Write your name here

Surname	Other names

Edexcel GCSE

Centre Number | Candidate Number

Manufacturing (Double Award)
Engineering (Double Award)

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

Monday 16 May 2011 – Afternoon
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

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** the 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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 3 8 8 3 6 A 0 1 2 4

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SECTION A

Answer ALL questions.

Some questions must be answered with a cross in a box ☒. 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** sector.

(2)

Supermarket receipt	☒
Perfume	☒
Welding hearth	☒
DAB radio	☒
Business card	☒
Personal video recorder	☒

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

(2)

Wireless router	☒
Recycled envelope	☒
USB dongle	☒
Office desk	☒
Car phone holder	☒
Document shredder	☒

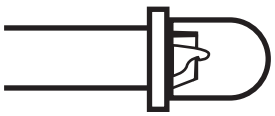
(Total for Question 1 = 4 marks)

2 The tables below show some components used in the manufacture of products.

(a) Complete Table 1 by naming each component.

(2)

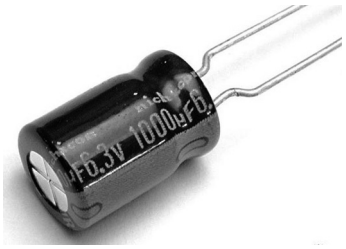
Table 1

Component	Component name	Use
		Gives off light when current passes through. Current flows in one direction.
		A semi-conductor device commonly used to amplify or switch electronic signals.

(b) Complete Table 2 by explaining what each component is used for.

(4)

Table 2

Component	Component name	Use
	Potentiometer	
	Electrolytic capacitor	

(Total for Question 2 = 6 marks)

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

Each Key Area can be used more than once.

Term	Key Area
Bluetooth	
Robotics	Modern materials
Polypropylene (PP)	
Silicon	Control technology
Video conferencing	
Computer aided manufacture (CAM)	Information and communications technology (ICT)
Polyvinyl chloride (PVC)	

(Total for Question 3 = 7 marks)

4 PCB drills belong to the electrical and electronics sector.

(a) Name **two** other products from this sector, apart from a PCB drill, that utilise modern material in their manufacture.

(2)

1 .....

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 **manufacturer** of using the modern material named in 4(b)(i).

(4)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

(c) (i) State **two** smart materials used in the electrical and electronics sector.

(2)

1 .....

2 .....

(ii) Describe the characteristics of **one** smart material named in 4(c)(i).

(2)

.....

.....

.....

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(Total for Question 4 = 11 marks)

5 Computer-aided design (CAD) and computer-aided manufacture (CAM) are both used by manufacturers of electrical and electronic products.

(a) Describe why a **manufacturer** would use CAD rather than traditional methods.

(2)

.....

.....

.....

.....

(b) (i) State **two** benefits to the **manufacturer** of using CAM.

(2)

1 .....

.....

2 .....

.....

(ii) Explain **two** benefits to the **distributor** when the manufacturer uses CAD and CAM.

(4)

1 .....

.....

.....

2 .....

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(Total for Question 5 = 8 marks)

6 Systems and control technologies are widely used by manufacturers of electrical and electronic products.

(a) Explain the term 'systems and control technology'.

(2)

(b) Robotics is an example of a systems and control technology.

(i) Name **one** other example of a systems and control technology.

(1)

(ii) Name the traditional method this has replaced.

(1)

(iii) Explain **two** benefits of using robotics in hazardous conditions.

(4)

1

2

(Total for Question 6 = 8 marks)

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

Explain **one** implication that information and data handling systems have for:

(a) marketing

(3)

(b) materials supply.

(3)

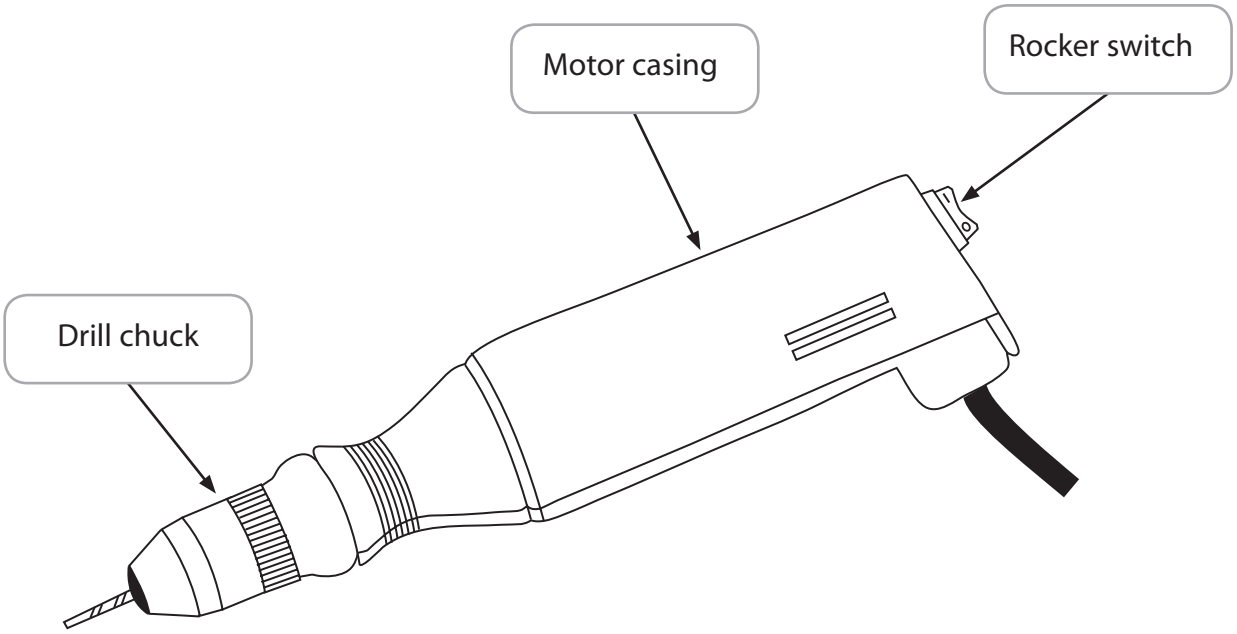
(Total for Question 7 = 6 marks)

