

Write your name here

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 19 May 2015 – 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 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
Textbook	<input type="checkbox"/>
Cordless drill	<input type="checkbox"/>
Baking powder	<input type="checkbox"/>
DAB radio	<input type="checkbox"/>
Birthday card	<input type="checkbox"/>
Barbeque	<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
Flourescent lamp	<input type="checkbox"/>
Recipe book	<input type="checkbox"/>
Door entry system	<input type="checkbox"/>
Shampoo	<input type="checkbox"/>
Tablet PC	<input type="checkbox"/>
Business card	<input type="checkbox"/>

(Total for Question 1 = 4 marks)



2 The tables below show some tools and symbols used during the manufacture of electrical and electronics, process control, computers, telecommunications products.

(a) Complete Table 1 by naming each tool.

(2)

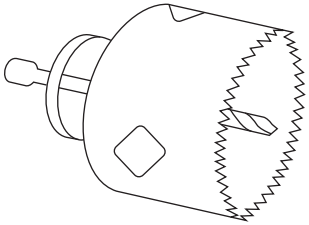
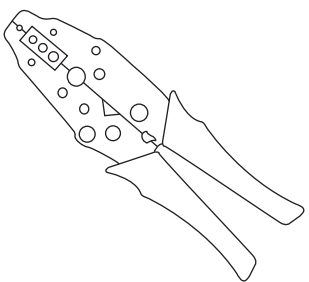
Tool	Tool name	Use
		A tool used to produce large diameters in engineering materials.
		Designed for squeezing or connecting a connector to the tip of a cable.

Table 1

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

(4)

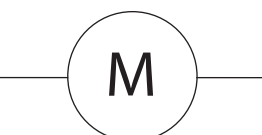
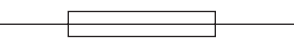
Symbol	Symbol name	Use
	Motor	
	Fuse	

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

Lithium

Presentation software

Nickel

Automation systems

Germanium

Wi-Fi

Computer-integrated
engineering (CIE)

Modern materials

Control technology

Information and
communications
technology (ICT)

(Total for Question 3 = 7 marks)



4 Moisture testers belong to the electrical and electronics, process control, computers, telecommunications sectors and use modern materials in their manufacture.

(a) Name **two** other products from this sector that use modern materials in their manufacture.

(2)

Product 1

Product 2

(b) (i) State **one** modern material used in the manufacture of a product you named in 4(a)

(1)

(ii) Explain **two** benefits to the **consumer** of using this material.

(4)

1

2



(c) (i) State **one** smart material used in the electrical and electronics, process control, computers, telecommunications sector.

(1)

(ii) Briefly describe the features of the smart material you named in 4(c)(i).

(2)

(Total for Question 4 = 10 marks)



5 Communications technology is widely used by manufacturers of electrical and electronics, process control, computers, telecommunications products.

The internet is an example of communications technology.

(a) (i) Using an example, describe the term **internet**.

(3)

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

(2)

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(b) (i) Name **one** example, other than the internet, of a communications technology.

(1)

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(ii) Explain **one** benefit to the retailer of using the example named in 5(b)(i).

(2)

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(Total for Question 5 = 8 marks)



6 Robotics and computer-integrated manufacturing systems (CIM) are used increasingly in electrical and electronics, process control, computers, telecommunications companies.

(a) (i) State **one** way in which robots may be used when manufacturing an electrical and electronics, process control, computers, telecommunications product.

(1)

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.....

(ii) Explain **two** disadvantages to an electrical and electronics, process control, computers, telecommunications manufacturer of using robotics.

(4)

1

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2

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(b) Describe **two** main features of a CIM system.

(4)

1

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2

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(Total for Question 6 = 9 marks)



7 Handling information and data is an essential feature in electrical and electronics, process control, computers, telecommunications companies.

(a) Describe how a manufacturer would use production planning and scheduling information at the materials supply and control stage.

(4)

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(b) Explain **one** way that the use of information and data handling systems would benefit the manufacturer when marketing and selling products.

(2)

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(Total for Question 7 = 6 marks)

