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Surname

Other names

Pearson
Edexcel GCSE

Centre Number

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Candidate Number

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Manufacturing (Double Award) Engineering (Double Award)

Unit 3: Application of Technology in Engineering and Manufacturing
Paper E: Electrical and Electronics, Process Control, Computers, Telecommunications

Tuesday 24 May 2016 – Morning
Time: 1 hour 30 minutes

Paper Reference

5EM03/3E

You must have:

Notes and sketches collected during your pre-release research.
Ruler, pen, pencil, rubber.

Total Marks

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Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 110.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
– *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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PEARSON

SECTION A

Answer ALL questions.

Some questions must be answered with a cross . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

1 All of the products listed below belong to a manufacturing sector.

(a) Put a cross in the **two** boxes below where the products belong to the **electrical and electronics, telecommunications** sector.

(2)

Products	Put a cross in two boxes below
Multi meter	<input type="checkbox"/>
T-shirt	<input type="checkbox"/>
Hairdryer	<input type="checkbox"/>
Bottled water	<input type="checkbox"/>
A4 diary	<input type="checkbox"/>
Ring spanner	<input type="checkbox"/>

(b) Put a cross in the **two** boxes below where the products belong to the **process control, computer** sector.

(2)

Products	Put a cross in two boxes below
Bluetooth speaker	<input type="checkbox"/>
Bus ticket	<input type="checkbox"/>
Sun cream	<input type="checkbox"/>
Pizza cutter	<input type="checkbox"/>
Filing cabinet	<input type="checkbox"/>
Rate-of-rise detector	<input type="checkbox"/>

(Total for Question 1 = 4 marks)



2 The tables below show some equipment and symbols used during the manufacture of electrical and electronic products.

(a) Complete Table 1 by naming each piece of equipment.

(2)

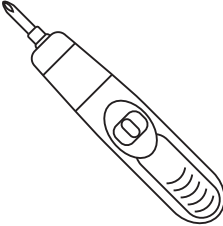
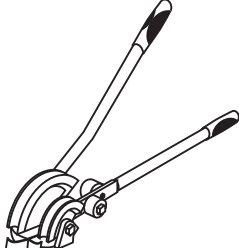
Equipment	Equipment name	Use
		Used with semi permanent fasteners to assemble components.
		For use on tubing, to form different shapes.

Table 1

(b) Complete Table 2 by explaining the use of the symbol component.

(4)

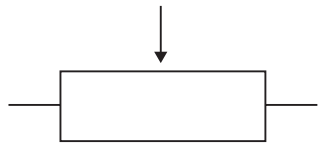
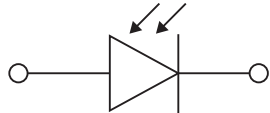
Symbol	Symbol name	Use
	Potentiometer	
	Photodiode	

Table 2

(Total for Question 2 = 6 marks)



3 Draw a straight line to link each **Term** listed below to the most appropriate **Key Area**.

Each Key Area can be used more than once.

Term

Key Area

Thermostat

Voice over internet protocol

Smart grease

Gold

Programmable logic
controllers (PLCs)

Ceramics

Video conferencing

Modern materials

Control technology

Information and
communications
technology (ICT)

(Total for Question 3 = 7 marks)



4 Bite alarms belong to the electrical and electronic, process control, computers, telecommunications sector and use etching and automation in their manufacture.

(a) Name **two** other products from this sector that use etching and automation in their manufacture. (2)

Product 1

Product 2

(b) (i) Name one type of material removal process, apart from etching, used in the manufacture of a product you named in 4(a). (1)

(ii) Describe the etching process used in the manufacture of a product you named in 4(a). (3)

(c) Describe **two** examples of automation used in the manufacture of a product you named in 4(a). (4)

1

2

(Total for Question 4 = 10 marks)



5 Computer-aided design (CAD) and computer-integrated manufacturing (CIM) are both used by manufacturers of electrical and electronic, process control, computers, telecommunications products.

