

Design technology
Higher level
Paper 2

Friday 13 November 2015 (afternoon)

Candidate session number

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1 hour 45 minutes

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer one question.
- Write your answers in the boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[60 marks]**.



Section A

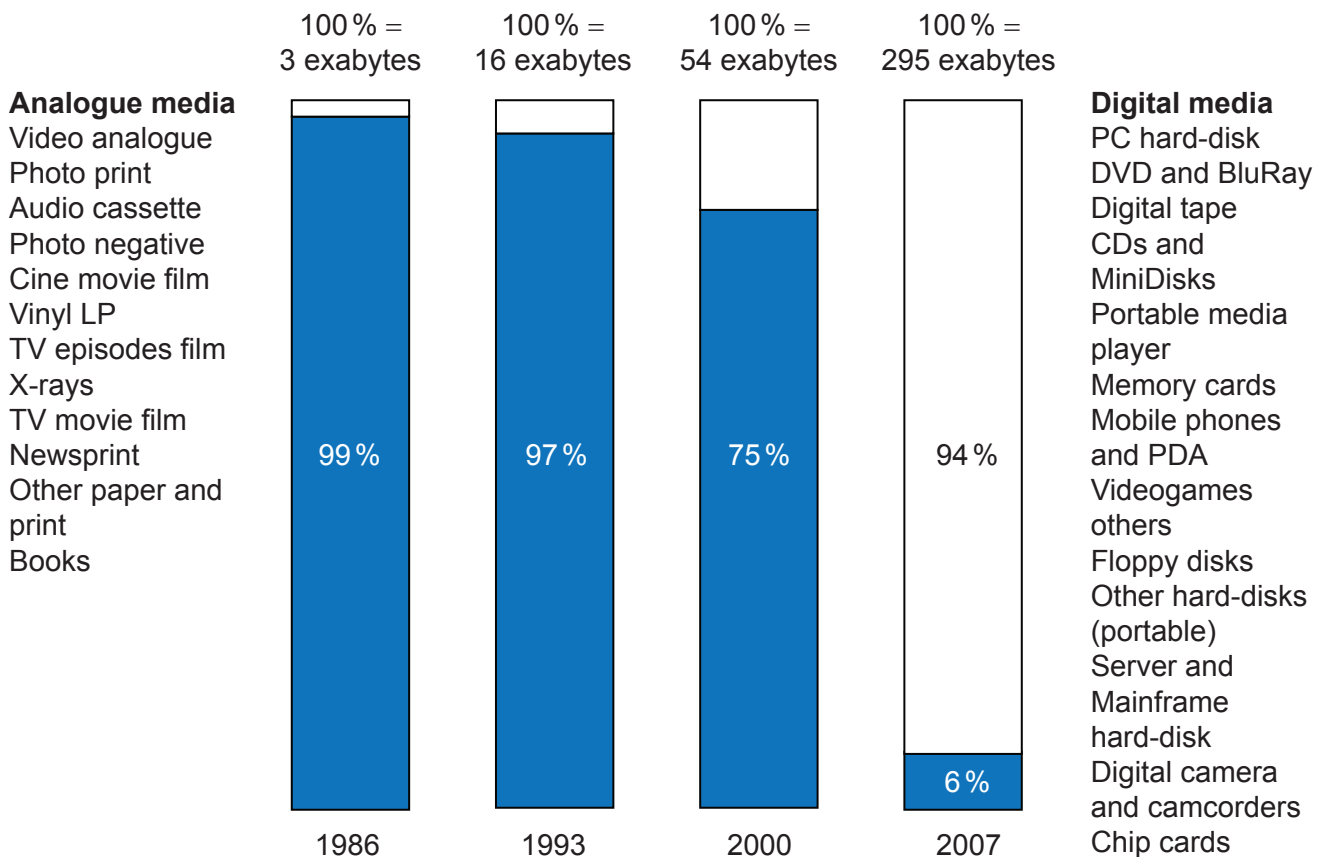
Answer **all** questions. Write your answers in the boxes provided.

1. Creating and storing data has driven technological change dramatically over the past 30 years. **Figure 1** is a chart showing the shift from analogue to digital data storage in the period from 1986 to 2007. **Figures 2** and **3** are charts which allow for a comparison of the amount of analogue and digital data stored in the year 2000 and the year 2007.

