



22107013



**COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1**

Thursday 6 May 2010 (afternoon)

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Section A: answer all the questions.
- Section B: answer all the questions.

SECTION A

Answer *all* the questions.

1. State **two** items that would be included in a *requirements specification* in addition to inputs and outputs. [2 marks]

2. (a) State a suitable file format for a graphics file that is to be sent as an email attachment. [1 mark]
(b) Outline **one** advantage of the file format for this purpose. [2 marks]

3. (a) State the binary representation of the decimal number 24. [1 mark]
(b) Using 6 bits state the two's complement representation of the decimal number –24. [1 mark]
(c) A register has 8 bits. State the binary representation of the hexadecimal number 5F in this register. [2 marks]

4. Outline the function of the *arithmetic and logic unit* (ALU) in the *central processing unit* (CPU). [2 marks]

5. Identify **one** characteristic of
 - (a) a sequential access file; [1 mark]
 - (b) a direct access file. [1 mark]

6. (a) Outline **one** example of an application, where a microprocessor is used. [2 marks]
(b) For the application outlined in part (a), state **one** input and **one** output. [2 marks]

7. Describe the difference between *private class members* and *public class members*. [2 marks]

8. (a) Outline **one** use of a *macro* within an application. [2 marks]
(b) State **two** advantages of using the macro from part (a). [2 marks]

9. Describe how a *check sum* could ensure data integrity in the transmission of data. [3 marks]

10. Compare *magnetic tape* with *flash memory* as media for backing up data. [4 marks]

SECTION B

Answer *all* the questions.

11. A chain of supermarkets gives discounts to regular customers who shop in any one of their stores. The regular customers all have a card with a magnetic strip which stores an identification number. Each item in the supermarket has a barcode that identifies the item. This barcode is used to find the price of the item which is stored on a computer in the store. Prices and discounts are marked on the shelves.

(a) Identify **two** input devices needed at the checkout. *[2 marks]*

Each store has a computer which holds prices and member discounts for each item.

(b) Outline how the barcode is used to access the record of an item. *[2 marks]*

(c) Describe the process of creating a bill for a regular customer who buys items, some of which get a discount. *[4 marks]*

When the store is closed, prices and discounts are updated from a central computer.

(d) Suggest why the prices and discounts are updated when the store is closed. *[2 marks]*

12. A college server stores student assignments. Students can access their own assignments at anytime, from any place, so that assignments can be worked on during weekends and vacations. Teachers can continually access the work of their students.

(a) Identify a transmission medium that would be appropriate

(i) within the college premises; *[1 mark]*

(ii) when away from the college. *[1 mark]*

(b) Only a student and their teacher have access to the student's work.

(i) Describe suitable security measures to protect the student's work from being copied or modified. *[3 marks]*

(ii) State **one** system that would allow the teacher to comment on the student's work. *[1 mark]*

Computer resources at the college are allocated according to need and priority. The use of resources is recorded by the server.

(c) Explain the role of the college server in controlling data storage and printing services. *[4 marks]*

13. Two arrays, `student[]` and `grade[]`, are shown below.

`student[]`

[0]	[1]	[2]	[3]	[4]	[5]
Pietro	Michelle	Archie	Sol Me	Dyna	Clara

`grade[]`

[0]	[1]	[2]	[3]	[4]	[5]
7	4	5	2	5	9

The following method, `deleteStudent()`, is used to manipulate the two arrays. It contains an error. It can be assumed that the student name entered into the method is present in the array.

```
public void deleteStudent(String name)
{
    int j = 0;
    for (int c = 0; c < 6; c++)
    {
        if (student[c] == name)
        { j = c; }
    }
    for (int c = j; c < 6; c++)
    {
        student[c] = student[c + 1];
        grade[c] = grade[c + 1];
    }
}
```

(a) Copy and complete the table below for the first loop in the call

`deleteStudent("Archie").`

[4 marks]

name	j	c	student[c] == name	student[c]	grade[c]
Archie	0	0	false	Pietro	7
		1	false	Michelle	4

(b) (i) Identify the error. [1 mark]

(ii) State the type of error. [1 mark]

(c) Outline **one** way in which the method could be adapted to avoid the error. [2 marks]

(d) Suggest **one** way in which the efficiency of the method could be improved. [2 marks]

14. A specialised company is asked to design and implement a new computer system for a factory. The new design will include automating some manufacturing processes.
- (a) Outline **one** method of *data collection* which the company could use in the analysis stage. *[2 marks]*
 - (b) Describe the usefulness of producing more than one prototype of the new system. *[2 marks]*
 - (c) State **two** advantages of a modular design for the new software. *[2 marks]*
 - (d) Discuss **two** social implications of introducing the new system into the factory. *[4 marks]*
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