

BOARD OF STUDIES
NEW SOUTH WALES

2007

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 13–20

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, 2 and 3.

IND-TECH is a company in the metals and engineering industry. The company has been awarded a major contract. To meet increased production requirements, the company needs to review its current facilities and practices.

Question 1 (20 marks)

- (a) Outline a method of maintaining quality control during increased production. **2**

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- (b) Identify strategies that the company could use to obtain information for the review of its current facilities and practices. **3**

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Question 1 continues on page 3

Question 1 (continued)

- (c) (i) Define the term *automation*. 1

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- (ii) Explain how automation can be used to improve the efficiency of production practices. 3

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- (d) Discuss how increased production could impact on the organisation and management of the company. 4

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Question 1 continues on page 4

Question 1 (continued)

- (e) IND-TECH is to investigate using other specialist organisations to supply some components for their products.

7

Discuss the advantages and disadvantages of using other organisations in the production process.

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End of Question 1

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Student Number

Section I (continued)

Marks

Question 2 (20 marks)

- (a) Identify strategies that could be used to minimise waste from the increased production at IND-TECH. **2**

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- (b) What is meant by the term *workplace culture*? Outline a strategy that IND-TECH could use to enhance workplace culture. **3**

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Question 2 continues on page 6

Question 2 (continued)

- (c) Discuss using examples, the impact of government legislation on employees. **4**

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- (d) Evaluate the role of computer technology in training employees. **4**

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Question 2 continues on page 7

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Centre Number

Section I (continued)

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Student Number

Marks

Question 3 (20 marks)

IND-TECH'S production targets for a 6-month period are shown.

<i>Month</i>	<i>Units</i>
January	1000
February	1500
March	1900
April	1800
May	2000
June	2300

(a) Outline reasons for producing production targets.

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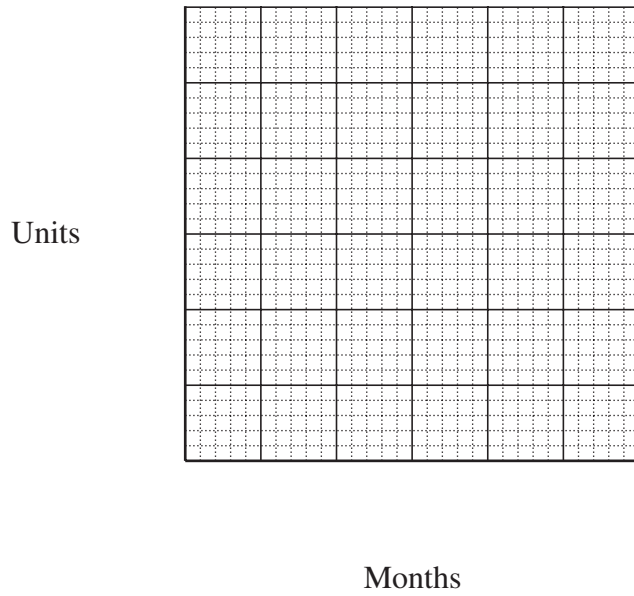
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Question 3 continues on page 10

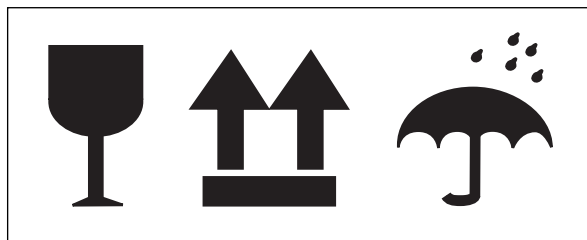
Question 3 (continued)

- (b) Draw a graph on the grid to represent IND-TECH's production targets. 3



- (c) The symbols shown are examples of signage commonly used on packaging. 4

Discuss the purpose of placing graphical images on packaging.



Question 3 continues on page 11

Question 3 (continued)

- (d) The company is required to package 10 500 units for distribution.

4

Complete the table indicating the cost of packaging these units. All prices are inclusive of GST.

