Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson 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**

Wednesday 24 May 2017 – 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

## 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.
- 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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Pearson

## 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, telecommunications** sector.

**(2)**

| Products | Put a cross in **two** boxes below |
|---|---|
| Electric drill | ☒ |
| Tea towel | ☒ |
| Soldering iron | ☒ |
| Tea cake | ☒ |
| Ring binder | ☒ |
| Adjustable spanner | ☒ |

(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 |
|---|---|
| CCTV | ☒ |
| Train ticket | ☒ |
| Moisturiser | ☒ |
| Blender | ☒ |
| Tank cutter | ☒ |
| Endoscope | ☒ |

**(Total for Question 1 = 4 marks)**

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

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

**(2)**

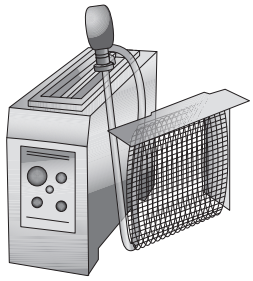
| Equipment | Equipment name | Use |
|---|---|---|
|  | | To provide protection from loud or persistent sound. |
|  | | To remove the unprotected parts of a metal surface using chemicals. |

**Table 1**

(b) Complete Table 2 by explaining the function of each component.

**(4)**

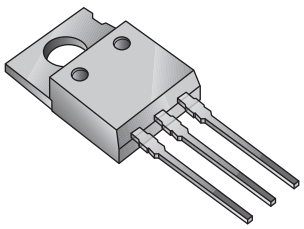
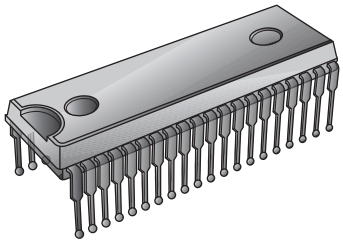
| Component | Component name | Function |
|---|---|---|
|  | Rectifier | |
|  | Integrated Circuit (IC) | |

**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 |
| --- | --- |
| System remote panel | Modern materials |
| High impact polystyrene (HIPS) | |
| Database | Control technology |
| Luminescent gel | |
| Conveyor systems | Information and communications technology (ICT) |
| Acrylic (PMMA) | |
| Virtual learning environment (VLE) | |

**(Total for Question 3 = 7 marks)**

**4** (a) Finishing processes are used when manufacturing external hard drives in the electrical and electronics, process control, computers, telecommunications sector.

(i) Name **two** other products from this sector that use finishing processes in their manufacture.

**(2)**

Product 1

.....

Product 2

.....

(ii) Name **two** different finishing processes used in the manufacture of products from this sector.

**(2)**

Finishing process 1

.....

Finishing process 2

.....

(iii) Describe **one** finishing process you named in 4(a)(ii).

**(2)**

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(b) Quality control techniques are used in the manufacture of products in the electrical and electronics, process control, computers, telecommunications sector.

Describe **two** examples of quality control techniques used in the manufacture of products from this sector.

**(4)**

1 .....

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2 .....

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**(Total for Question 4 = 10 marks)**

**5** (a) State **two** functions of a computer-aided manufacturing (CAM) system.

**(2)**

1 .....

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2 .....

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(b) A manufacturer has changed from using traditional production methods to computer-aided manufacturing (CAM) techniques.

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

**(2)**

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(c) Programmable logic controllers (PLCs) are a control technology.

Describe **two** benefits of using PLCs for a manufacturer.

**(4)**

1 .....

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2 .....

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**(Total for Question 5 = 8 marks)**

**6** Communications technologies, including **Wi-Fi**, are used by manufacturers of electrical and electronics, process control, computers, telecommunications products.

(a) (i) Name **one** example, other than **Wi-Fi**, of a communications technology.

**(1)**

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.....

(ii) Describe the term **Wi-Fi**.

**(2)**

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(b) Embedded computers are used by manufacturers of electrical and electronics, process control, computers, telecommunications products.

Explain **three** reasons why a manufacturer would use embedded computers during manufacture.

**(6)**

1 .....

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2 .....

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3 .....

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**(Total for Question 6 = 9 marks)**

