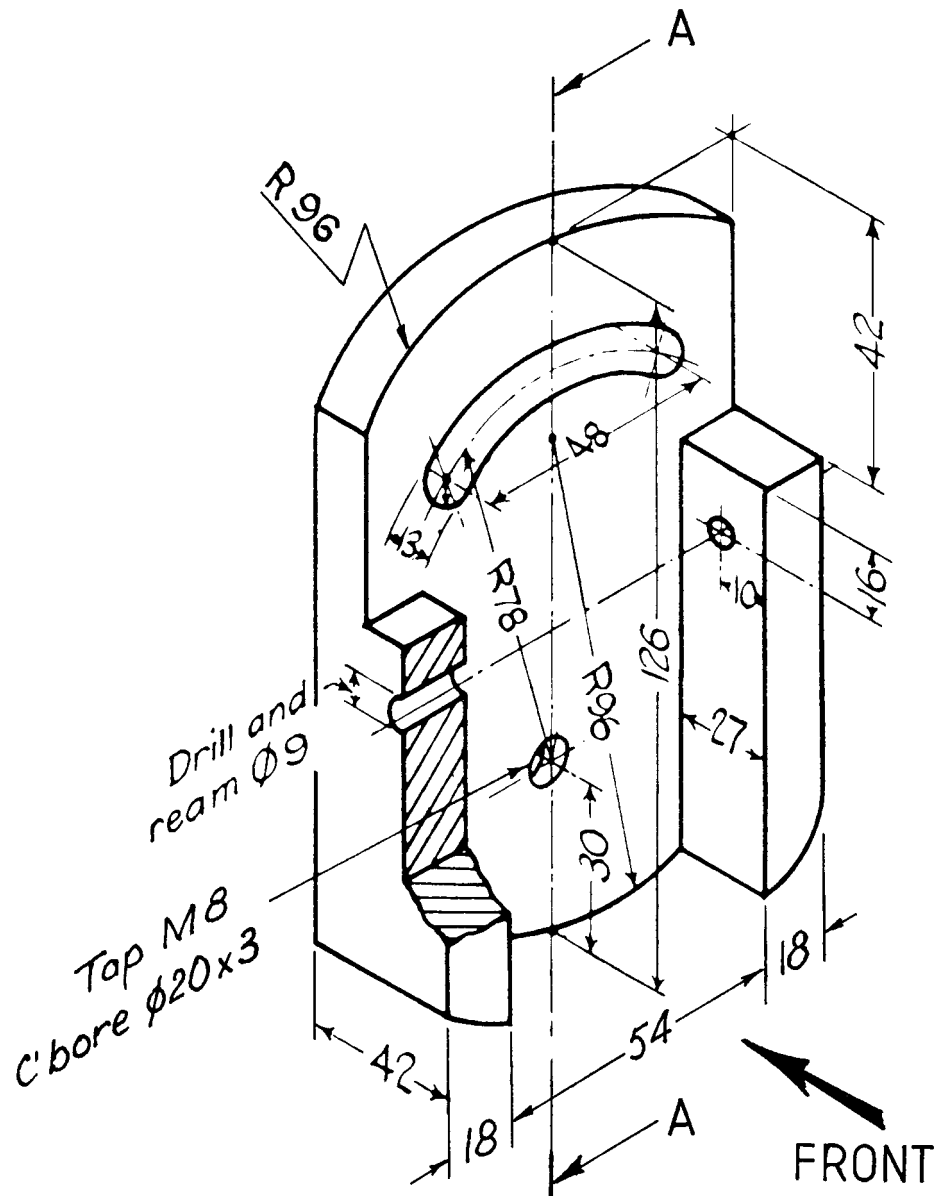
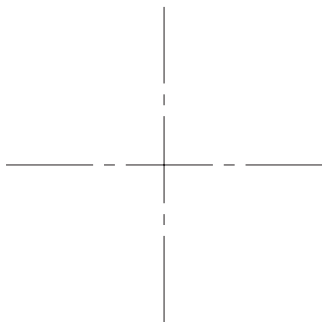


FIG. 14

QUESTION 5. (Continued)



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