

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

METALWORK

6040/01

Paper 1 Theory, Drawing and Design

October/November 2006

2 hours 45 minutes

Additional Materials: A2 Drawing Paper (1 sheet)
Answer Paper
Standard Drawing Equipment

READ THESE INSTRUCTIONS FIRST

Write your name, Centre number and candidate number in the spaces provided on the Answer Paper.

Section A

Answer any **three** questions.

Write your answers on the separate Answer Paper provided.

Section B

Answer **all** questions.

Use the A2 sheet of Drawing paper prepared prior to the examination for your answers.

At the end of the examination, fasten together the separate Answer paper for Section A and place it within your folded drawing paper for Section B.

The number of marks is given in brackets [] at the end of each question or part question.

All dimensions are in millimetres unless otherwise stated.

Except where pictorial views are used **all** diagrams are in First Angle Projection.

This document consists of **9** printed pages and **3** blank pages.



Section A

Theory

Answer any **three** questions in this section.

Use bold sketches to illustrate your answers wherever possible.

You are advised to spend 1 hour 15 minutes on Section A.

- 1 Fig. 1 shows a 3 and 4 jaw chuck.

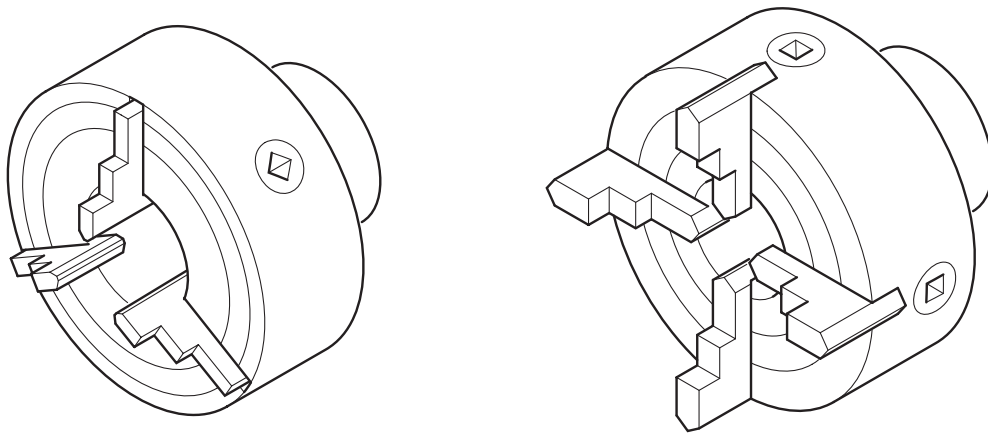


Fig. 1

- (a) Use notes and sketches to explain

- (i) the way in which the jaws open and close in each chuck, [6]
- (ii) the method of centring work in the jaws of the 4 jaw chuck, [3]
- (iii) the method of removing the chuck from the lathe. [2]

- (b) In lathe work it is sometimes necessary to use either a cutting compound, a lubricant or a coolant.

For **each one** describe a working situation where it would be used and explain why it would be used. [6]

- 2 (a) Fig. 2 shows a component to be worked by hand in BDMS.

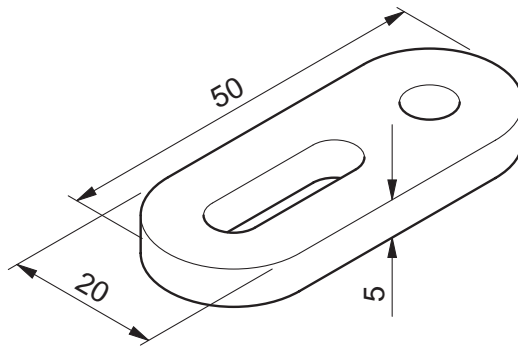


Fig. 2

- (i) Give the extended wording of BDMS. [1]
 - (ii) Give a brief description of the main features of BDMS. [4]
- (b) Use notes and sketches to explain how you would
- (i) mark out the component and the hole and slot from a strip of BDMS 20 mm wide, [6]
 - (ii) hold the component and cut the slot. Name all of the processes and tools used. [6]

