

EXAMINATIONS COUNCIL OF ZAMBIA

Examination General Certificate of Education Ordinary Level

Metalwork

6040/1

paper 1: Theory, Drawing and Design

Friday

22 JULY 2016

Additional materials:

A4 Answer Booklet

A2 drawing paper (1 sheet)

Standard drawing equipment

2 hours 45 minutes

Marks: 100

Instructions to Candidates

Write your **Name, Centre Number and Candidate Number** in the spaces provided on the Answer Booklet.

Section A

There are **five** questions in this section.

Answer **any three** questions.

Write your answers in the Answer Booklet provided.

Section B

There are **two** questions in this section.

Answer **both** questions.

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

At the end of the examination, fasten the Answer Booklet for **Section A** and place it within your folded drawing paper for **Section B** after tying **loosely** in the top left hand corner.

Information for Candidates

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 **Third Angle Projection**.

SECTION A

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

This section carries 51 marks

Make bold sketches to illustrate your answer wherever possible. You are advised to spend not longer than 1 hour 15 minutes on this section.

1

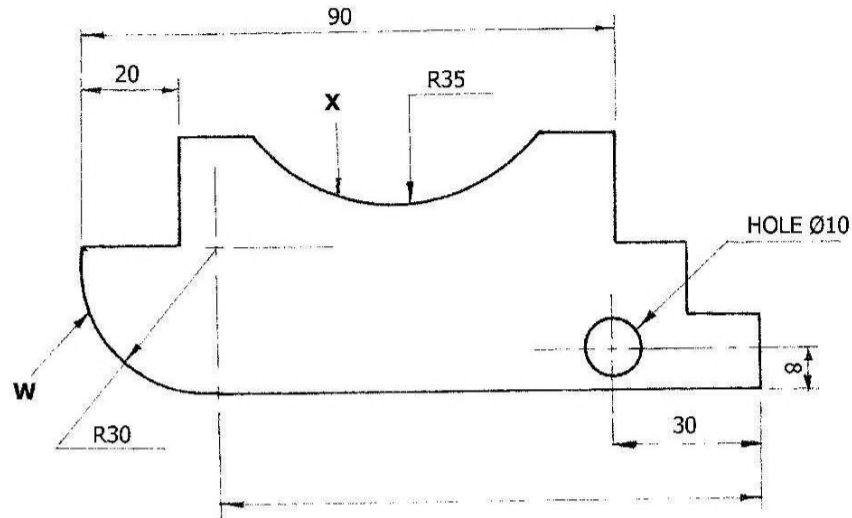


Figure 1

Figure 1 shows a Wood Circular Saw cover which is made of mild steel 3mm thick.

- (a) (i) List three (3) marking out tools you would use to mark out the details on **Figure 1**. [3]
- (ii) Calculate the overall length of the cover. [1]
- (iii) Explain how to locate the centre of curve 'W' on the saw cover before shaping. [3]
- (b) (i) Assuming that marking out has been done, describe how to shape curve 'X' [3]
- (ii) Outline the procedures required to draw file the edges of the circular saw cover. [2]
- (c) (i) List the steps you would take to drill a hole of diameter to 10mm in **Figure 1**. [3]
- (ii) State two safety precautions to be observed when making the circular saw. [2]

- 2 (a)** Production of iron and steel involves the use of furnaces.
- (i)** State the functions of each of the three (3) basic materials that consist the charge fed into the blast furnace. [3]
 - (ii)** Name one furnace that is used in the production of tool steel. [1]
- (b)** Give two reasons why most metals are usually used as alloys than pure metals. [2]
- (c)** For each of the following items state a property of the material suitable for making them.
- (i)** Rivets
 - (ii)** Electric wire
 - (iii)** Soldering wire
 - (iv)** Food can [4]
- (d)** Using notes and sketches, illustrate how snap head riveting can be carried out. [7]
- 3 (a) (i)** Give three reasons why copper is used for the 'bit' of a soldering iron. [3]
- (ii)** What damage to the tinned 'bit' can be expected if it was over heated to red heat? [1]
 - (iii)** Explain the function of flux in the soldering process? [1]
 - (iv)** When would you use a resin flux in preference to zinc chloride flux? [1]
- (b)** Give two reasons why planishing is such an important process in beaten metalwork? [2]
- (c)** By relating to the final stages of making a gilding metal dish with 120mm diameter x 1mm thick hollowed to an approximate radius of 75mm, explain the processes of:
- (i)** planishing [3]
 - (ii)** pickling [3]
 - (iii)** annealing [3]

