BOARD OF STUDIES
NEW SOUTH WALES

2010

HIGHER SCHOOL CERTIFICATE EXAMINATION

Industrial Technology
Metal and Engineering Technologies

General Instructions

- Reading time – 5 minutes
- Working time – $1\frac{1}{2}$ hours
- Write using black or blue pen
- Draw diagrams using pencil
- Board-approved calculators may be used
- Write your Centre Number and Student Number at the top of page 5

Total marks – 40

Section I Pages 2–4

10 marks

- Attempt Questions 1–10
- Allow about 20 minutes for this section

Section II Pages 5–8

15 marks

- Attempt Questions 11–16
- Allow about 35 minutes for this section

Section III Page 9

15 marks

- Attempt Question 17
- Allow about 35 minutes for this section

Section I

10 marks
Attempt Questions 1–10
Allow about 20 minutes for this section

Use the multiple-choice answer sheet for Questions 1–10.

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1 Which of the following is a ferrous metal?

(A) Aluminium

(B) Brass

(C) Silver

(D) Steel

2 What metal is extracted from bauxite ore?

(A) Aluminium

(B) Brass

(C) Copper

(D) Steel

3 What is the purpose of annealing metals?

(A) To change their colour

(B) To increase their strength

(C) To improve their workability

(D) To improve their conductivity

4 What does the term ‘upsetting’ mean in relation to working metal?

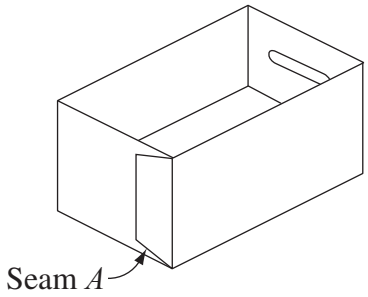
(A) Pulling metal through a die to reduce its diameter

(B) Heating metal to a molten state and cooling rapidly

(C) Shaping metal while red hot with a hammer and anvil

(D) Making the metal thicker and shorter by hitting on the end

5 The letterbox body shown is going to be made from galvanised steel sheet and will be mass-produced.



What is the best method of joining seam *A*?

(A) Brazing

(B) MIG welding

(C) Soft soldering

(D) Spot welding

6 In the milling process, what is the name of the operation when the feed is in the same direction as the cutter rotation?

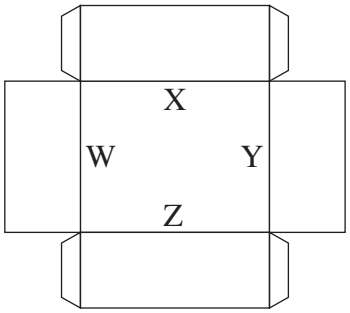
(A) Up milling

(B) Down milling

(C) In line milling

(D) Reverse milling

7 A sheetmetal tray has been cut out and is now ready for folding as shown in the diagram.



What is the best order in which to fold the metal sheet?

(A) W, X, Y, Z

(B) X, Z, W, Y

(C) Y, W, X, Z

(D) Z, Y, X, W

8 A 15 mm diameter hole is to be drilled 25 mm deep into the end of a cylindrical piece of metal using a metal lathe.

Which of the following best describes the correct order of operations to do this?

(A) Pilot hole, centre drill, finish hole, face end

(B) Centre drill, face end, pilot hole, finish hole

(C) Face end, centre drill, pilot hole, finish hole

(D) Face end, pilot hole, centre drill, finish hole

9 Which of the following statements is true for MIG welding but not for any other type of welding?

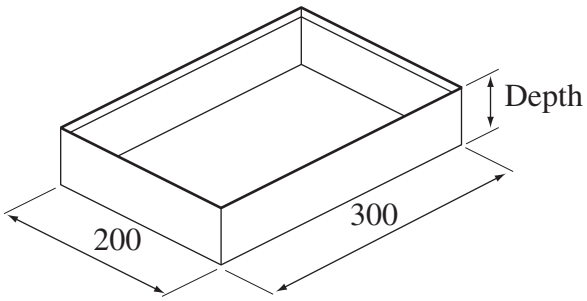
(A) An electric arc is used to melt the parent metal and filler rod.

(B) A flow of protective gas is used to shield the weld area during welding.

(C) An automatically fed, continuous wire roll is used as a consumer electrode.

(D) A work clamp is attached to the job to complete the electrical circuit for welding.

10 Sheetmetal trays are being made from blanks which are 500 × 400 mm. The trays must have a base which is 300 × 200 mm. All exposed edges must include a 10 mm folded safety edge, as shown in the diagram.



What will be the depth of the finished tray?

(A) 80 mm

(B) 90 mm

(C) 100 mm

(D) 110 mm

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Centre Number

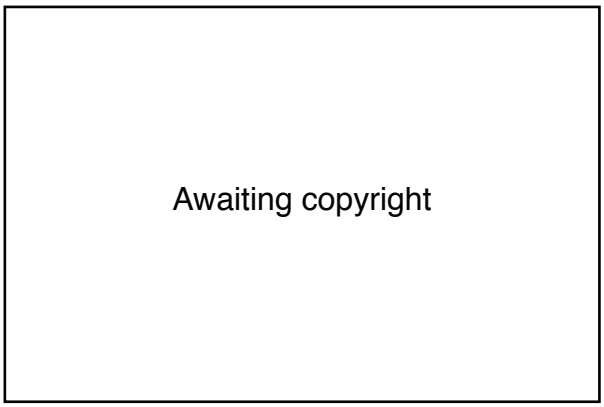
Student Number

Section II

15 marks
Attempt Questions 11–16
Allow about 35 minutes for this section

Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.

Questions 11–16 refer to the motorbike trailer shown in the photo.



Question 11 (1 mark)

Name a suitable metal section that could be used to make the drawbar of the trailer and give a reason for your choice. **1**

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Question 12 (2 marks)

The trailer coupling is shown. **2**

Describe an industrial process used to produce the body of the coupling before machining.

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Question 13 (2 marks)

What method could be used for attaching the coupling to the drawbar of the trailer? Explain why you have chosen this method. **2**

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Question 14 (3 marks)

While welding the frame of the trailer, the welder notices that the frame is being distorted.

(a) What is the likely cause of this distortion? **1**

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(b) Outline methods that can be used to minimise distortion from welding. **2**

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Question 15 (3 marks)

The axle of the trailer will be made using stub axles (shown below) at each end.

(a) Identify a machine that could be used to shape the stub axles. **1**

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(b) Describe how the tapered shape could be achieved using the machine identified in part (a). **2**

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Question 16 (4 marks)

Discuss suitable finishing methods that could be used to protect the trailer from corrosion. **4**

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Section III

15 marks
Attempt Question 17
Allow about 35 minutes for this section

Answer the question in a writing booklet provided. Extra writing booklets are available.

Question 17 (15 marks)

A small family-owned company is operating successfully in a local market. The company is assessing the feasibility of relocating to a larger facility in order to expand production.

(a) Outline environmental considerations that may affect the expansion of the company. **3**

(b) Analyse the structural, technical and personnel issues to be considered prior to relocating and expanding. **12**

End of paper

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