3 Fig. 3 shows an anvil used in forgework.

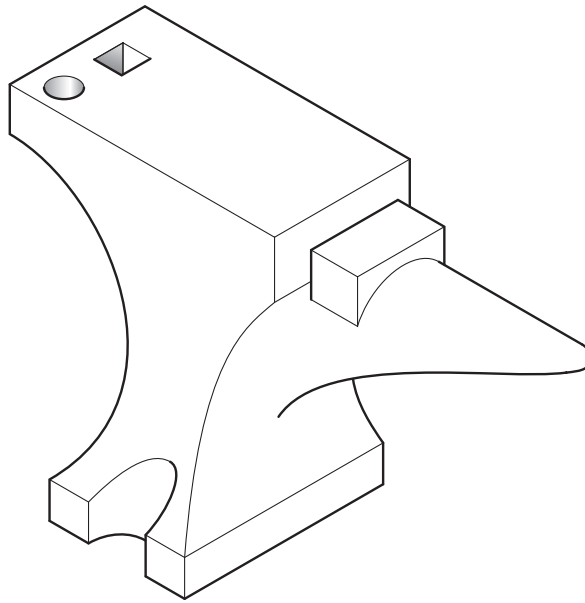


Fig. 3

Use notes and sketches to explain:

- (i) the stages you would go through to form an eye on the end of a piece of wrought iron 6 mm square. The finished eye is shown in Fig. 4. [6]

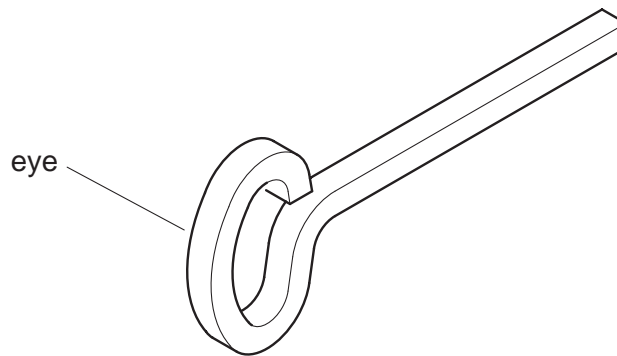


Fig. 4

- (ii) how you would draw down the end of a piece of wrought iron 10 mm square into a point shown in Fig. 5. [6]

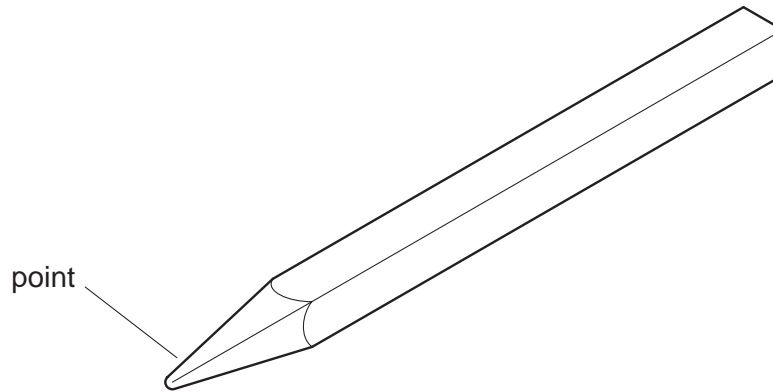


Fig. 5

- (iii) how you would thicken the end of a piece of wrought iron 12 mm square shown in Fig. 6. Name the process and say why this might be carried out. [5]

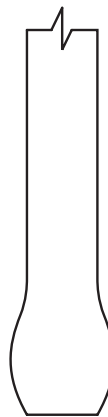


Fig. 6

4 Fig. 7 shows the section of two pieces of steel.

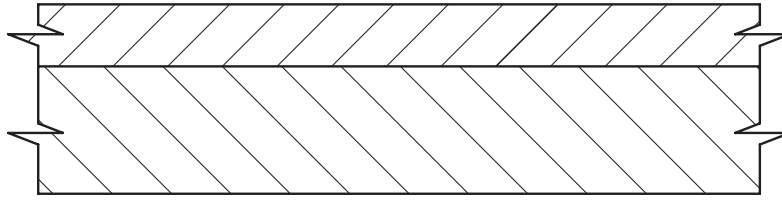


Fig. 7

(a) Copy the sketch and show how the steel would be:

- (i) joined using a nut, bolt and washers. [6]
- (ii) joined with a countersunk head rivet. [4]

(b) Fig. 8 shows two pieces of mild steel.