1 exabyte = 10^{18} bytes (1 followed by 18 zeros or 1 000 000 terabytes)

Figure 1: Comparison of analogue and digital data storage 1986–2007

Data storage



[Source: Data source: Big Data, an independent report from Lyonsdown distributed by the *Sunday Telegraph* in November 2012]

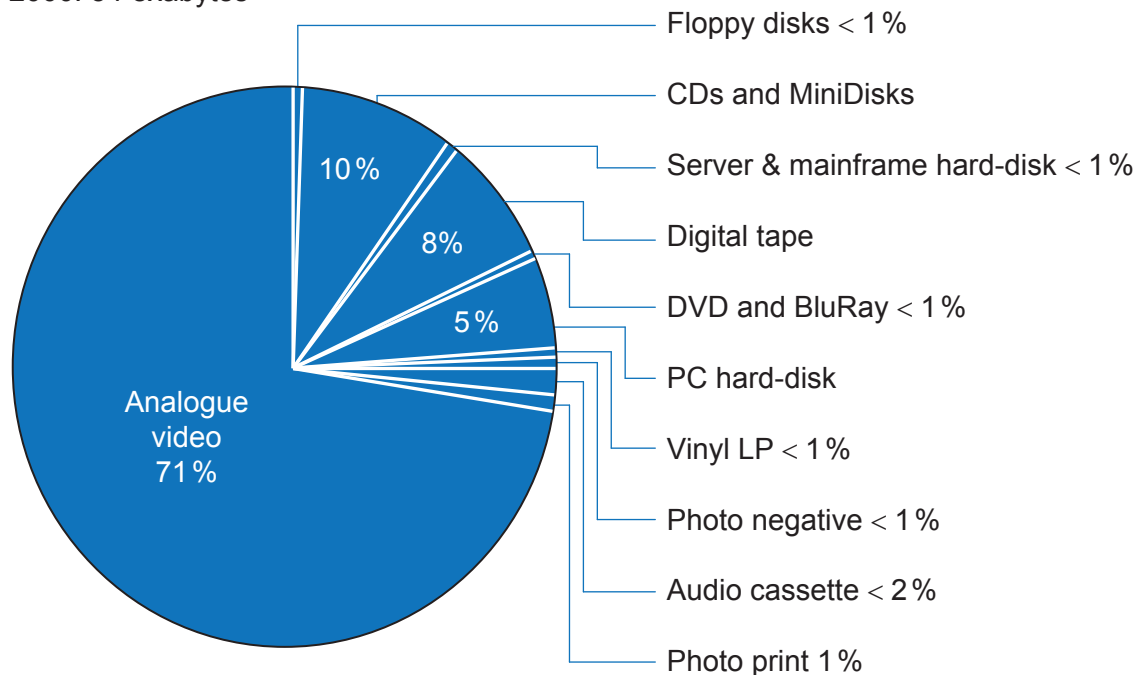
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(Question 1 continued)

