Modified Enlarged 24pt

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Friday 10 January 2020 – Morning

Level 1/2 Cambridge National Award/ Certificate in Engineering Design

R105/01 Design briefs, design specifications and user requirements

Time allowed: 1 hour plus your additional time allowance

No extra materials are needed.

Please write clearly in black ink.

Centre number | | | | | |

Candidate number | | | | |

First name(s) _____

Last name _____

READ INSTRUCTIONS OVERLEAF

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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, 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 (*).

ADVICE

Read each question carefully before you start your answer.

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Answer ALL the questions.

1 (a) Designers complete a range of tasks throughout the design cycle. The tasks are shown in the list below.

A	Test the product
B	Create a brief
C	Create a prototype
D	Develop a design specification
E	Evaluate the design

Put the tasks in the correct order. One has been completed for you. [4]

				E

(b) **Designers will also complete research to inform the design of new products.**

State THREE ways a designer can undertake research.

1 _____

2 _____

3 _____

[3]

(c) **Explain why further research may be required later in the design process.**

_____

_____

_____

_____

_____

_____ **[3]**

2 Fig. 1 shows a portable speaker.

FIG. 1

(a) Describe a product requirement for each of the following areas that should be included in a design specification for the portable speaker.

(i) working environment

_____

_____ **[2]**

(ii) ergonomics

_____

_____ [2]

(iii) lifecycle

_____

_____ [2]

(b) Give ONE other product requirement that should be included in a design specification.

_____ [1]

(c) **Describe how a design specification is used to ensure the product can be successfully manufactured.**

_____

_____

_____

_____

_____

_____ **[3]**

3 **Testing is an important part of the design process.**

(a) **Give TWO reasons why designers test a product.**

1 _____

2 _____

[2]

(b) **State TWO methods that designers could use to test a product.**

1 _____

2 _____

[2]

(c)* Discuss why designers would evaluate a product during the validate phase of the design cycle.

[6]

4 Scale of production is an important manufacturing consideration.

(a) Name ONE production process that would be suitable for each scale of production.

(i) one-off

_____ **[1]**

(ii) mass

_____ **[1]**

(b) Suggest ONE product that would be manufactured in each scale of production.

(i) one-off

_____ **[1]**

(ii) batch

_____ **[1]**

(iii) mass

_____ **[1]**

(c) State ONE reason why manufacturing plans should consider the scale of production early in the design cycle.

_____

_____ [1]

(d) Explain why processes used for mass production may not be suitable for producing a one-off product.

_____

_____

_____

_____

_____

_____

_____

_____ [4]

5 New and emerging materials can improve product performance.

(a) Name THREE new and emerging materials.

1 _____

2 _____

3 _____

[3]

(b) Describe, using an example product, how a new and emerging material has improved the performance of a product.

Example product _____

Description _____

_____

_____

_____ **[3]**

(c) Give TWO ways that production costs can be affected by material selection.

1 _____

_____

2 _____

_____

[2]

(d) Name TWO other factors that can affect production costs.

1 _____

2 _____

[2]

6 Fig. 2 shows a disposable cup and plastic drinking straw.

FIG. 2

(a) (i) State TWO environmental pressures that are affected by the products in Fig. 2.

1 _____

2 _____

[2]

(ii) **Suggest TWO design changes that could be made to reduce the effect of the disposable cup and plastic drinking straw on the environment.**

1 _____

_____

2 _____

_____

[2]

(iii) **Give TWO performance requirements that the disposable cup and plastic drinking straw must still meet following the design changes.**

1 _____

_____

2 _____

_____

[2]

(b) **Explain why disposable cups and plastic drinking straws contribute to environmental pressures.**

_____

_____

_____

_____

_____

_____

_____

_____ **[4]**

END OF QUESTION PAPER

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