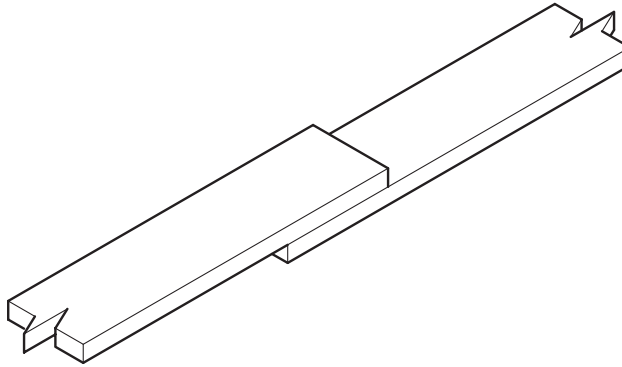


Fig. 8

- (i) Using notes and sketches describe how you would join these two pieces together using a heat process. [5]
- (ii) Name **two** other processes which can be used to join ferrous or non-ferrous metal involving heat. [2]

- 5 Fig. 9 shows a wooden pattern which is being prepared to cast a block in aluminium alloy.

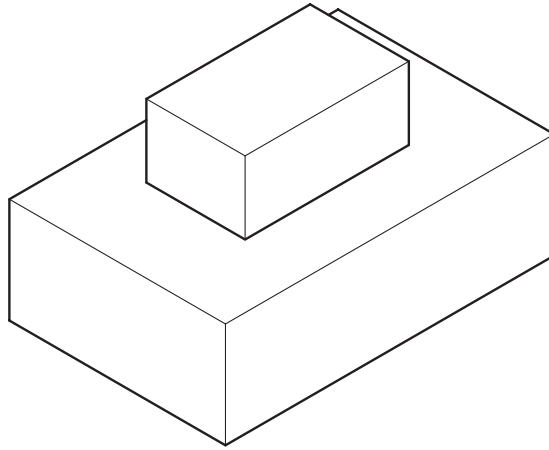


Fig. 9

Use notes and sketches to:

- (i) show how you would modify the pattern to improve the quality of the actual casting. Make sure that you name each of the modifications. [8]
- (ii) explain the main stages you would go through in preparing the two part casting box up to the stage where it is ready for the aluminium to be poured. [9]

Section B Drawing and Design

Answer **all** questions in this section.

Use the sheet of A2 drawing paper prepared prior to the examination for your answers.

Set the paper with the long edge of the top of your drawing board and use the space to the right of the line for your freehand sketches in answer to question 6.

Use only one side of your paper.

Dimensions not given are left for you to decide.

Fig. 10 shows details of a wall bracket A and speaker support B. The speaker support is an aluminium casting which is attached to the arm with a screw. The wall bracket and both arms are mild steel.

- 6** To the right of the vertical line on your paper make a series of sketches leading to the solution of the design problems below. Brief notes should be added to identify details such as important sizes and specific materials. It should be possible for the examiner to understand your solutions from these sketches.

To solve these problems you may incorporate additional parts and make minor modifications to the given components. Methods of assembly should not include the use of adhesives.

Design Problems

- (a)** An attachment to locate arm C to arm D to allow:
- (i)** the speaker bracket arm C to be slid outwards.
 - (ii)** to be fixed in position on the wall bracket arm D.
 - (iii)** to keep the two arms parallel when locked in a chosen position with centres 30 mm apart.
- (b)** A method of ensuring that the speaker bracket arm does not rotate in the attachment, to keep the speaker support horizontal.
- 7** Draw full size, in either 1st or 3rd angle orthographic projection the following views of the assembled speaker holder, complete with your solutions to the design problems in Question 6.
- (a)** An end view in the direction of arrow Y.
 - (b)** A sectional front view in the direction of arrows X – X.

