BOARD OF STUDIES
NEW SOUTH WALES

Centre Number

Student Number

2006

HIGHER SCHOOL CERTIFICATE EXAMINATION

Industrial Technology
Electronics 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 and 2.

IND-TECH is a company in the electronics 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

Marks

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

Centre Number

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

Marks

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

Marks

Question 2 (continued)

(e) Discuss how the Environmental Protection Authority (EPA) and the Occupational Health and Safety (OHS) Act may impact on IND-TECH's planning for change. **7**

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End of Question 2

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Centre Number

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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Question 3 continues on page 10

Marks

Question 3 (continued)

(c) An extract from a catalogue is shown. **4**

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

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Question 3 continues on page 11

Marks

Question 3 (continued)

(d) An extract from a Material Safety Data Sheet (MSDS) for toner is shown. **4**

Section VI – Health Hazard Data

Health Hazards (Acute and Chronic): This material when used as intended, does not represent a health or safety hazard.
Signs and Symptoms of Exposure: Nil
Medical Conditions: None when used as described by product literature.

Section VII – Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled: 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.
Waste Disposal Method: Do not incinerate. No special techniques beyond normal practice. Ensure conformity with federal, state or local regulations.
Precautions to be taken in Handling and Storing: Avoid inhalation of excessive dust. Store below 30°C.

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

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Question 3 continues on page 12

Question 3 (continued)

(e) Justify why consistent terminology and standards are essential when calculating and ordering materials, and writing reports. **7**

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End of Question 3

Industrial Technology
Electronics Industries

Centre Number

Student Number

Section II

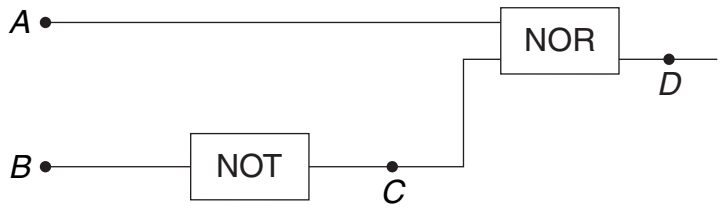
40 marks
Attempt Questions 4–5
Allow about 35 minutes for this section

Answer the questions in the spaces provided.

Marks

Question 4 (20 marks)

(a) A block diagram of a simple logic circuit is shown. If the input at A = logic 1, and the input at B = logic 1, identify the logic values at C and D. **2**



C = Logic .....

D = Logic .....

(b) Explain how Light Dependent Resistors (LDRs) operate. **3**

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Question 4 continues on page 14

Marks

Question 4 (continued)

(c) Identify the properties of semiconductor materials that make them conductors or insulators. **4**

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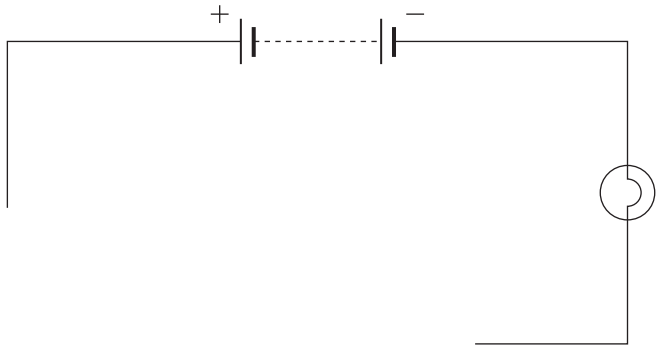
(d) Complete the sketch of the circuit below to show a power diode connected in forward bias. Explain what happens to the current flow in the circuit if the diode is reversed. **4**



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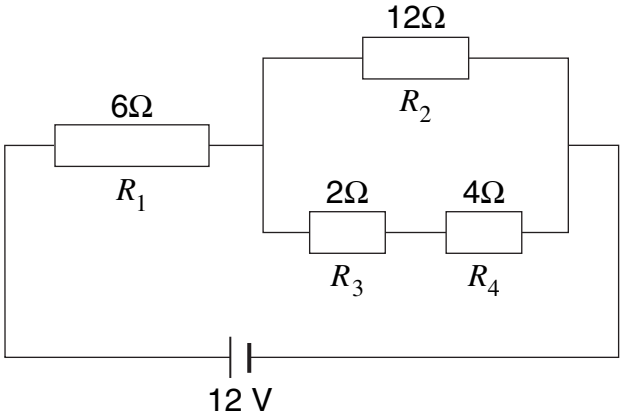
Question 4 continues on page 15

Question 4 (continued)

(e) Using the formulae provided, calculate the voltage drop AND power dissipated across R_1. Ignore the resistance in the wire. **7**



Formulae

$$V = IR$$

$$R_T = R_1 + R_2 + R_3 + \cdots$$

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots$$

$$P = VI$$

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Question 4 continues on page 16