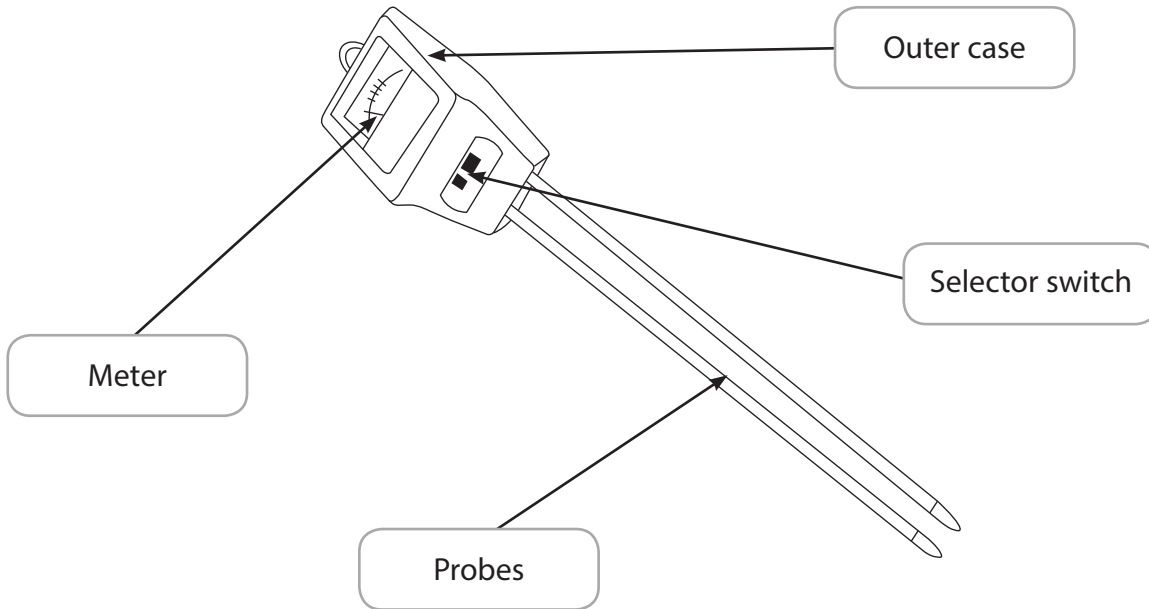
TOTAL FOR SECTION A = 50 MARKS



SECTION B

Answer ALL questions in section B with reference to the manufacture of mass produced moisture testers.

The diagram below shows a moisture tester.



8 Describe, using notes and sketches:

(a) the function of the probes

(3)

probes

(b) the function of the outer case

(3)

outer case



(c) the function of the selector switch.

(3)

selector switch

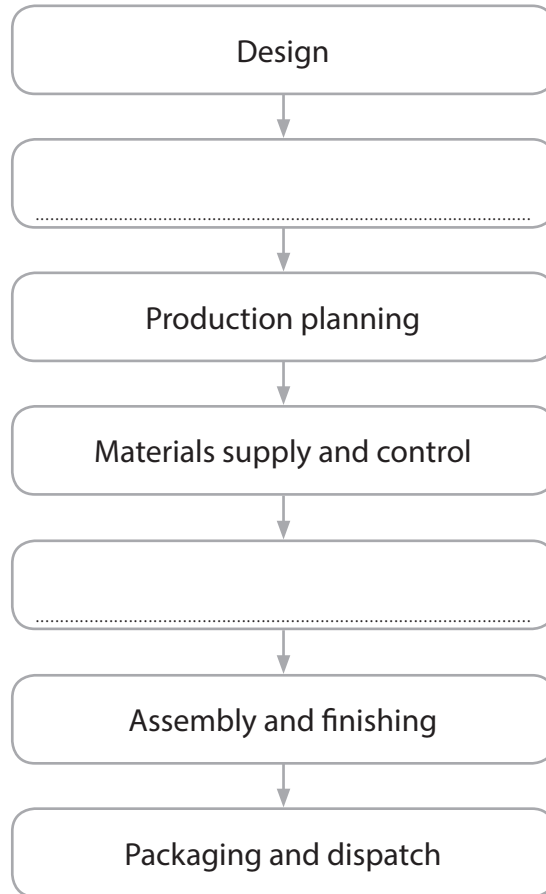
(Total for Question 8 = 9 marks)



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

(i) Complete the flow diagram by adding the **two** missing stages in the manufacture of moisture testers.

(2)



(ii) State the stage in manufacturing where the probes are inserted into the moisture tester.

(1)

Stage



(b) List **three** activities carried out at the design stage when manufacturing moisture testers.

(3)

- 1
- 2
- 3

(c) Describe the packaging and dispatch stage when manufacturing moisture testers.

(3)

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(Total for Question 9 = 9 marks)



10 (a) State a specific material commonly used for a probe of the moisture tester. (1)

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(b) The outer case of the moisture tester is produced by injection moulding.

(i) State **three** production processes, other than moulding, used during the manufacture of moisture testers. (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 moisture testers. (3)

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(c) Explain why thermoplastic materials are appropriate for the meter case of the moisture tester.

(3)

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(Total for Question 10 = 10 marks)



11 Control technology plays an important role in the manufacture of moisture testers.

(a) (i) State **two** uses of control technology during assembly and finishing.

(2)

1

2

(ii) Describe **two** ways in which control technology is used when producing moisture testers.

(4)

1

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2

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(b) Describe **three** benefits to the manufacturer of using computer controlled production.

(6)

1

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2

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3

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(Total for Question 11 = 12 marks)



P 4 4 6 9 2 A 0 1 7 2 4

12 A manufacturer of moisture testers has decided to change its production methods so that it follows lean manufacturing principles.

(a) (i) Explain the term **lean manufacturing**.

(2)

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(ii) Describe **two** advantages lean manufacturing could have for the retailer of moisture testers.

(4)

1

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2

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(b) Changing to lean manufacturing methods will have an impact on the global environment and on the manufacturer's workforce.

(i) State **two** reasons why using lean manufacturing could have a positive effect on the global environment.

(2)

1

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2

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(ii) Explain **one** benefit that this change could have on the workforce.

(2)

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(Total for Question 12 = 10 marks)



13 Moisture testers are manufactured from a variety of materials.

Discuss how a manufacturer can process these materials sustainably.

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(Total for Question 13 = 4 marks)



***14** In recent times the manufacture of electrical and electronics, process control, computers, telecommunications products has become increasingly automated. Discuss the impact of automation on the quality of these products.

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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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