<i>Item</i>	<i>Cost</i>	<i>Total cost</i>
Artwork	\$2100	\$2100
Materials	70c per unit	
Printing	35c per unit	
Labour	\$75 per 100 units	
	Total cost of packaging	
	Cost per unit	

Question 3 continues on page 12

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Student Number

Section II

40 marks

Attempt Questions 4–5

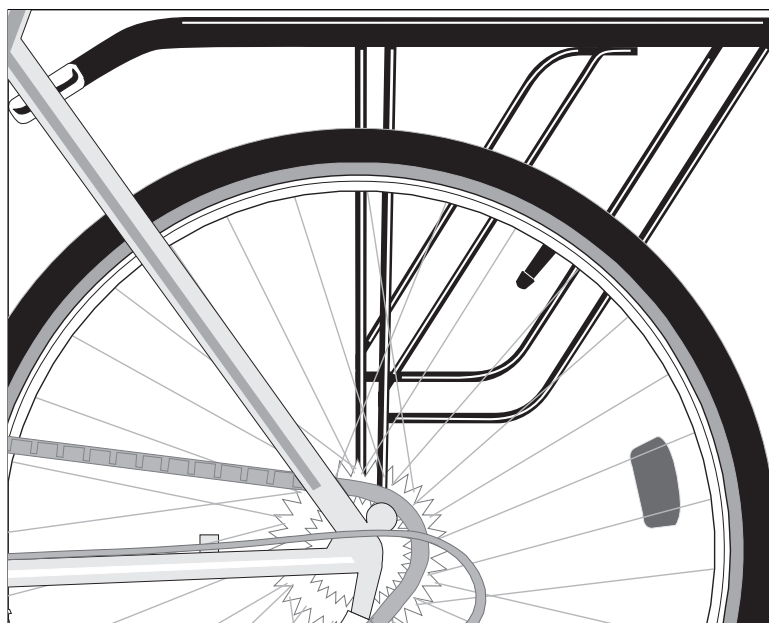
Allow about 35 minutes for this section

Answer the questions in the spaces provided.

Marks

Question 4 (20 marks)

A design of a bicycle rack is shown. The rack is to be mass-produced and manufactured from a tubular section of aluminium alloy.



- (a) Outline reasons why aluminium alloy would be preferred to mild steel.

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Question 4 continues on page 14

Question 4 (continued)

(b) Name and describe a piece of equipment that could be used to bend the tube. **3**

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(c) Name and justify a suitable industrial process that could be used to join the aluminium alloy tubing. **4**

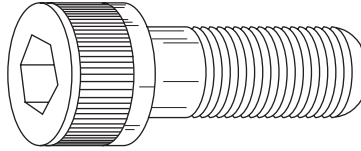
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Question 4 continues on page 15

Question 4 (continued)

(d) The fastener used to attach the rack to the bicycle is shown.

4



Name this fastener. Explain why it is an appropriate fastener to secure the rack to the bicycle frame.

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Question 4 continues on page 16