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

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

(a) design

**(3)**

(b) production planning

**(3)**

**(Total for Question 7 = 6 marks)**

**TOTAL FOR SECTION A = 50 MARKS**

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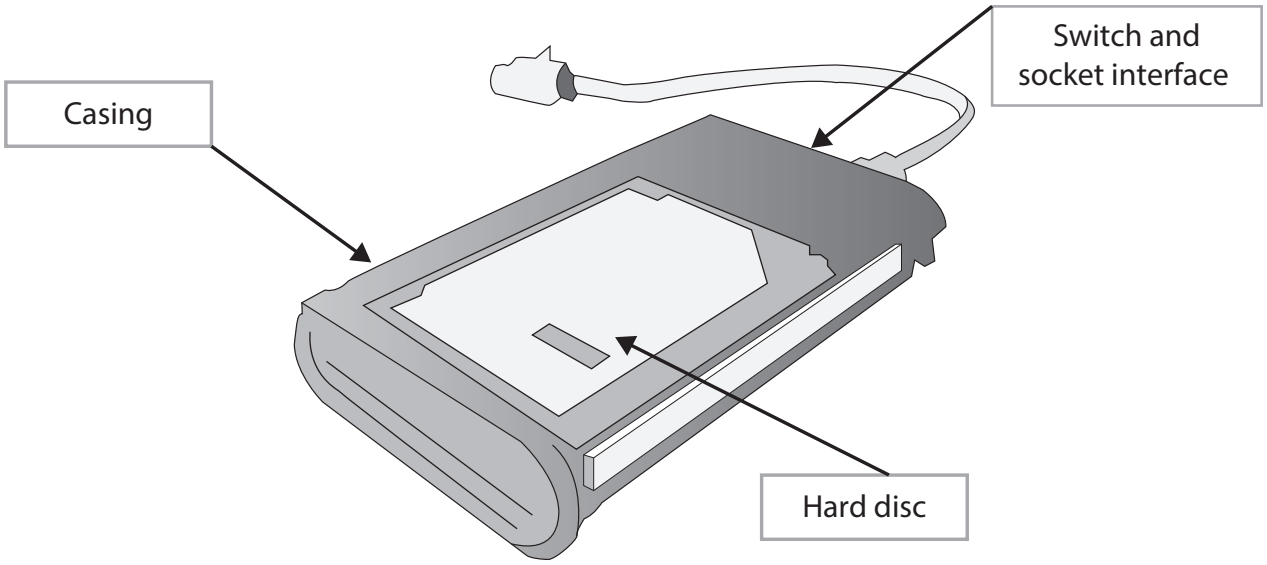
## SECTION B

**Answer ALL questions in Section B with reference to the manufacture of mass produced external hard drives.**

The diagram below shows an external hard drive.



**8** Describe, using notes and sketches:

(a) the function of the casing

**(3)**

casing

(b) the function of the switch and socket interface

**(3)**

switch and socket interface

(c) the function of the hard disc

**(3)**

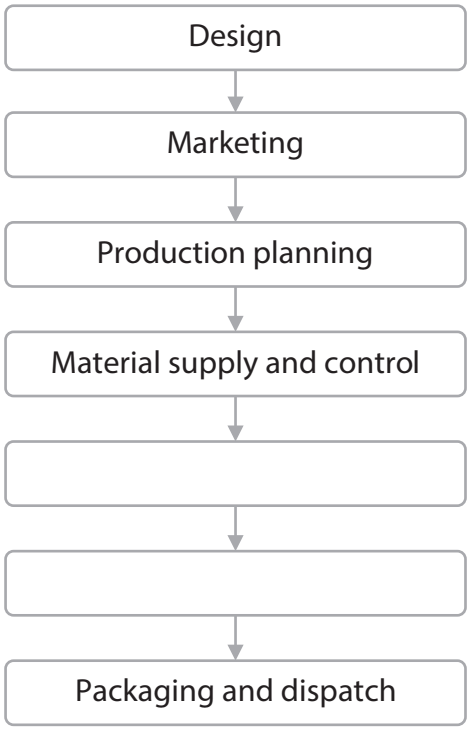
hard disc

**(Total for Question 8 = 9 marks)**

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

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

**(2)**




(ii) State the stage in manufacturing where the drawings for the external hard drives are created.

**(1)**

Stage

.....

(b) List **three** activities carried out at the marketing stage when manufacturing the external hard drives.

**(3)**

1 .....

2 .....

3 .....

(c) Describe the packaging and dispatch stage when manufacturing the external hard drives.

**(3)**

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**(Total for Question 9 = 9 marks)**

**10** (a) State a modern polymer commonly used for the case in an external hard drive.

**(1)**

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(b) Surface mount technology is one of the processes used during the manufacture of external hard drives.

(i) State **three** production processes, other than surface mount technology, used during the manufacture of external hard drives.

**(3)**

Process 1

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Process 2

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Process 3

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(ii) Explain why surface mount technology is a suitable process to use during the manufacture of external hard drives.

**(3)**

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(c) Explain how the use of modern materials has helped manufacturers of external hard drives to increase sales.

**(3)**

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**(Total for Question 10 = 10 marks)**

**11** Automation is used in the manufacture of mass produced external hard drives.

(a) Explain the term **automation**.

**(2)**

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(b) (i) Describe **three** different examples of automation used in the production stage of the manufacture of external hard drives.

**(6)**

1 .....

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2 .....

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3 .....

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(ii) Explain **one** disadvantage to the manufacturer of applying a type of automation when manufacturing external hard drives.

**(2)**

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(iii) Explain **one** benefit to the consumer of applying a type of automation when manufacturing external hard drives.

**(2)**

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**(Total for Question 11 = 12 marks)**

**12** (a) The introduction of modern technology has an impact on safety and efficiency when manufacturing mass produced external hard drives.

(i) State **two** benefits the introduction of modern technology has had for the safety of the workforce.

**(2)**

1 .....

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2 .....

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(ii) Explain **two** effects the introduction of modern technology has had on the efficiency of the production process.

**(4)**

1 .....

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2 .....

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(b) The introduction of modern technology when manufacturing external hard drives has an impact on the global environment.

Explain **two** advantages the use of modern technology has had for the global environment.

**(4)**

1 .....

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2 .....

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**(Total for Question 12 = 10 marks)**

**13** Information and communications technology (ICT) is an essential feature in the manufacture of mass produced external hard drives.

Explain **two** impacts of ICT on the material supply and control stage in manufacturing.

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2 .....

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**(Total for Question 13 = 4 marks)**

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***14** Discuss how manufacturers monitor and control energy consumption when manufacturing external hard drives.

**(Total for Question 14 = 6 marks)**

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