OCR
Oxford Cambridge and RSA

Friday 9 June 2017 – Morning

A2 GCE DESIGN AND TECHNOLOGY

F524/01 Product Design: Component 1

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- A calculator may be used

Duration: 1 hour

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F5240 1

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- This paper is to be taken with F524/02 in the same examination session of **2 hours 30 minutes**. The times given on the front of each paper are advisory.
- Components 1 and 2 should be available to candidates for the full session.
- Answer **ONE** question only from component 1 and **ONE** question only from component 2.
- Component 1 and Component 2 choices can be from different material areas although it is envisaged that most candidates will select the same material area.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Do **not** write in the barcodes.
- The discuss question will be used to assess your Quality of Written Communication.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **36**.
- All dimensions are in mm.
- Where appropriate calculations should be shown.
- This document consists of **40** pages. Any blank pages are indicated.

A calculator may be used for this paper

DC (ST/SG) 138203/2

1 Built Environment and Construction

Fig. 1 shows a ground-supported concrete floor slab.

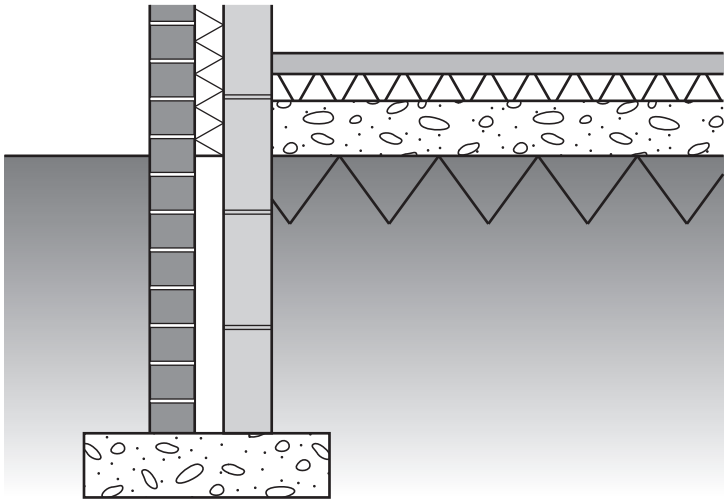

Fig. 1

(a) Give **four** justified design requirements for the floor structure of the type shown in Fig. 1.

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(b) Describe **two** key features of a JIT (Just-in-time) manufacturing system.

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[4]

(c) Describe how, and give a reason why, a textured surface has been used on **two** different products.

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[4]

(d) Use **two** examples to explain what is meant by the term 'smart materials'.

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(e) (i) State a **suitable specific material** for the finish to the floor structure shown in Fig. 1.

Give **two** properties or characteristics that make the material suitable for this use.

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(ii) Describe in detail how the floor structure shown in Fig. 1 would be constructed.

Include details to show how the floor structure would satisfy the requirements of the Building Regulations.

Use a flow chart and/or annotated diagrams to support your answer.

[9]

(f) Discuss how concerns for the environment have influenced the design of products.

.... **[8]**

2 Engineering

Fig. 2 shows a cooking pan.

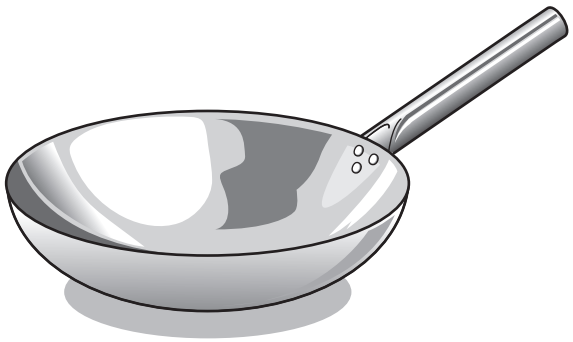

Fig. 2

(a) Give **four** justified design requirements for a cooking pan of the type shown in Fig. 2.

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[4]

(b) Describe **two** key features of a JIT (Just-in-time) manufacturing system.

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[4]

(c) Describe how, and give a reason why, a textured surface has been used on **two** different products.

1 .....

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

(d) Use **two** examples to explain what is meant by the term 'smart materials'.

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(e) **(i)** State a **suitable specific material** for the round base of the cooking pan shown in Fig. 2.

Give **two** properties or characteristics that make the material suitable for this use.

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(ii) Describe in detail how the round base of the cooking pan shown in Fig. 2 would be manufactured as a batch of **250**.

Include details to show how the handle would be attached to the base.

Give details of any special tooling and quality control checks that would be used.

Use a flow chart and/or annotated diagrams to support your answer.

[9]

(f) Discuss how concerns for the environment have influenced the design of products.