(a) State **two** functions of a computer-aided design (CAD) system.

(2)

1

2

(b) A manufacturer has changed from using traditional design methods to computer-aided design (CAD).

Describe **one** disadvantage of this change for the manufacturer.

(2)

.....

.....

(c) State **two** functions of a computer-integrated manufacturing (CIM) system.

(2)

1

2

(d) Explain **one** benefit of linking computer-aided design (CAD) and computer-integrated manufacturing (CIM) for the manufacturer.

(2)

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(Total for Question 5 = 8 marks)



6 Information and data are important to manufacturers.

(a) (i) Describe the term **database**.

(3)

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(ii) Explain **one** disadvantage to a manufacturer of using databases.

(2)

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.....

.....

(b) Explain **two** reasons why a manufacturer would use an electronic spreadsheet.

(4)

1

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2

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.....

(Total for Question 6 = 9 marks)



7 Communications technology is an essential feature in electrical and electronic, process control, computers, telecommunications companies.

(a) Explain **one** benefit of using communications technology on the global environment.

(3)

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(b) Other than environmental benefits, explain **one** advantage of using communications technology when marketing a product.

(3)

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(Total for Question 7 = 6 marks)

TOTAL FOR SECTION A = 50 MARKS



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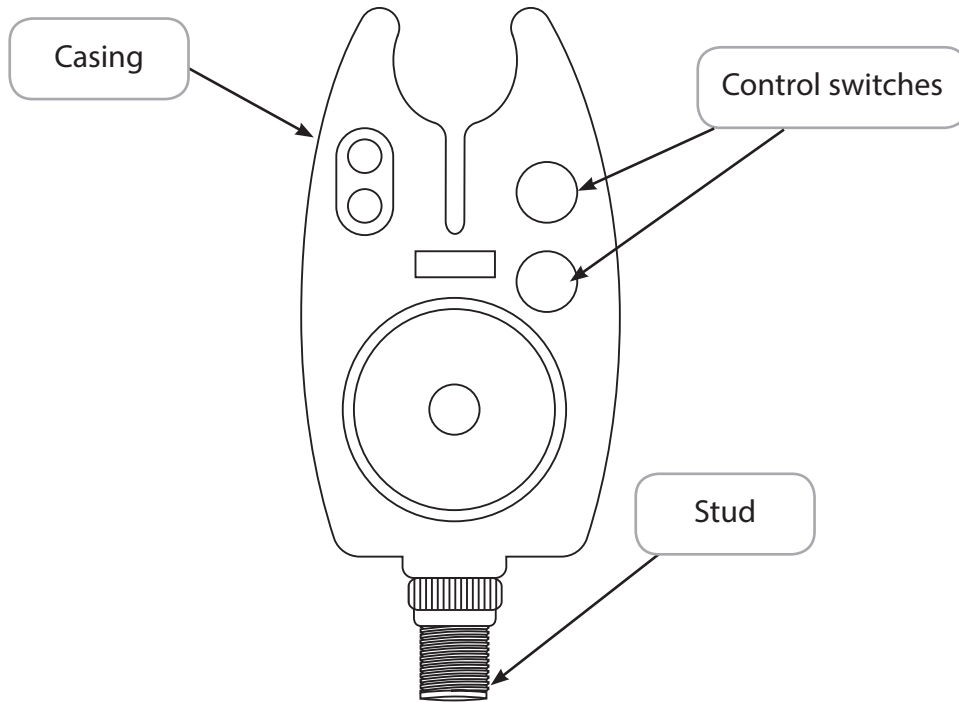
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SECTION B

Answer ALL questions in Section B with reference to the manufacture of mass produced bite alarms.

The diagram below shows a bite alarm.



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8 Describe, using notes and sketches:

(a) the function of the casing.

(3)

casing

(b) the function of the control switches.

(3)

control switches



(c) the function of the stud.

