

BOARD OF STUDIES
NEW SOUTH WALES

2006

HIGHER SCHOOL CERTIFICATE
EXAMINATION

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Centre Number

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Student Number

Industrial Technology

Metals and Engineering Industries

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 this page and pages 5, 9, 13 and 17

Total marks – 100

Section I Pages 2–12

60 marks

- Attempt Questions 1–3
- Allow about 55 minutes for this section

Section II Pages 13–19

40 marks

- Attempt Questions 4–5
- Allow about 35 minutes for this section

Section I

60 marks

Attempt Questions 1–3

Allow about 55 minutes for this section

Answer the questions in the spaces provided.

Marks

Use the following information to answer Questions 1 and 2.

IND-TECH is a company in the metals and engineering industry. Competition from cheap imports has led the company to investigate organisational changes to prevent closure. The present workforce is to be retained.

Question 1 (20 marks)

- (a) Identify organisational changes that IND-TECH could make to become more competitive. **2**

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- (b) Outline reasons why IND-TECH would want to keep their present workforce. **3**

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Question 1 continues on page 3

Question 1 (continued)

- (c) Discuss how retraining some of the workforce could help IND-TECH remain competitive. 4

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- (d) Outline possible roles for unions during the organisational change. 4

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Question 1 continues on page 4

Question 1 (continued)

- (e) Discuss equity issues that would need to be considered when changing IND-TECH’s organisation. **7**

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End of Question 1

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Student Number

Section I (continued)

Marks

Question 2 (20 marks)

- (a) Identify ways in which IND-TECH's costs could be reduced through recycling. **2**

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- (b) Name an emerging technology, and outline how it could improve IND-TECH's production system. **3**

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Question 2 continues on page 6

Question 2 (continued)

- (c) What is *mass production*? How could mass production help IND-TECH compete with cheap imports? **4**

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- (d) Describe safe material handling practices and how these practices could improve efficiency and reduce costs for IND-TECH. **4**

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Question 2 continues on page 7

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Student Number

Section I (continued)

Marks

Question 3 (20 marks)

- (a) List TWO characteristics of Occupational Health and Safety (OHS) signage that would help employees to understand safe working procedures. **2**

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- (b) Outline the advantages of using computer software graphics to create company documentation. **3**

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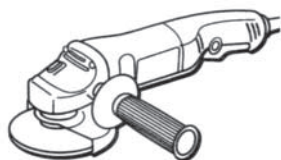
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Question 3 continues on page 10

Question 3 (continued)

(c) An extract from a catalogue is shown.

4



**125 mm Angle Grinder
With Spindle Lock**
1200 W, adjustable guard,
metal gear case, kit box.
2 year warranty.

Discuss the advantages of displaying graphics AND text in this catalogue extract.

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Question 3 continues on page 11

Question 3 (continued)

(d) An extract from a Material Safety Data Sheet (MSDS) for toner is shown.

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<p>Section VI – Health Hazard Data</p> <hr/> <p><i>Health Hazards (Acute and Chronic):</i> This material when used as intended, does not represent a health or safety hazard.</p> <hr/> <p><i>Signs and Symptoms of Exposure:</i> Nil</p> <hr/> <p><i>Medical Conditions:</i> None when used as described by product literature.</p>
<p>Section VII – Precautions for Safe Handling and Use</p> <hr/> <p><i>Steps to be Taken in Case Material is Released or Spilled:</i> Loose toner can be removed using a vacuum cleaner. Residue can be removed with soap and cold water. After removal of loose toner, garments may be washed or dry-cleaned.</p> <hr/> <p><i>Waste Disposal Method:</i> Do not incinerate. No special techniques beyond normal practice. Ensure conformity with federal, state or local regulations.</p> <hr/> <p><i>Precautions to be taken in Handling and Storing:</i> Avoid inhalation of excessive dust. Store below 30°C.</p>

Outline reasons why these sheets are produced, and their relevance for IND-TECH.

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Question 3 continues on page 12

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Student Number

Section II

40 marks

Attempt Questions 4–5

Allow about 35 minutes for this section

Answer the questions in the spaces provided.

Marks

Question 4 (20 marks)

IND-TECH intends to manufacture the wheelbarrow shown below.



- (a) State TWO reasons, other than strength, for using mild steel in the manufacture of the frame. **2**

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Question 4 continues on page 14

Question 4 (continued)

- (b) The bucket of the wheelbarrow is to be formed using sheet metal. Suggest a suitable sheet metal, and state reasons why this material has been selected. **3**

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- (c) Describe the processes involved in forming the wired edge of the bucket, and outline the reasons for its inclusion in the design. **4**

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- (d) Identify and compare TWO suitable processes for joining the mild steel components of the wheelbarrow frame. **4**

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Question 4 continues on page 15

Question 4 (continued)

- (e) When selecting a protective finish for the wheelbarrow frame, OHS and environmental issues must be considered. Select and justify suitable finishing processes that could be used.

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End of Question 4

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Centre Number

Section II (continued)

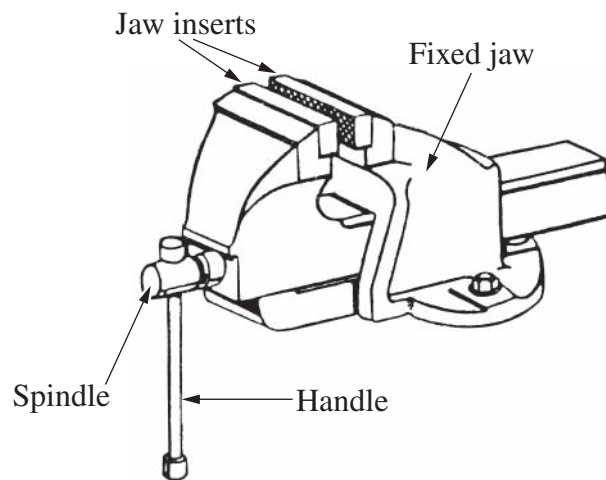
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Student Number

Marks

Question 5 (20 marks)

IND-TECH intends to produce the bench vice shown below.



(a) Give TWO reasons for the use of cast iron for the manufacture of the fixed jaw. **2**

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(b) The jaw inserts are manufactured from medium carbon steel. Outline reasons why the jaw inserts are held in place with machine screws rather than by welding. **3**

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Question 5 continues on page 18

Question 5 (continued)

- (c) Identify and describe a suitable process to achieve the hardness required for the jaw inserts. 4

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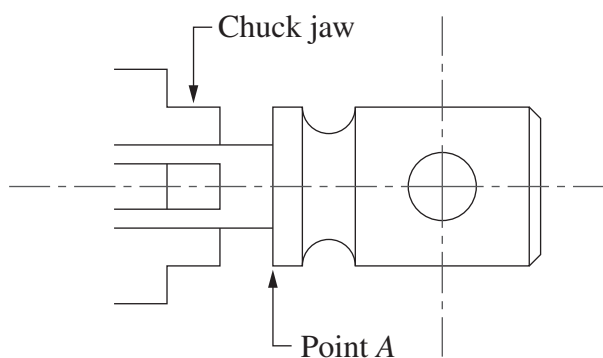
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- (d) Describe the processes used to machine the part of the spindle to the right of point A, as shown. 4



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Question 5 continues on page 19

Question 5 (continued)

- (e) Bench vices can be made using casting or fabrication processes. Describe each of these processes, and compare their advantages. **7**

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