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Centre Number

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Student Number

2004
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 13–19

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

IND-TECH is a company in the electronics industry employing a mix of male and female employees. Management has decided to investigate the viability of introducing new technologies to stimulate productivity and expansion in the market.

Question 1 (20 marks)

(a) Identify an example of a new technology that IND-TECH could investigate. **1**

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(b) Outline the implications of the introduction of new technologies on IND-TECH’s existing technologies. **3**

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Question 1 continues on page 3

Question 1 (continued)

- (c) Describe ways in which IND-TECH’s management could evaluate the viability of introducing new technologies. 4

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- (d) Explain how the introduction of new technologies could stimulate IND-TECH’s productivity. 4

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Question 1 continues on page 4

Industrial Technology
Electronics Industries

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Centre Number

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Student Number

Section I (continued)

Marks

Question 2 (20 marks)

- (a) Identify sources of finance that IND-TECH may use to support the introduction of the new technologies. **2**

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- (b) Outline possible changes to the production manager’s responsibilities when new technologies are introduced. **2**

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Question 2 continues on page 6

Question 2 (continued)

- (c) The introduction of new technologies may enhance IND-TECH’s position in the product market. **4**

Discuss how the introduction of new technologies could improve the marketability of IND-TECH’s products.

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- (d) As a result of the introduction of new technologies, a number of IND-TECH’s employees are identified as being redundant and are to be dismissed. **4**

Outline the industrial rights of these employees, and identify appropriate action that can be taken by them.

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Question 2 continues on page 7

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Centre Number

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Student Number

Section I (continued)

Question 3 (20 marks)

Marks

- (a) Identify the sign shown and state how IND-TECH's employees should respond to it. 2



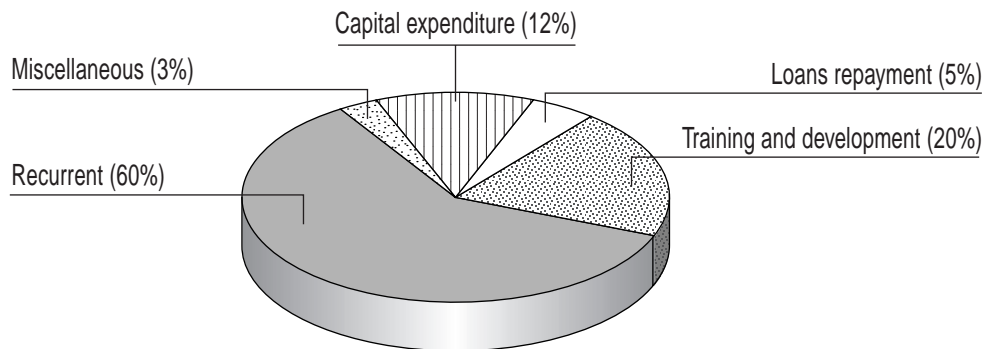
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- (b) The graph shows IND-TECH's expenditure in the year following the introduction of the new technologies. 2



Identify reasons for the proportion being spent on training and development.

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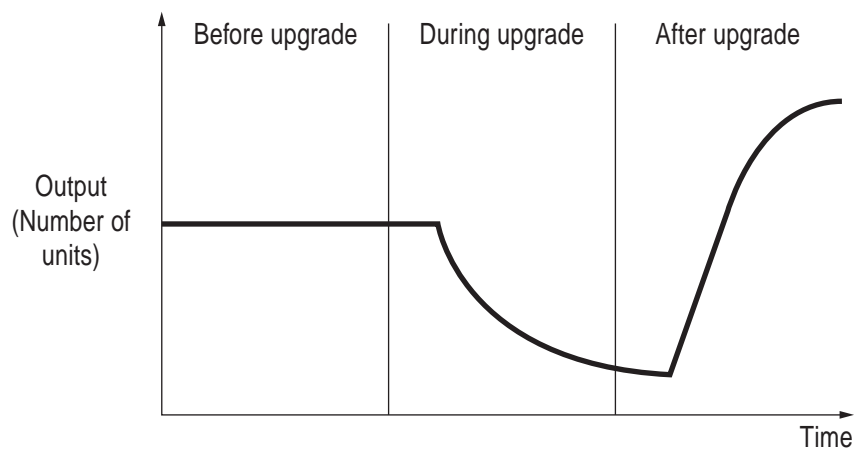
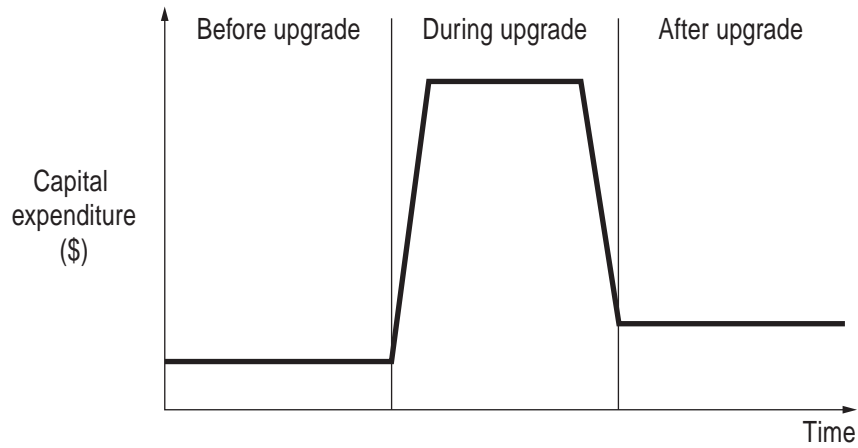
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Question 3 continues on page 10

Question 3 (continued)

- (c) The graphs below illustrate IND-TECH's capital expenditure and output before, during and after the introduction of new technologies. 4



Explain the reasons for the changes in capital expenditure and output during and after the upgrade phases.