(3)

stud

(Total for Question 8 = 9 marks)

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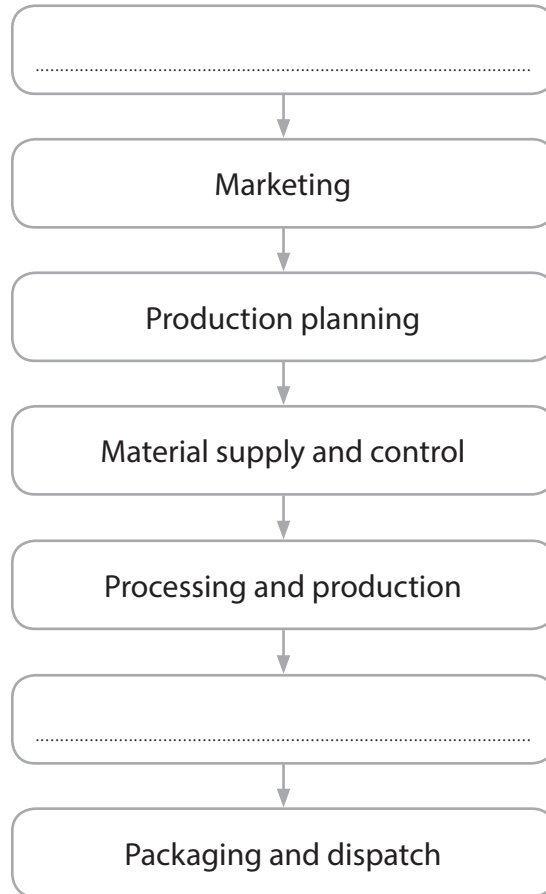
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9 (a) The incomplete flow diagram below indicates some of the main stages in manufacturing bite alarms.

(i) Complete the flow diagram by adding the **two** missing stages in manufacturing bite alarms.

(2)



(ii) State the stage in manufacturing where the bite alarms are advertised.

(1)

Stage

(b) List **three** activities carried out at the production planning stage when manufacturing bite alarms.

(3)

1

2

3



(c) Describe the materials supply and control stage when manufacturing bite alarms.

(3)

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(Total for Question 9 = 9 marks)

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10 (a) State a specific material commonly used for the stud in the bite alarm. (1)

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(b) Injection moulding and etching processes are used to manufacture bite alarms.

(i) State **three** production processes, other than injection moulding and etching, used during the manufacture of bite alarms. (3)

Process 1

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Process 2

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Process 3

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(ii) Explain why injection moulding is a suitable process to use during the manufacture of bite alarms. (3)

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(c) Explain how the use of modern materials can reduce wastage when producing bite alarms. (3)

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(Total for Question 10 = 10 marks)



11 Computer-aided manufacture (CAM) and quality control are used in the manufacture of bite alarms.

(a) State **two** reasons why computer-aided manufacture (CAM) is used at the packaging and dispatch stage.

(2)

- 1
- 2

(b) Describe **three** quality control procedures carried out at the packaging and dispatch stage.

(6)

- 1
- 2
- 3

(c) Explain **two** benefits of using quality control at the packaging and dispatch stage.

(4)

- 1
- 2

(Total for Question 11 = 12 marks)



12 The introduction of modern technology and modern materials in the manufacture of mass produced bite alarms has brought changes.

(a) (i) State **two** different changes the introduction of modern technology has had on the workforce.

(2)

1

2

(ii) Explain **two** different effects the introduction of modern technology has had on the working environment.

(4)

1

2

(b) Explain **two** different benefits modern materials have had on product characteristics and sales.

(4)

1

2

(Total for Question 12 = 10 marks)



13 Control technology is an essential feature in the manufacture of bite alarms.

Explain the impact of control technology on safety.

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(Total for Question 13 = 4 marks)

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***14** Manufacturers of electrical and electronic, process control, computers, telecommunications products are increasingly using robotics.

Discuss the impact of robotics on production efficiency, product quality and manufacturing costs.

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(Total for Question 14 = 6 marks)

TOTAL FOR SECTION B = 60 MARKS
TOTAL FOR PAPER = 110 MARKS



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