Figure 2: Analogue and Digital Data Storage in 2000

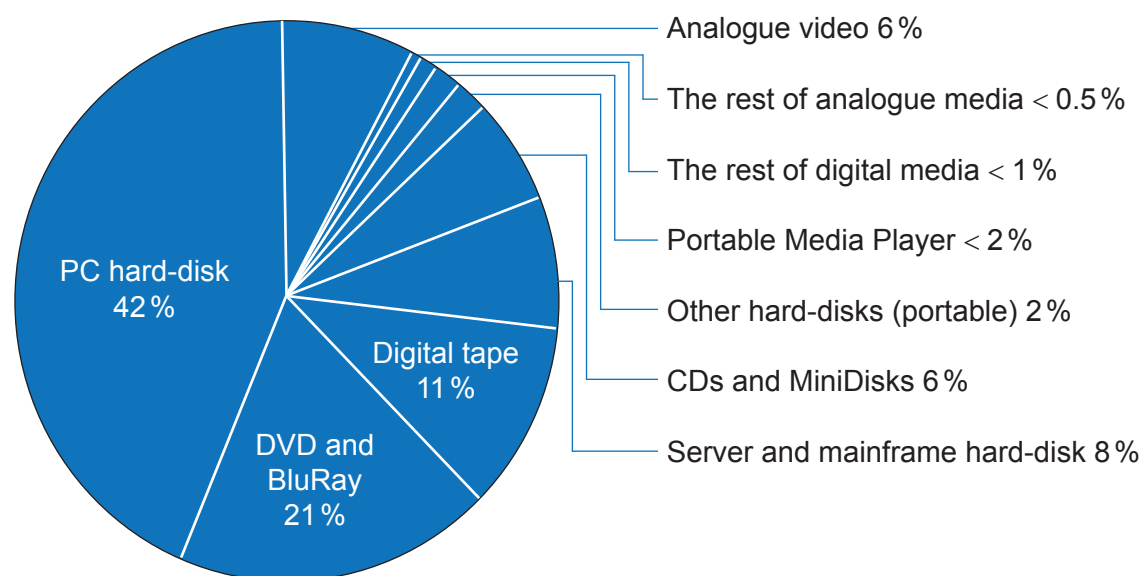
2000: 54 exabytes



[Source: Data source: Big Data, an independent report from Lyonsdown distributed by the *Sunday Telegraph* in November 2012]

Figure 3: Analogue and Digital Data Storage in 2007

2007: 295 exabytes



[Source: Data source: Big Data, an independent report from Lyonsdown distributed by the *Sunday Telegraph* in November 2012]

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24EP03

Turn over

(Question 1 continued)

- (a) (i) State the reason why the relative percentage of data stored on CDs and MiniDisks reduced from 2000 to 2007. [1]

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- (ii) State the percentage of analogue media in 2000. [1]

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- (iii) Calculate the increase in data stored on PC hard-disks between 2000 and 2007. [2]

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- (b) (i) Outline **one** reason for the dramatic rise in the amount of data stored on a PC hard-disk from 2000 to 2007. [2]

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(Question 1 continued)

- (ii) Outline **one** reason why the data percentages shown in **Figures 1 and 2** are likely to be an extrapolation. [2]

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- (c) (i) State which digital technology had the biggest impact on the decline of analogue video by 2007. [1]

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- (ii) Explain the influence of planned obsolescence on the data shown on the charts in **Figures 2 and 3**. [3]

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(Question 1 continued)

Many large store chains, especially supermarkets, issue “loyalty” cards to customers who regularly shop at their stores. The loyalty card is a plastic card (similar to a credit card) with a bar code or magnetic strip which, when scanned at the check-out, identifies the customer matched to the purchases made. Customers have to register for the card by providing contact details and can receive benefits from the store, such as special offers on products and discounts, for being a loyal customer. **Figure 4** shows a number of company loyalty “cards”.

Figure 4: Company loyalty cards

Please go to: http://www.retail-week.com/pictures/636xAny/1/2/4/1301124_loyalty-cards.jpg

- (d) (i) State **one** method of gathering customer data for a company loyalty card application.

[1]

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(Question 1 continued)

- (ii) Suggest **one** way in which the company issuing the loyalty cards may extrapolate information from continued use of the card by individual customers. [3]

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- (e) (i) Outline **one** benefit of the loyalty card scheme to the company apart from specific data gathered from the use of the cards. [2]

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- (ii) Outline **one** disadvantage to customers of having their data stored on the loyalty card. [2]

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2. (a) State how energy is converted from one form to another for a kite in flight. [1]

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- (b) Explain why some governments promote the use of nuclear power as part of their renewable energy policy. [3]

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3. (a) Describe a simple gear train. [2]

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- (b) Describe how a bevel gear works. [2]

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4. (a) State an important characteristic of metals which makes them suitable for high pressure die-casting. [1]

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- (b) Explain why high pressure die-casting is suitable for the manufacture of hip replacements. [3]

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5. (a) List **two** advantages of friction welding. [2]

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- (b) Outline a suitable adhesive for use when constructing a boat deck from hardwood. [2]

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6. (a) State the percentile value used to decide the height of a wash basin. [1]

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- (b) Explain why people working in the same interior environment often differ in what they regard as thermally comfortable. [3]

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24EP11

Turn over

Section B

Answer **one** question. Write your answers in the boxes provided.