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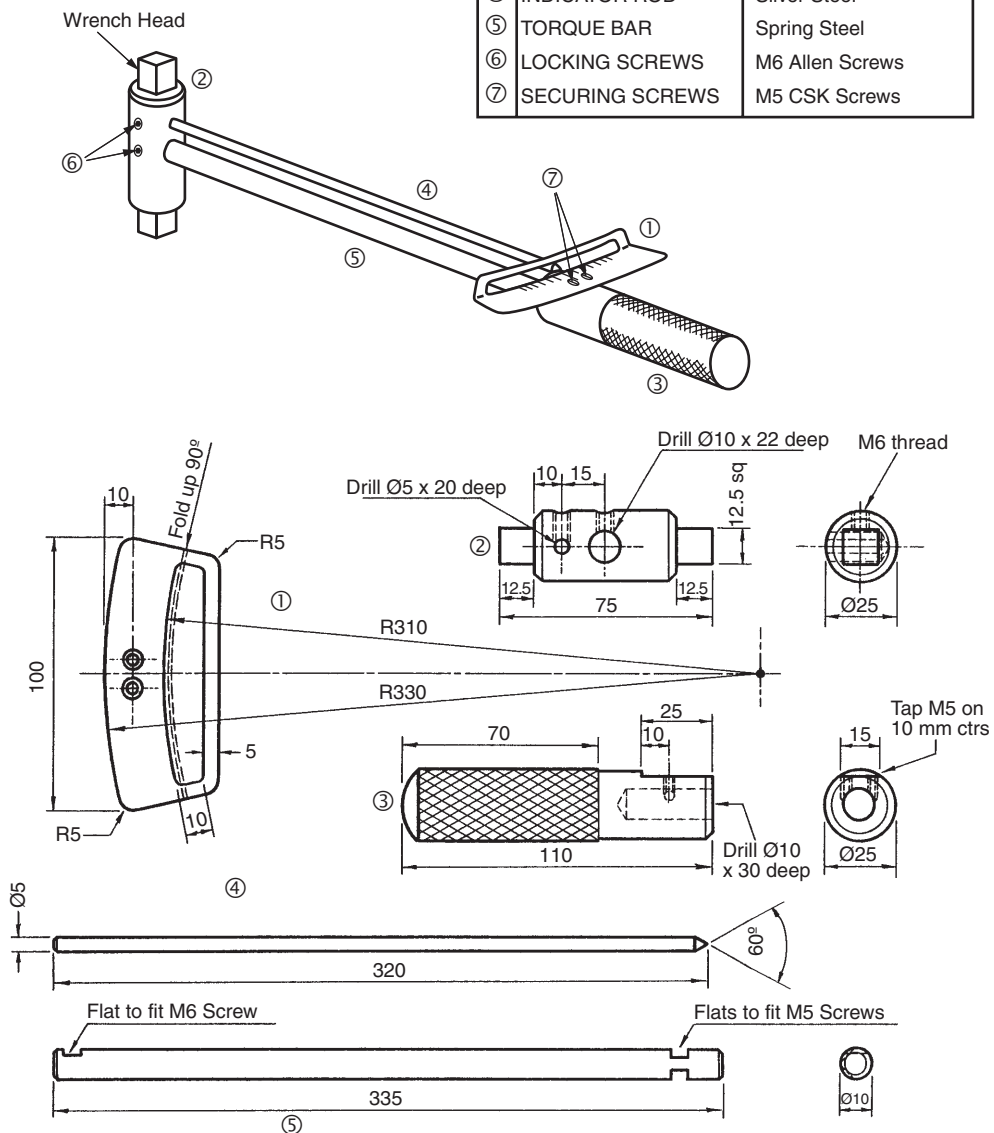
Section II (continued)

Question 5 (20 marks)

A prototype of a tension wrench that is to be produced is shown. All parts of Question 5 refer to the information below.

MATERIAL LIST

①	SCALE PLATE	Stainless Steel 1.2 mm
②	WRENCH HEAD	Mild Steel
③	HANDLE	Mild Steel
④	INDICATOR ROD	Silver Steel
⑤	TORQUE BAR	Spring Steel
⑥	LOCKING SCREWS	M6 Allen Screws
⑦	SECURING SCREWS	M5 CSK Screws



Question 5 continues on page 18

Question 5 (continued)

The tension wrench is used to set the prescribed torque settings of nuts and bolts precisely. The prototype is to be manufactured in accordance with the illustrated parts list.

- (a) Interpret the specification of M5 CSK in relation to Part ⑦. **2**

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- (b) Describe the process of producing the M6 thread in the wrench head. **3**

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- (c) Name and describe a process for producing a non-slip surface on the handle. **4**

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Question 5 continues on page 19

Question 5 (continued)

- (d) Identify and describe a suitable process that may be used to form the 12.5 square sections on the wrench head. **4**

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Question 5 continues on page 20