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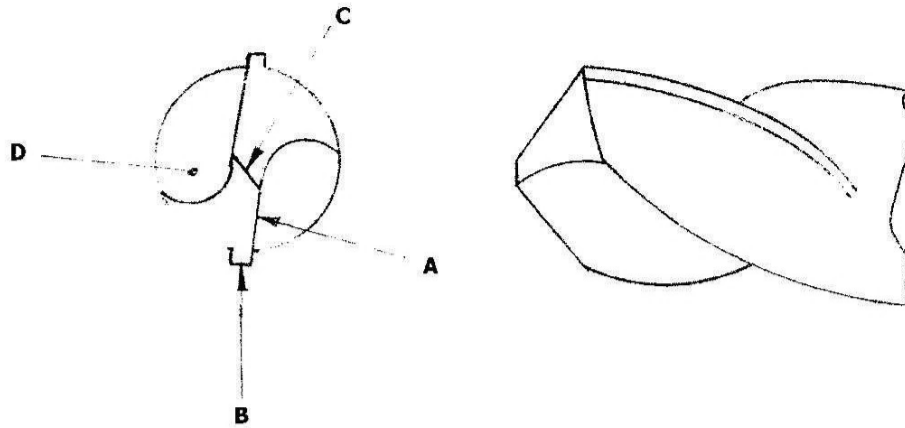


Figure 2

- (a) (i) **Figure 2** shows the cutting end of a twist drill. Name the parts of the drill **A**, **B**, **C** and **D**. [4]
- (ii) Give two factors that influence the selection of the cutting speed (RPM) of a drilling machine. [2]
- (b) Sketch the top face of the following turning tools showing the direction of cut of each tool. [6]
- (i) Straight round nosed tool.
- (ii) Left hand finishing tool.
- (iii) Right hand roughing tool.
- (c)

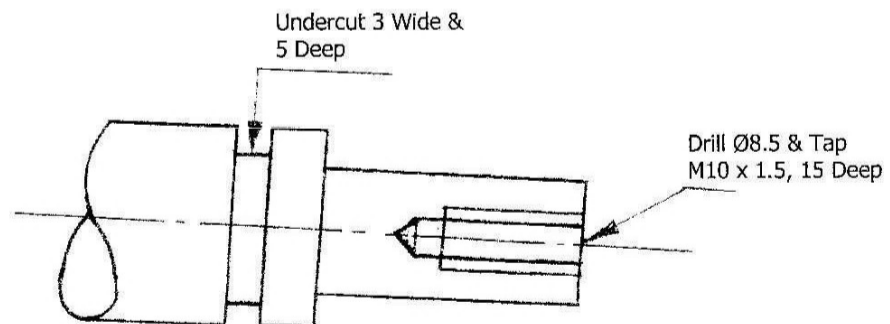


Figure 3

Test Piece MATL: BDMS

Describe the process of making a tapping hole in **figure 3**, using a centre lathe before applying the threading taps. [5]

- 5 (a) The following relate to the Anvil in **Figure 4(a)**.

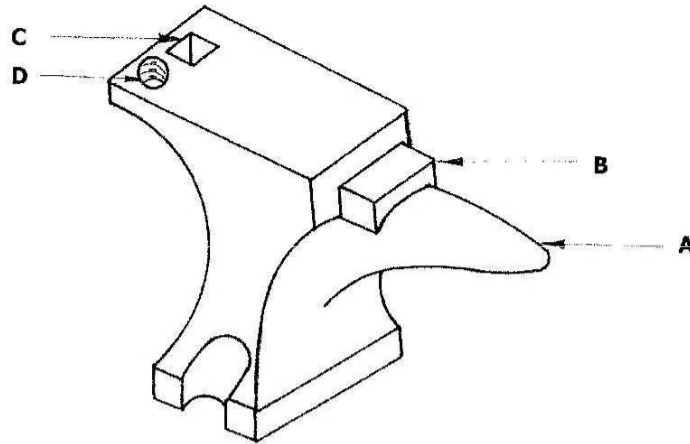


Figure 4 (a)

- (i) A face of cast steel has been welded to it. Explain the reason for this. [1]
 - (ii) What material is the rest of the anvil made of? [1]
 - (iii) Why is Cast Iron used in making the stand of an anvil. [1]
- (b) Identify and briefly explain the use of the labelled parts
- (i) **A**
 - (ii) **B**
 - (iii) **C**
 - (iv) **D** [8]
- (c) Describe briefly how to:
- (i) Draw down the end of a Wrought iron 10mm square into a point shown below; [3]