- 7. **Figure 5** shows the Barcelona chair which was originally designed by Mies Van De Rohe for the International Exhibition in Barcelona 1929. Florence Knoll acquired the exclusive rights to manufacture Ludwig Mies van der Rohe's designs in 1948. The chair is manufactured in East Greenville, Pennsylvania, with a polished (stainless) steel frame and a seat cushion of plastic foam upholstered (covered) in natural leather. The cushions rest on a number of leather straps attached to the frame with metal fasteners (rivets) (**Figure 6**). Contemporary versions of the Barcelona chair are available in a variety of colours.

Figure 5: Barcelona chair



[Source: Image courtesy of Knoll, Inc.]

Figure 6: Detail of the frame of the Barcelona chair



[Source: Image courtesy of Knoll, Inc.]

- (a) (i) Outline why the Barcelona chair may be considered a dominant design. [2]

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(Question 7 continued)

- (ii) Outline **one** way in which a similar design of chair could be produced at a cheaper cost. [2]

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- (b) (i) Describe how the strategy of reconditioning could be used to extend the life cycle of the Barcelona chair. [2]

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- (ii) Discuss the Barcelona chair in relation to fashion. [3]

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(Question 7 continued)

- (c) (i) Outline how the metal frame of the Barcelona chair would have been joined together.

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- (ii) Discuss how the designer has balanced strength with stiffness in the choice of materials for the seat base, the cushion and the frame of the Barcelona chair.

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24EP15

Turn over

8. **Figure 7** shows Foodsafe plastic cups made from 100 % recycled plastic by Invicta Plastics (UK) for the global drinks company Coca Cola. Usually recycled plastic needs to be mixed with raw plastic to be able to create mass produced products but Invicta Plastics has managed to develop a process which overcomes the barrier of using 100 % recycled plastic. The Invicta Plastics Chief Executive is very motivated by environmentally friendly processes and products and is prepared to share the company's trade secrets with other manufacturers to encourage them to use 100 % recycled plastic for their products as long as they are a British company so there would not be detrimental environment issues transporting raw materials long distances.

[Source: Adapted from *Plastic Fantastic: A Green Solution For The Industry*, Sunday Telegraph Business Section (2013)]

Figure 7: Invicta Plastics plastic cups



[Source: Credit: Stewart Goldstein. Used with permission.]

- (a) (i) Outline **one** reason why a global company such as Coca Cola would want a range of plastic cups. [2]

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- (ii) Outline how the Coca Cola cup can be viewed as an example of incremental and radical design without consumers knowing it is made from 100 % recycled plastic. [2]

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(Question 8 continued)

- (b) (i) Outline a suitable manufacturing technique for the production of the Coca Cola cups shown in **Figure 7**. [2]

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- (ii) Explain the corporate strategy used by Coca Cola in commissioning Invicta Plastics to produce the plastic cups for them. [3]

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- (c) (i) Outline the potential product life cycle of the plastic cups shown in **Figure 7**. [2]

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24EP19

Turn over

9. **Figure 8** shows the Pouchlink Drinks Machine manufactured by the Green Drinks company. The Pouchlink system filters water from the mains supply and flash chills it before mixing it with fresh fruit concentrate and packaging it in a flat packed flexible plastic pouch which is re-sealable. There are five fruit flavours available and the machine holds 1000 pouches. The machine is self-cleaning and the company offers to install a machine in a school free for two weeks. **Figure 9** shows a plastic pouch drinks container from the machine.

Figure 8: Pouchlink vending machine



[Source: Courtesy of Green Drinks (Gb) Limited.]

Figure 9: Pouch from the Pouchlink machine



[Source: Courtesy of Green Drinks (Gb) Limited.]

- (a) (i) Outline the influence of market pull on the design of the Pouchlink machine. [2]

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- (ii) Outline the influence of technology push on the design of the Pouchlink machine. [2]

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(Question 9 continued)

- (b) (i) Outline the evaluation strategy represented by the offer to schools. [2]

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- (ii) Discuss **one** disadvantage of the Pouchlink drinks containers in relation to ergonomics. [3]

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- (c) (i) Outline the feature of the Pouchlink drinks system which will be the most energy intensive. [2]

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