Industrial Technology
Electronics Technologies

General Instructions
• Reading time – 5 minutes
• Working time – 1 1/2 hours
• Write using black or blue pen
  Black pen is preferred
• Draw diagrams using pencil
• Board-approved calculators may be used
• Write your Centre Number and Student Number at the top of page 9

Total marks – 40

Section I Pages 2–5
10 marks
• Attempt Questions 1–10
• Allow about 20 minutes for this section

Section II Pages 9–12
15 marks
• Attempt Questions 11–15
• Allow about 35 minutes for this section

Section III Page 13
15 marks
• Attempt Question 16
• 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.

1 Electric current is the flow of which particles?
   (A) Atoms
   (B) Electrons
   (C) Neutrons
   (D) Protons

2 Which statement is true for the circuit shown?

   ![Circuit Diagram](image)

   (A) The voltage across each component is the same.
   (B) The current across each component is the same.
   (C) The voltage across each component is different.
   (D) The capacitance across each component is different.

3 What is the function of the circuit shown?

   ![Circuit Diagram](image)

   (A) To convert AC voltage to DC voltage
   (B) To prevent voltage surges in a circuit
   (C) To reduce voltage output from a circuit
   (D) To increase voltage output from a circuit
4. Which of the following electrical symbols represents a light-dependent resistor?

(A) ![Light-dependent resistor symbol]

(B) ![Light-dependent resistor symbol]

(C) ![Light-dependent resistor symbol]

(D) ![Light-dependent resistor symbol]

5. What is the resistance in an electric kettle rated at 5 amps on a domestic 240V supply?

(A) 5 Ω

(B) 24 Ω

(C) 48 Ω

(D) 1200 Ω

6. What is the main advantage of a relay switch?

(A) It can be manually or electromagnetically operated.

(B) The electromagnetic switch contacts never get dirty.

(C) Low voltage input sources allow larger voltage outputs.

(D) High voltage inputs are reduced across the electromagnetic switch.
A teacher has planned a class project where each student is required to make a simple LED torch. The table shows the materials required and the costs.

<table>
<thead>
<tr>
<th>Quantity required per torch</th>
<th>Description</th>
<th>Supply Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PCB board</td>
<td>$1.25 each</td>
</tr>
<tr>
<td>1</td>
<td>12V battery</td>
<td>$3.19 each</td>
</tr>
<tr>
<td>1</td>
<td>12V battery holder</td>
<td>$0.90 each</td>
</tr>
<tr>
<td>3</td>
<td>Super bright white LED</td>
<td>$1.10 each</td>
</tr>
<tr>
<td>1</td>
<td>680 ohm resistor</td>
<td>$0.05 each</td>
</tr>
<tr>
<td>1</td>
<td>Slide switch – SPST</td>
<td>$1.45 each</td>
</tr>
</tbody>
</table>

What is the total cost of supplying the materials for a class of 24 students?

(A) $10.14  
(B) $190.56  
(C) $243.36  
(D) $486.72  

The incomplete truth table for an AND gate is shown.

<table>
<thead>
<tr>
<th>Input A</th>
<th>Input B</th>
<th>Output Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Which of the following shows the correct outputs in column Q?

(A) 0 1 1 0  
(B) 0 0 0 1  
(C) 1 0 0 0  
(D) 0 1 1 0
In a circuit, a thermistor is a type of resistor designed to
(A) dissipate heat by vibration.
(B) burn out if power is excessive.
(C) prevent heat expansion in a circuit.
(D) change resistance with changes in heat.

What is an operational amplifier (op amp)?
(A) A high gain linear device for use in digital circuits
(B) A high gain linear device for use in analog circuits
(C) A high gain non-linear device for use in digital circuits
(D) A high gain non-linear device for use in analog circuits
Section II

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

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

Question 11 (2 marks)

List TWO common faults that could be identified by a visual inspection of a PCB circuit that is not working.

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Please turn over
**Question 12 (3 marks)**

The diagram shows the sprung floor of a dance club that uses piezo devices to create lighting effects as people dance.

Explain how the piezo devices are used to achieve this effect.

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**Question 13 (3 marks)**

Describe the operation of a stepped motor and provide an example of its application.

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**Question 14** (3 marks)

Calculate the readings on the voltmeter and ammeter in the circuit below. Show your working.

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Please turn over
Question 15 (4 marks)

Explain the functions of both the transistors and the capacitors in this flasher circuit.
Question 16 (15 marks)

(a) Explain why a company should comply with safety standards.  

(b) Assess strategies that a company could implement to establish and maintain a safe work culture.