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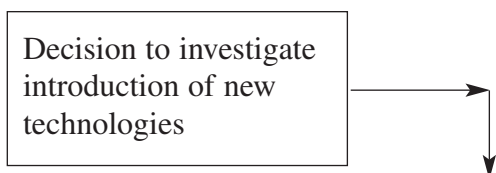
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Question 3 continues on page 11

Question 3 (continued)

- (d) Complete the diagram to show a sequence plan for the introduction of the new technologies at IND-TECH. **4**

Introduction of new technologies plan



Question 3 continues on page 12

Industrial Technology
Electronics Industries

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Centre Number

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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) Outline why heat-shrink tubing is used in electronic circuits.

2

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(b) Identify features that should be considered when selecting a microphone for inclusion in an audio circuit.

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Question 4 continues on page 14

Question 4 (continued)

(c) The drawing below shows how carbon resistors are labelled.

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Explain how the labelling is used to calculate the value range of carbon resistors.

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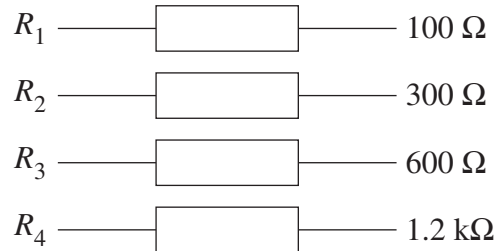
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Question 4 continues on page 15

Question 4 (continued)

- (d) The four resistors shown can be organised to produce a total resistance of $200\ \Omega$. 4



Using the following formulae

$$R_T = R_1 + R_2 + R_3 \dots, \quad \frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

calculate how this is done, and complete the diagram below.

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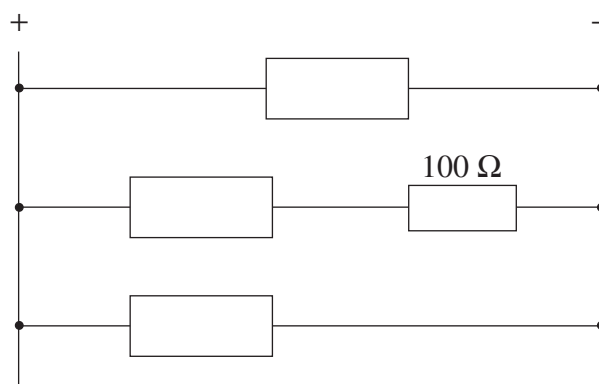
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Question 4 continues on page 16

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Student Number

Section II (continued)

Marks

Question 5 (20 marks)

- (a) Outline how the risk of electric shock can be minimised when testing an electronic circuit. 2

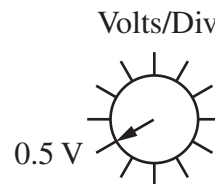
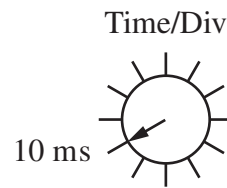
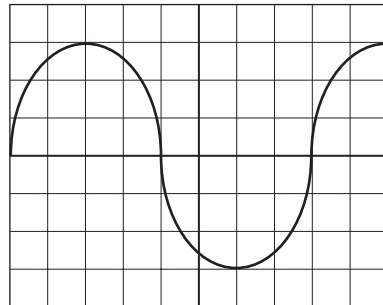
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- (b) Calculate the period of the waveform shown in the oscilloscope display. 2



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Question 5 continues on page 18

Question 5 (continued)

(c) Describe how visual display units display information.

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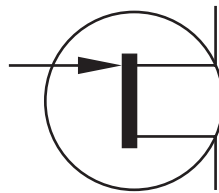
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(d) Using the diagram, explain how a field effect transistor (FET) operates.

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Field effect transistor symbol, and Waveforms from Basic Electronics for Tomorrow's World by Len Jones, reproduced with permission from Cambridge University Press

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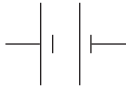
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Question 5 continues on page 19

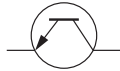
- (e) Use the circuit components listed below to design a circuit which, when activated, causes a delay before a bulb is switched on. Explain how the circuit operates. Neglect component values.

8

Components:



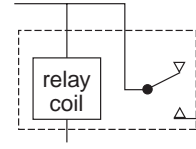
Battery



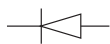
Bipolar transistor



Bulb



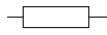
Relay



Diode



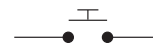
Capacitor



Resistor



Switch



Switch

CIRCUIT DIAGRAM

CIRCUIT EXPLANATION

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