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3 Food

Fig. 3 shows a pack of six Chelsea buns.

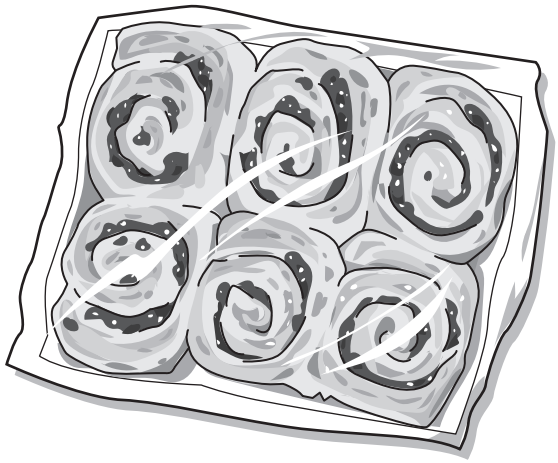

Fig. 3

(a) Give **four** justified design requirements for a pack of six Chelsea buns of the type shown in Fig. 3.

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[4]

(b) Describe **two** key features of a JIT (Just-in-time) manufacturing system.

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[4]

(c) Describe how, and give a reason why, a textured surface has been used on **two** different products.

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

(d) Use **two** examples to explain what is meant by the term 'smart materials'.

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(e) **(i)** All white and brown flour is fortified by law.

Explain the benefits of fortifying flour.

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(ii) Describe in detail how the Chelsea buns in Fig. 3 would be manufactured as a batch of **500**.

Include details of all the processes and the scientific principles underlying the processes.

Use a flow chart and/or annotated diagrams to support your answer.

[9]

(f) Discuss how concerns for the environment have influenced the design of products.

.... **[8]**

4 Graphic Products

Fig. 4 shows a carrier for hot drinks.

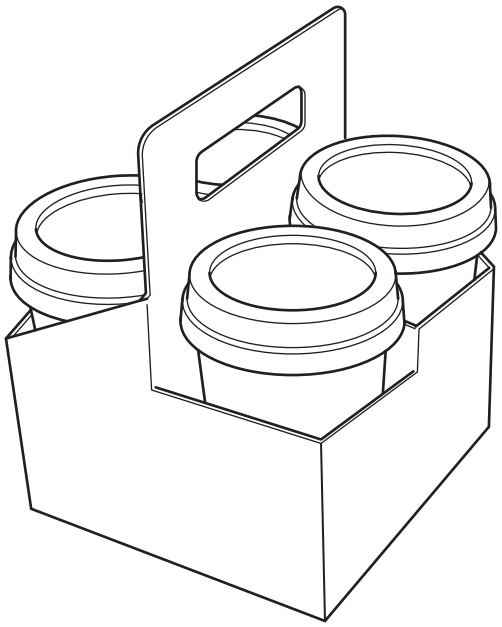

Fig. 4

(a) Give **four** justified design requirements for a carrier of hot drinks of the type show in Fig. 4.

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[4]

(b) Describe **two** key features of a JIT (Just-in-time) manufacturing system.

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[4]

(c) Describe how, and give a reason why, a textured surface has been used on **two** different products.

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[4]

(d) Use **two** examples to explain what is meant by the term 'smart materials'.

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(e) (i) State a **suitable specific material** for the hot drinks carrier shown in Fig. 4.

Give **two** properties or characteristics that make the material suitable for this use.

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(ii) Describe in detail how the hot drinks carrier would be manufactured as a batch of **5000**.

Use a flow chart and/or annotated diagrams to support your answer.

[9]

(f) Discuss how concerns for the environment have influenced the design of products.

.... **[8]**

5 Manufacturing

Fig. 5 shows a door handle.

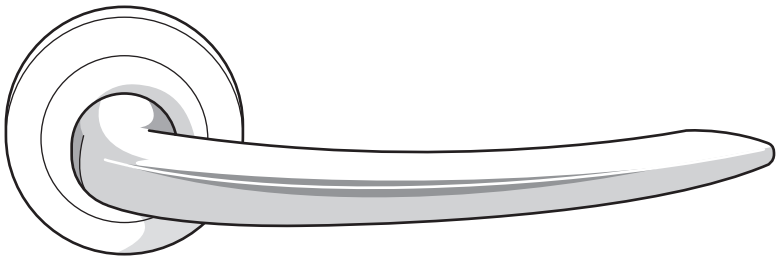

Fig. 5

(a) Give **four** justified design requirements for a door handle of the type shown in Fig. 5.

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[4]

(b) Describe **two** key features of a JIT (Just-in-time) manufacturing system.

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[4]

(c) Describe how, and give a reason why, a textured surface has been used on **two** different products.