TOTAL FOR SECTION A = 50 MARKS

SECTION B

Answer ALL questions in Section B with reference to the manufacture of mass produced PCB drills.

The diagram below shows a **PCB drill.**



8 Describe, using notes and sketches:

(a) the function of the drill chuck

(3)

Drill chuck

(b) the function of the motor casing

(3)

Motor casing

(c) the function of the rocker switch.

(3)

Rocker switch

(Total for Question 8 = 9 marks)

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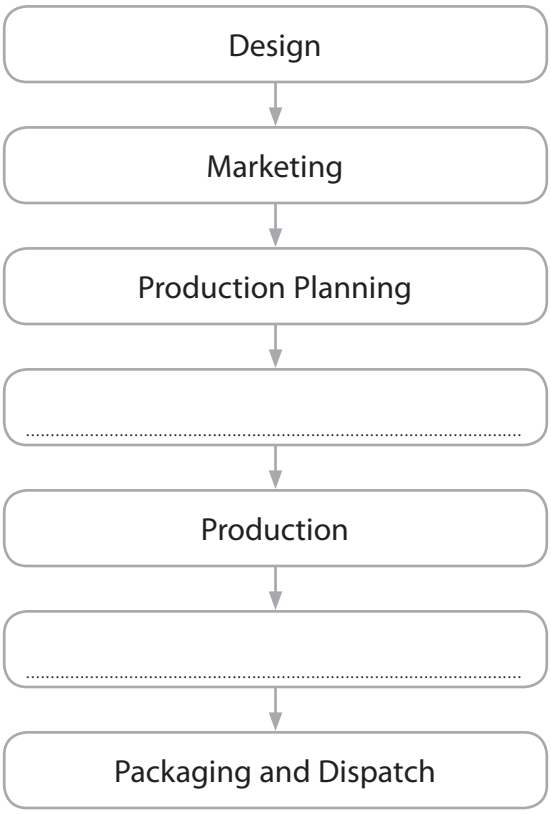
9 (a) The incomplete flow diagram below indicates some of the main stages in manufacturing PCB drills.

(i) Complete the flow diagram by writing the **two** missing main stages in manufacturing PCB drills.

(2)



(ii) State the stage where the PCB drills would be advertised on websites.

(1)

Stage

.....

(b) Describe the following **two** stages in the manufacture of PCB drills.

(i) Production planning

(3)

(ii) Packaging and dispatch

(3)

(Total for Question 9 = 9 marks)

10 (a) State a specific material commonly used for the drill chuck of a PCB drill.

(1)

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(b) Injection moulding is used in the manufacture of PCB drills.

(i) State **three** production processes, other than injection moulding, used during the manufacture of PCB drills.

(3)

Process 1

.....

Process 2

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Process 3

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(ii) Explain why injection moulding is a suitable process for producing the motor casing of the PCB drill.

(3)

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(c) Explain how the use of modern materials has helped the manufacturer of PCB drills to increase sales.

(3)

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(Total for Question 10 = 10 marks)

11 Automation is used in the manufacture of PCB drills.

(a) Explain the term 'automation'.

(2)

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(b) (i) Describe **two** examples of automation used at the production stage of the manufacture of PCB drills.

(4)

1 .....

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2 .....

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(ii) Explain **one** benefit to the **manufacturer** of applying a type of automation described in 11(b)(i).

(2)

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(iii) Explain **one** benefit to the **consumer** of applying a type of automation described in 11(b)(i).

(2)

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(c) Explain the difference between automation and mechanisation.

(2)

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(Total for Question 11 = 12 marks)

12 Communications technology and quality control play an important role in the manufacture of PCB drills.

(a) (i) State **two** types of communications technology used at the **design** stage when manufacturing PCB drills.

(2)

1 .....

2 .....

(ii) Using an example from 12(a)(i), describe **one** benefit of the use of communications technology at the **design** stage.

(2)

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(b) During the manufacture of PCB drills, physical damage quality checks are carried out.

(i) State **one** other quality check used during the **production** stage.

(1)

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(ii) Describe how the quality check stated in 12(b)(i) would be carried out.

(2)

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(iii) Explain the benefits of the use of quality control to the PCB drill end user.

(3)

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(Total for Question 12 = 10 marks)

13 The utilisation of modern technology in the manufacture of PCB drills has brought changes. Explain the effect of these changes for the workforce **and** the working environment.

(Total for Question 13 = 4 marks)

***14** Discuss the impact of the use of modern technologies on the sustainable manufacture of PCB drills.

(Total for Question 14 = 6 marks)

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

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