



Oxford Cambridge and RSA

**Monday 9 January 2023 – Morning**

**Level 1/2 Cambridge National in Engineering Design**

**R105/01** Design briefs, design specifications and user requirements

**Time allowed: 1 hour**



No extra materials are needed.



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number  Candidate number

First name(s) \_\_\_\_\_

Last name \_\_\_\_\_

**INSTRUCTIONS**

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- Answer **all** the questions.

**INFORMATION**

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [ ].
- Quality of written communication will be assessed in questions marked with an asterisk (\*).
- This document has **12** pages.

**ADVICE**

- Read each question carefully before you start your answer.

Answer **all** the questions.

1 The design cycle consists of **four** phases:

**Design phase**

**Identify phase**

**Optimise phase**

**Validate phase**

(a) Complete the table below by:

- (i) Putting the design cycle phases in the correct order.
- (ii) State **one** activity that takes place in each phase.

One of each has been completed for you.

Order	Design Cycle Phase	Activity
1st		
2nd	Design phase	Development of a range of design ideas.
3rd		
4th		

[6]

Error proofing is an important part of design and manufacture.

Fig. 1 shows a 3 pin plug and socket.

Fig. 1



(b) (i) State how error proofing is used in the design of the 3 pin plug and socket shown in Fig. 1.

.....  
..... [1]

(ii) State why error proofing is used in manufacturing.

.....  
..... [1]

(iii) Explain why error proofing is important to the user.

.....  
.....  
.....  
..... [2]

2 (a) When presenting a design brief, state what is meant by the following terms:

(i) Client

.....  
..... [1]

(ii) Designer

.....  
..... [1]

(b) (i) Give **two** reasons why corporate branding is important.

1 .....  
2 ..... [2]

(ii) State **two** ways corporate branding can be shown on a product.

1 .....  
2 ..... [2]

(c) State **two** ways a focus group can help to inform market research.

1 .....  
2 ..... [2]

(d) Describe what is meant by the term 'consumer trends'.

.....  
.....  
.....  
..... [2]

3 Products can be upcycled at the end of their life.

(a) Describe how a product can be upcycled.

.....  
.....  
.....  
..... [2]

(b) Name **two** other processes that avoid the disposal of products at the end of their life.

1 .....  
2 ..... [2]

(c) State **two** benefits of using eco-friendly materials.

1 .....  
2 ..... [2]

(d) Explain the effects that extraction of non-renewable materials has on the environment.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [4]

4 (a) Give the meaning of the term 'ergonomics'.

.....

.....

.....

..... [2]

Fig. 2 shows a toothbrush.

Fig. 2



(b) State **two** ergonomic features considered in the design of the toothbrush shown in Fig. 2.

1 .....

2 .....

[2]

Fig. 3 shows a dining chair.

Ergonomic design and anthropometric data were used in the design of the dining chair.

Fig. 3



(c) Explain why ergonomic design is important when designing the dining chair shown in **Fig. 3**.

.....  
.....  
.....  
.....  
.....  
..... [3]

(d) Explain, using an example, how anthropometrics are used in the design of the dining chair.

.....  
.....  
.....  
.....  
.....  
..... [3]

5 (a) State the meaning of each of the terms below, which are used in product requirements.

(i) Durability ..... [1]

(ii) Reliability ..... [1]

(b) Explain why it is important to check material availability prior to commencing production.

..... [2]

(c)\* Discuss how scale of production affects production costs.

..... [6]



6 Fig. 4 shows a robot arm used in manufacturing and assembly.

Fig. 4



(a) (i) State **two advantages** of using robots in manufacturing and assembly.

1 .....

.....

2 .....

.....

[2]

(ii) State **two disadvantages** of using robots in manufacturing and assembly.

1 .....

.....

2 .....

.....

[2]

(b) Give **two** reasons why pre-manufactured components may be used in the manufacture of products.

1 .....

.....

2 .....

.....

[2]

(c) (i) Explain what is meant by the term 'cloud computing'.

.....  
.....  
.....  
..... [2]

(ii) State **two** advantages of using cloud computing.

1 .....  
.....  
2 .....  
..... [2]

**END OF QUESTION PAPER**

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