



Oxford Cambridge and RSA

# AS Level Computer Science

## H046/01 Computing Principles

### Monday 6 June 2016 – Morning

### Time allowed: 1 hour 15 minutes



**Do not use:**

- a calculator



|               |  |  |  |  |  |                  |  |  |  |  |
|---------------|--|--|--|--|--|------------------|--|--|--|--|
| First name    |  |  |  |  |  |                  |  |  |  |  |
| Last name     |  |  |  |  |  |                  |  |  |  |  |
| Centre number |  |  |  |  |  | Candidate number |  |  |  |  |

#### INSTRUCTIONS

- Use black ink.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- If additional space is required, use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the bar codes.

#### INFORMATION

- The total mark for this paper is **70**.
- The marks for each question are shown in brackets [ ].
- Quality of extended responses will be assessed in questions marked with an asterisk (\*).
- This document consists of **16** pages.

Answer **all** the questions

- 1 See And Believe is a company that specialises in computer-generated imagery (CGI) for films.

Producing CGI requires lots of processing power and so the company has a large number of high-performance computers.

- (a) Explain why See And Believe would use a distributed operating system.

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..... [3]

- (b) The processors in the company's powerful computers have fast clock speeds and large amounts of cache memory. Describe how each of these improves the processor's performance:

- (i) fast clock speed

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..... [2]

- (ii) large cache memory

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



- 2 Elegant Bags is a company that makes designer handbags. It has decided it wants to sell its products online.

Elegant Bags puts its website on its servers which are given a public IP address. It also purchases the domain name `elegantbagsonline.co.uk`.

- (a) Explain the automated process that takes place that allows customers to access the site when they enter the domain name into their browser.

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..... [3]

The company's handbags come in a variety of materials. It would like visitors to its website to be able to select different materials in their browser and for the image shown to then instantly change to one of a handbag made of the selected material.

- (b) Explain how the website developer would implement this. You are not expected to write any code.

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..... [4]

(c) Elegant Bags prides itself on its ethical reputation.

(i) State **one** ethical issue the company may have considered when designing its website.

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..... [1]

(ii) State **one** action the company could take to address the ethical issue identified in part (i).

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



4 A programmer spends her spare time contributing to an open source application that converts video files from a range of formats to one which uses lossy compression.

(a) Describe what is meant by the term 'open source software'.

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..... [2]

(b) Describe what is meant by the term 'lossy compression'.

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..... [2]





5 (a) Give the number 55 in binary as an 8-bit unsigned integer.

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..... [2]

(b) Represent the number 55 in normalised floating point binary notation, using 8 bits for the mantissa followed by 8 bits for the exponent, both in two's complement binary.

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..... [2]

(c) Represent the number 55 in normalised floating point binary notation, with the mantissa and exponent both in two's complement binary, using as few bits as possible.

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..... [2]

(d) State why a programmer might choose to declare a variable as a floating point number.

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..... [1]

**PLEASE DO NOT WRITE ON THIS PAGE**

**Turn over for the next question**

6 An insurance company's offices have a large number of black and white printers.

The company's technicians keep accurate records of the printers in the building, and the quantity of toner cartridges in stock, in a flat file database. An extract of the database is shown in Fig. 1.

| Printer Model  | Location          | Notes          | Cartridge Code | Quantity in stock | Re-order URL                          |
|----------------|-------------------|----------------|----------------|-------------------|---------------------------------------|
| LasPrint LP753 | office 3          |                | LP-7XB         | 12                | www.megacheapprint.com/toner/LP-7XB   |
| LasPrint LP710 | office 6          | drum replaced  | LP-7XB         | 12                | www.megacheapprint.com/toner/LP-7XB   |
| Zodiac ZN217   | reception         |                | Zod17          | 4                 | www.zodiaclasserprinting.com/shop/Z17 |
| Zodiac ZN217   | conference Room 2 | had to add RAM | Zod17          | 4                 | www.megacheapprint.com/toner/LP-7XB   |
| LasPrint LP753 | office 8          |                | LP-7XB         | 12                | www.megacheapprint.com/toner/LP-7XB   |

Fig. 1

(a) Describe **two** issues, referring to Fig. 1, that might arise from using a flat file database structure.

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2 .....

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..... [4]

13

A relational database is created with three tables:

- PrinterModel: this stores all the data about each model of printer
- PrinterInstance: this stores the data about each individual printer in the building
- Cartridge: this stores information about the toner cartridges.

(b) Draw an entity-relationship diagram to show the relationships between the three tables.

[4]

Most of the printers have their own on-board RAM.

(c) State what the printers' RAM is used for.

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**END OF QUESTION PAPER**

**ADDITIONAL ANSWER SPACE**

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

A large rectangular area with a vertical line on the left side and horizontal dotted lines across the page, providing space for writing answers.



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