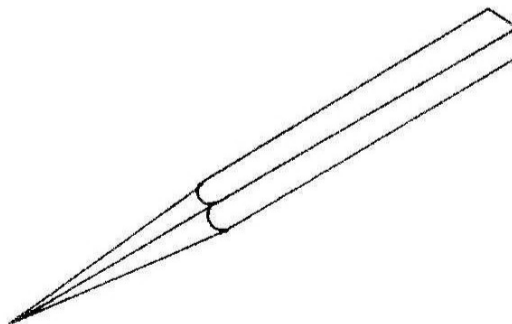


Figure 4 (b)

(ii) Thicken the piece of a 12mm square shown below and name the process.

[3]

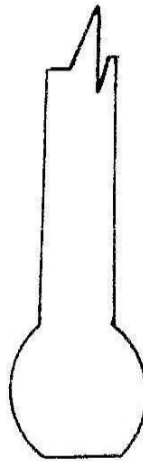


Figure 4 (c)

Section B Drawing and Design

Answer **all** questions in this section.

This section carries 49 marks

You are advised to spend 1 hour 30 minutes on this section

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

Set the paper with the long edge to the top of your drawing board.

Use only one side of your paper. Use the space to the right of the line on your paper to make your freehand sketch solutions in answer to question 6.

Use your own discretion where dimensions are not given.

Figure 5 shows incomplete details of a pipe vice made from mild steel. The spindle and the movable jaw slides along the key **A-A**. The spindle should be fixed to the vice through **B-B**.

Figure 6 shows section **X-X** of the pipe without the movable jaw and spindle.

- 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) A method of attaching the spindle to the body through **B-B**.
- (b) A method of attaching the spindle to the movable jaw so that the movable jaw moves up and down sliding along **A-A**.
- (c) A means of turning the spindle.

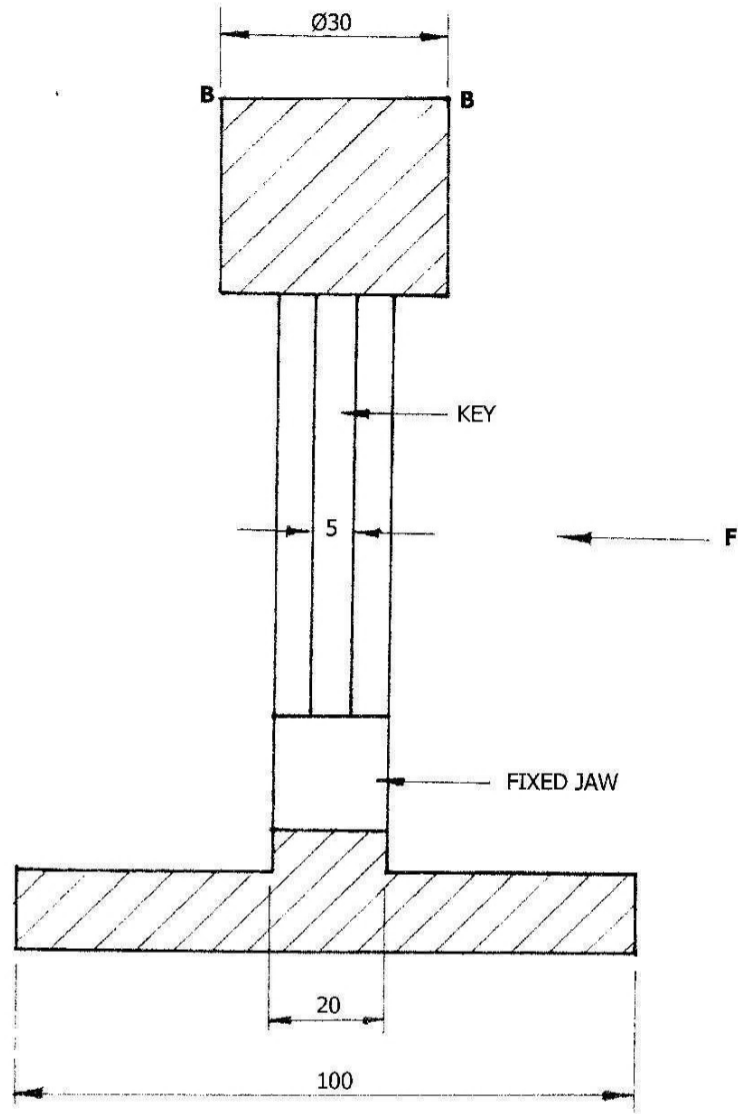


Figure 6