



GCE A level

1103/01

COMPUTING – CG3

A.M. TUESDAY, 17 June 2014

3 hours

1103
010001

ADDITIONAL MATERIALS

You will need a WJEC 20 page answer booklet (pink), which has been specifically designed for the examination paper. No other style of answer booklet should be used. Should you run out of space, use a standard 4 page continuation booklet.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Answer **all** questions.

Use both sides of the paper. Write only within the white areas of the book.

Write the question number in the two boxes in the left hand margin at the start of each answer.

Leave at least two line spaces between each answer.

The intended marks for questions or part questions are given in brackets []. You are advised to divide your time accordingly. The total number of marks available is 100.

You are reminded of the necessity for good written communication and orderly presentation in your answers.

Quality of written communication will be assessed in question 30.

0 1 A school encourages its pupils to use the school's *virtual learning environment* and the *Internet* during lessons.

Describe what is meant by each of the terms *virtual learning environment* and the *Internet* and give an example of how each might sensibly be used during school lessons.

Also describe **two** drawbacks of allowing free access to the *Internet* during lessons. [6]

0 2 *Stacks, queues, arrays* and *records* are types of data structures. Why are data structures useful in computing? Name **one** other type of data structure. [2]

0 3 State **two** computer applications where a *stack* is the most appropriate data structure. [2]

0 4 Explain what is meant by *circuit switching* and *packet switching* in a computer network.

One advantage of *packet switching* over *circuit switching* is that data is less likely to be affected by network failure. Give **two** other benefits of *packet switching* over *circuit switching*.

A typical packet contains the actual data and the destination address. State **two** other data items which the packet is likely to contain. [6]

0 5 Describe what is meant by a data collision on a network. Explain how the network should deal with a data collision once it is detected. [2]

0 6 A certain application requires the value of the **seventh** bit of an eight bit binary number, counting from the most significant bit. (The example below shows which bit is required.)

1 1 0 1 1 0 0 1
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Name the process used to achieve this, stating the eight bit binary number required. Also name the logical operation used when this number is combined with the original number. [3]

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|---|---|---|
| 0 | 7 | Explain why hexadecimal notation is often used to represent binary numbers.

Convert the binary number 01001110 to hexadecimal. [2] |
| 0 | 8 | Binary numbers can be represented in <i>integer form</i> or <i>floating point form</i> . Describe two advantages of storing numbers in <i>integer form</i> and one advantage of storing numbers in <i>floating point form</i> . [3] |
| 0 | 9 | Describe what is meant by the terms <i>overflow</i> and <i>underflow</i> in connection with storing numbers in a computer. [2] |
| 1 | 0 | Why is it useful to use character sets such as ASCII?

The decimal ASCII code for “a” is 97. What character will have an ASCII code of 100? [2] |
- | | | |
|---|---|---|
| 1 | 1 | Describe in detail what is meant by an <i>indexed sequential file</i> , and give the main advantage of using an <i>indexed sequential file</i> compared with an ordinary <i>sequential file</i> . [3] |
| 1 | 2 | Data held in computer files is often <i>archived</i> . Explain what is meant by the term <i>archiving</i> and explain why archiving is necessary. [3] |
- | | | |
|---|---|---|
| 1 | 3 | A computer process may be said to be in one of three states: <i>running</i> , <i>ready</i> or <i>blocked</i> . Explain the difference between the two states <i>ready</i> and <i>blocked</i> . [2] |
| 1 | 4 | Explain the purpose of buffering in a computer system making clear the difference between single buffering and double buffering. Why is double buffering usually preferable? Give one example of a situation where double buffering is useful. [4] |
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|---|---|---|
| 1 | 5 | A certain school uses a <i>two-dimensional array</i> to store data about its pupils.

Using a diagram, give an example of data which might sensibly be stored in a <i>two-dimensional array</i> in this case.

Occasionally, <i>three-dimensional arrays</i> are used to store data. Give one drawback of using <i>three-dimensional arrays</i> . [3] |
|---|---|---|

1	6	What is the purpose of Backus-Naur Form (BNF)?	[1]
1	7	<p>A manufacturer of computer printers produces thousands of <i>components</i>. Each component has a <i>component code</i> made up of a <i>name</i> and a <i>component number</i>.</p> <p>The <i>name</i> can be of any length, must start with an uppercase letter, and must otherwise be made up of only lowercase letters.</p> <p>The <i>component number</i> must contain exactly 5 digits.</p> <p>Examples of valid component codes are: Papertray36105 Controlmodule43028</p> <p>Produce an appropriate BNF definition for a <i>component code</i>.</p>	[4]
1	8	Produce an appropriate syntax diagram for a <i>component code</i> as described above.	[3]
1	9	A database is known to be in <i>first normal form</i> . Describe the step necessary to ensure that it is in <i>second normal form</i> .	[1]
2	0	Assume the same database is now in <i>second normal form</i> . Describe the step necessary to ensure that it is in <i>third normal form</i> .	[1]
2	1	Describe what is meant by a <i>primary key</i> in a database.	[1]
2	2	<p>A town has an annual poetry festival, where poets read their own poems at poetry-readings at various venues.</p> <p>Each poet has an id-number, a date of birth and may have written many poems. Each poem has a title and was written by only one poet and was finished on a particular date. Each poetry-reading is at a single venue on a particular date and involves only one poet. Each venue has a name, an address and a maximum size of audience. Each venue has no more than one poetry reading per day.</p> <p>Design a database system for the above situation in third normal form.</p>	[6]
2	3	Briefly describe how a <i>bubble sort</i> operates.	[3]
2	4	State the two main features of a recursive algorithm. Name a recursive sort algorithm which is usually faster than a <i>bubble sort</i> .	[3]
2	5	<p>Many organisations carry out <i>disaster planning</i> for their computer systems.</p> <p>Explain why disaster planning is very important and describe elements of disaster planning which can allow an organisation to recover quickly following a disaster.</p>	[5]

2 | 6

The sales director of a company wishes to compare the sales (in thousand pounds) achieved by her sales staff in the previous month.

Design an algorithm using pseudo-code with the following inputs:

- the number of sales staff
- the sales figure for each member of staff

The algorithm should output:

- the mean of the sales figures
- the values of the sales figures which are below the mean
- how many sales figures are below the mean
- the lowest sales figure

For instance, if the inputs are:

6
45 55 65 65 10 60

the outputs should be similar to:

Mean = 50

Values below the mean = 45 10

Total number of values below the mean = 2

Lowest sales figure = 10

[6]

2 | 7

Distributed databases are often used by large organisations. Explain what is meant by a *distributed database* and why they are useful. Describe one difficulty associated with the use of *distributed databases*.

[3]

2 | 8

Three types of programming language used are:

- fourth generation language
- visual language
- special purpose language

In each of the above three cases, describe a situation where this type of language might sensibly be used and give one reason why its use would be suitable in this case.

[6]

2 | 9

Outline what is meant by a *scripting language*.

[1]

3 | 0

Nu Stuff UK has hundreds of high-street clothes shops around the country.

It is developing a new computer system which will involve each of its shops having a number of in-store computers which customers can use to look at the latest clothes, check if they are in stock and find out more about them.

The team developing this system need to consider the best type of human computer interface (HCI) for this application. The system needs to be easy to use in a possibly noisy and crowded environment in the shop.

Discuss the different types of HCI (both hardware and software) which would be suitable in this case and those which would be less suitable.

[11]

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