Question 4 (continued)

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End of Question 4

Centre Number

Student Number

Section II (continued)

Marks

Question 5 (20 marks)

(a) Identify ways of minimising the risk of receiving an electric shock when working with electronic circuits. **2**

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(b) What is *electrical power*? What does the power rating of electrical equipment indicate? **3**

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Question 5 continues on page 18

Question 5 (continued)

(c) Outline the advantages of using analogue and digital multimeters. **4**

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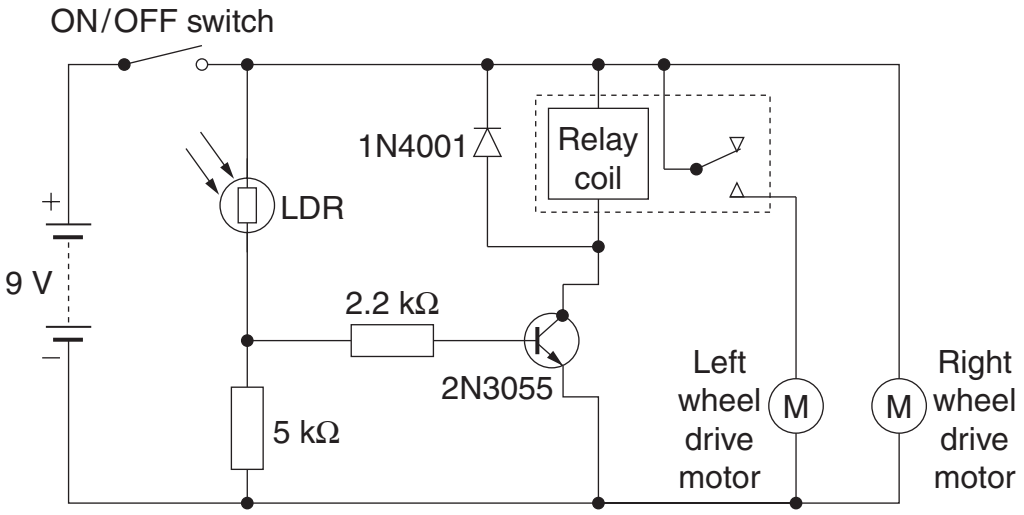
(d) The circuit for a two-wheel-drive vehicle is shown below. **4**



James Garrat, Design & Technology, 1991, Cambridge University Press

Outline how this vehicle will behave when the ON/OFF switch is turned on.

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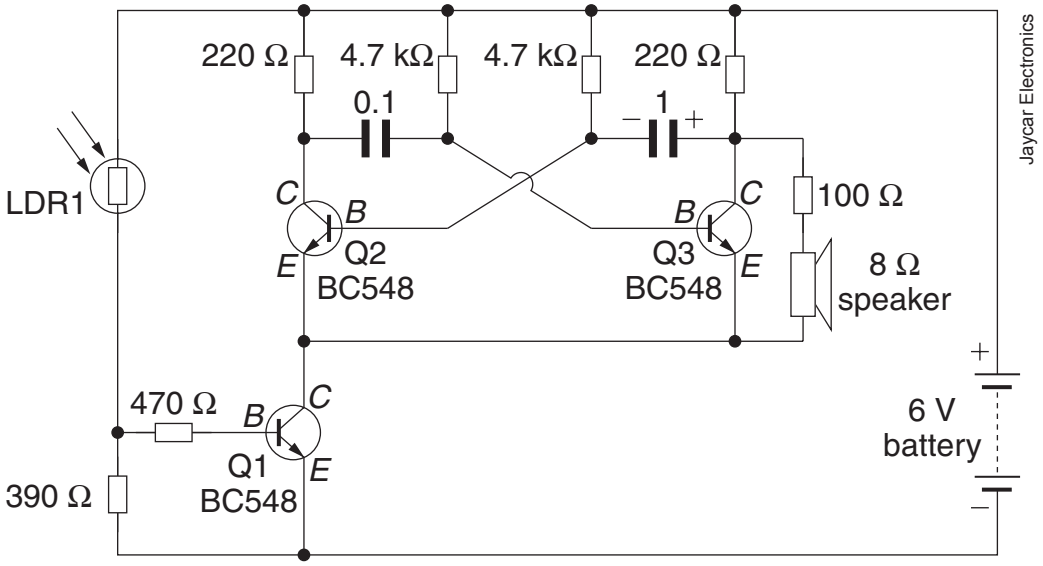
Question 5 continues on page 19

Marks

Question 5 (continued)

(e) A light-operated alarm circuit is shown below. **7**



Propose and explain a fault-finding sequence for testing this circuit if the speaker does not produce an output.

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Question 5 continues on page 20

Question 5 (continued)

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