Mark allocation:
 Communication [25]
 Design [24]

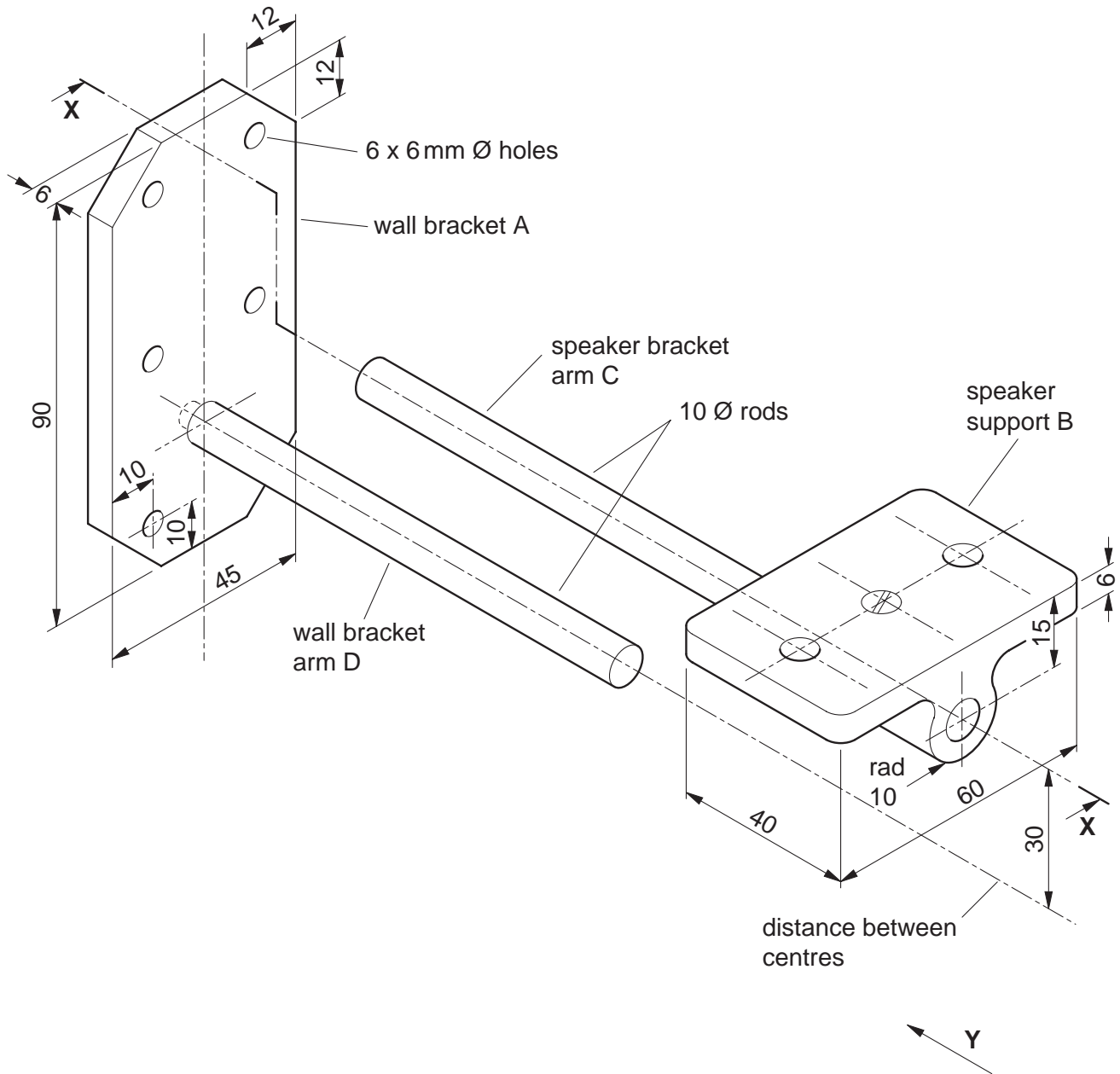


Fig. 10

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