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[4]

(d) Use **two** examples to explain what is meant by the term 'smart materials'.

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(e) Fig. 6 shows parts of the door handle.

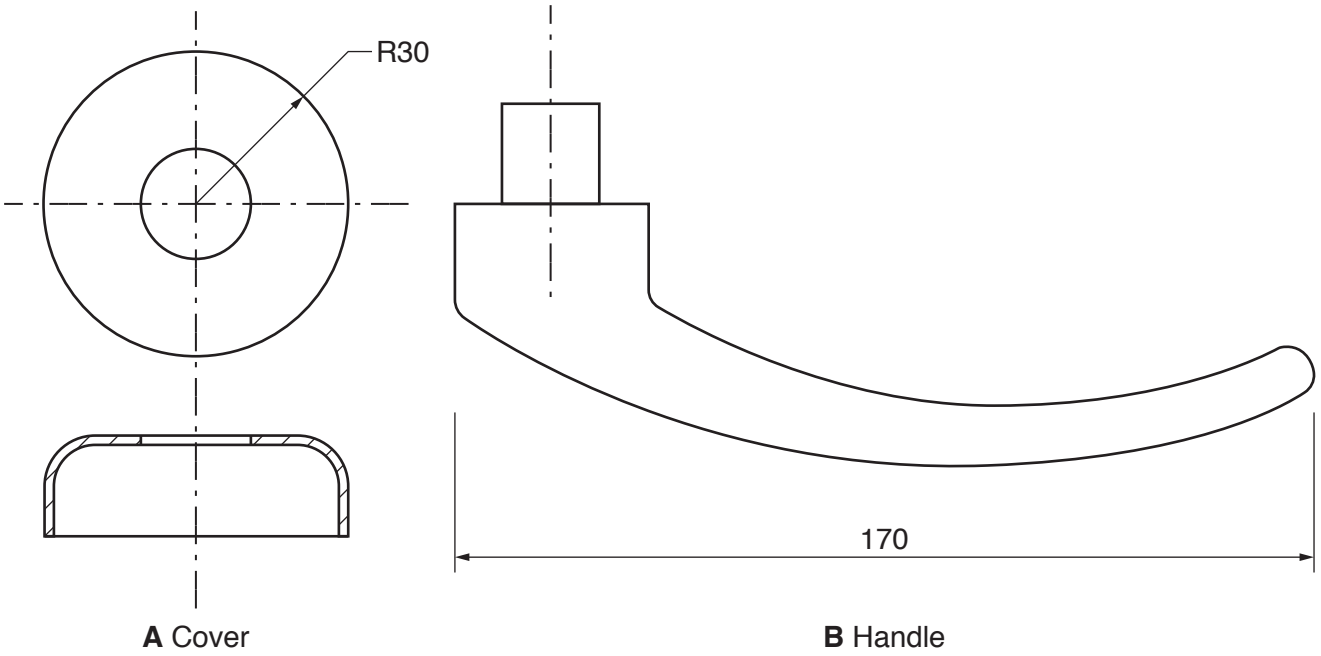

Fig. 6

Choose **one** of the parts **A** or **B** shown in Fig. 6.

Chosen part .....

(i) State a **suitable specific material** for the part that you have chosen.

Give **two** properties or characteristics that make the material suitable for this use.

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(ii) Describe in detail how the part you have chosen would be manufactured as a batch of **5000**.

Give details of any special tooling and quality control checks that would be used.

Use a flow chart and/or annotated diagrams to support your answer.

[9]

(f) Discuss how concerns for the environment have influenced the design of products.

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6 Resistant materials

Fig. 7 shows a stand for a tablet computer.

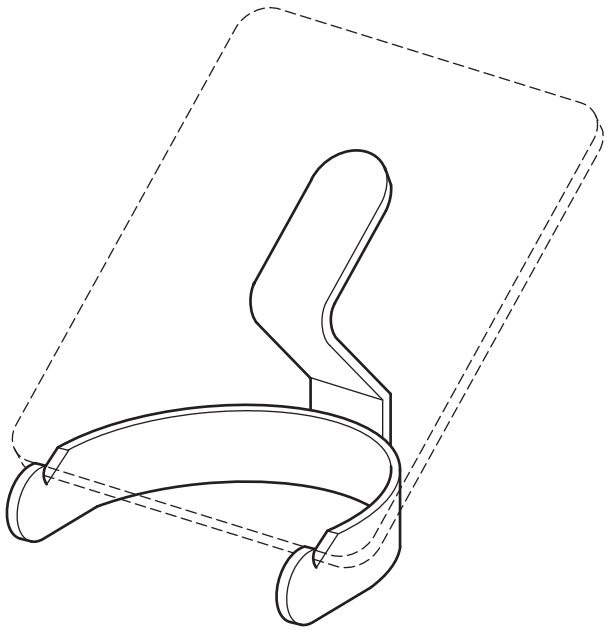

Fig. 7

(a) Give **four** justified design requirements for a stand for a tablet computer of the type shown in Fig. 7.

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(b) Describe **two** key features of a JIT (Just-in-time) manufacturing system.

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[4]

(c) Describe how, and give a reason why, a textured surface has been used on **two** different products.

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[4]

(d) Use **two** examples to explain what is meant by the term 'smart materials'.

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(e) (i) State a **suitable specific material** for the stand for a tablet computer shown in Fig. 7.

Give **two** properties or characteristics that make the material suitable for this use.

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(ii) Describe in detail how the stand for a tablet computer would be manufactured as a batch of **100**.

Include details of any jigs and/or formers used.

Use a flow chart and/or annotated diagrams to support your answer.

[9]

(f) Discuss how concerns for the environment have influenced the design of products.

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7 Systems and Control

Fig. 8 shows an electric desk fan with an oscillating head.

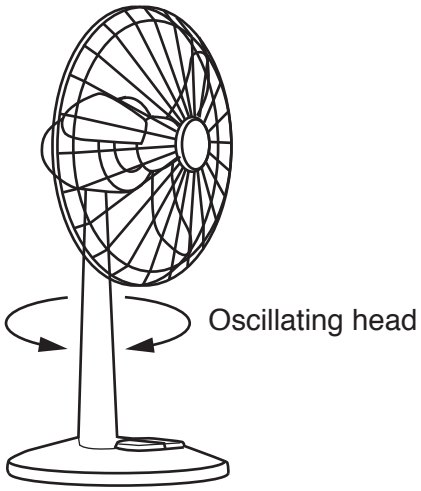

Fig. 8

(a) Give **four** justified design requirements for an electric desk fan of the type shown in Fig. 8.

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(b) Describe **two** key features of a JIT (Just-in-time) manufacturing system.

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(c) Describe how, and give a reason why, a textured surface has been used on **two** different products.

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(d) Use **two** examples to explain what is meant by the term 'smart materials'.

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(e) **(i)** The oscillating motion of the fan in Fig. 8 is driven by a rotating shaft.

Sketch a labelled diagram of a simple mechanism which can be used to convert rotary motion to oscillating motion.

[3]

(ii) The fan motor runs at a speed of 1800 rpm and it is necessary to reduce this speed to one revolution every 10 seconds for the oscillating mechanism.

Draw a fully labelled diagram of a gear system which would provide the required speed reduction.

You may use any arrangement of gears but, due to size limitations, no single gear may have more than 60 teeth.

For full credit you must clearly explain your calculations.

[9]

(f) Discuss how concerns for the environment have influenced the design of products.

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8 Textiles

Fig. 9 shows a set of work overalls.

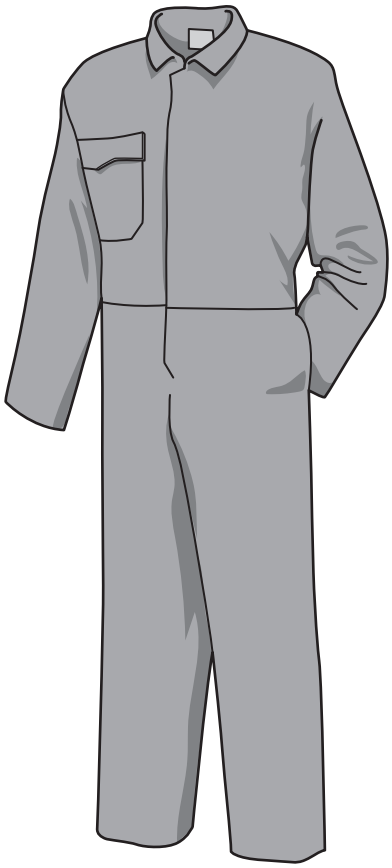

Fig. 9

(a) Give **four** justified design requirements for the work overalls shown in Fig. 9.

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[4]

(b) Describe **two** key features of a JIT (Just-in-time) manufacturing system.

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[4]

(c) Describe how, and give a reason why, a textured surface has been used on **two** different products.

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[4]

(d) Use **two** examples to explain what is meant by the term 'smart materials'.

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(e) (i) Explain why a double stitched seam is suitable for assembling the work overalls.

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(ii) The fabric for the work overalls is coloured using the batch dyeing method.

Describe the process of batch dyeing.

Use a flow chart and/or annotated diagrams to support your answer.

[9]

(f) Discuss how concerns for the environment have influenced the design of products.

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END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).