GCE AS/A level

1101/01

COMPUTING – CG1
Software and System Development

A.M. THURSDAY, 17 January 2013

3 hours

INSTRUCTIONS TO CANDIDATES

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

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Answers should be written in the spaces provided. Where the space is not sufficient for your answer, use a continuation sheet, taking care to number the continuation correctly.

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. Assessment will take into account the quality of written communication used in your answers to question 15.

1. *(a)* A ticket agency posts thousands of letters to customers informing them of future events. Name a feature of a word processing package which could be used to produce these letters and briefly describe how these personalised letters are produced. [3]

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(b) The ticket agency has the email address of most customers and is going to inform them of future events using email. Briefly describe the facility provided by an electronic mail system that would allow the same email to be sent to thousands of customers. Describe **one** advantage and **one** disadvantage for the agency of communicating with customers using email compared with conventional post. [3]

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(c) The ticket agency stores personal information about customers and must comply with the eight principles of the Data Protection Act. State **two** principles of the Act that the ticket agency must comply with.   [2]

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(d) Employees at the ticket agency have access to personal customer information and all employees have to sign a code of conduct. Give **two** reasons why the ticket agency would ask employees to sign a code of conduct.   [2]

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2. David has numerous photographs and videos stored on his home computer. They occupy approximately 20 gigabytes of his hard disc.

Compare the suitability of using multiple writable DVDs to back up David's photographs and videos with backing them up on an external hard disc. Your answer should refer to speed of access, cost per unit of storage and durability.

David decides to use a third storage method for this backup which has an advantage over the two methods described above. Describe a suitable method, giving the advantage. [5]

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3. *(a)* An estate agency uses a computer system to store information about properties that it has for sale. Name the most suitable data type for the storage of the following: [5]

the type of property, for example terrace; ....

the number of bedrooms, for example 3; ....

a single letter code to indicate the council tax band, for example B; ....

distance to nearest train station in miles, for example 12·5; ....

whether or not an offer has been made for the property, for example TRUE. ....

(b) State the data structure that would be most suitable to store all the data required for a property, briefly describing why it is the most suitable data structure. [2]

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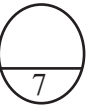
4. *(a)* Giving an example in **each** case, define the computer terms *bit* and *byte*. [2]

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(b) Define the computer term *word*. Give an advantage of a computer using a large word size compared with a computer using a small word size. [2]

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5. *Thirty Three to Forty Five* is a shop that sells new and second hand vinyl records. The manager of the shop has replaced a paper-based system, for storing information on current stock, with a computerised database system. *Thirty Three to Forty Five* has benefited from using this new system in many ways.

(a) Describe **two** problems with the old paper-based system and explain how the computerised database system should have solved **these** problems. [4]

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(b) Describe **two** different reports that the computerised database system could produce that would have been time consuming to produce with the old paper-based system. [2]

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(c) Some of the data input into the new computerised database system is validated.

(i) One item of data that is validated is the number of vinyl records delivered to the shop. A presence check and a type check are carried out on this data. Describe another suitable validation check that could be carried out, giving an example of invalid data that would be detected by **this** check. [2]

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(ii) Another item of data that is validated is the condition of the vinyl record which can be either *new, good* or *poor.*
Describe a **different** suitable validation check that could be carried out on this data. Do **not** use any of the three validation checks used in part (i). [1]

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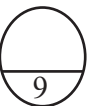
6. A local library loans books to members. A member can check the local library book list to see if a book is available. If the book is not available, the member can ask the library staff to check the availability of the book at the Central Library. If the book is available, a member of the local library staff can arrange to transfer the book from the Central Library to the local library.

The situation described is as shown in the diagram below:

| | B | | | Central Library book list |

Local Library availability

D

Book details to Local Library

A

C

Book details to Central Library

Check Central Library book list
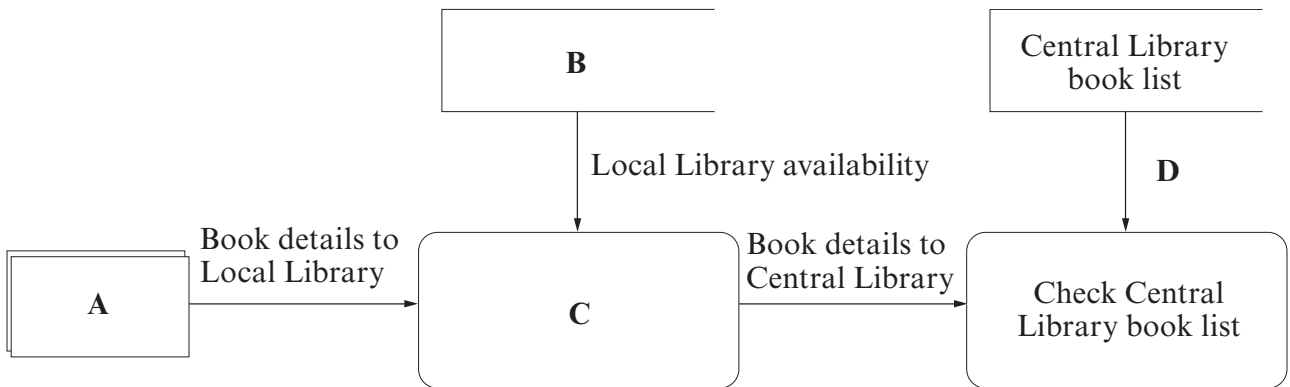
(a) (i) Describe why this type of diagram is useful in helping to explain a computer system. [1]

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(ii) What type of object does the rounded box in the diagram represent? [1]

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(iii)   Draw the shape used in the diagram to represent an external entity.   [1]

(b)   Give a suitable name for **each** of the objects shown as **A**, **B**, **C** and **D** in the diagram. [4]

A ....

B ....

C ....

D ....

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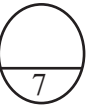
7. A gas company has an intranet, extranet and an Internet web site.

(a) Describe who would be most likely to use the company's intranet and web site, briefly describing how access is provided to **each**. [2]

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(b) Customers can enter their current meter readings using the gas company's extranet. Describe **one** other service the company could offer customers using their extranet. Describe **two** effects on employment within the company that could be caused by customers using the extranet to enter their own meter readings. [3]

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8. *(a)* Some hand held devices use handwriting recognition as a method of input. Describe advantages and disadvantages of using handwriting recognition on such devices. [3]

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(b) The Human Computer Interface (HCI) on many devices such as mobile telephones uses a touch screen. Explain why a touch screen is suitable for such devices. [4]

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9. Discuss the differences between fixed and variable length records. [6]

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10. Below is an algorithm.

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X is integer
Y is integer
Z is integer

startmainprog

        set Y = 0
        set Z = 100

        output "type in a number"
        input X

        repeat
                if X > Y then set Y = X
                if X < Z then set Z = X

                output "type in a number"
                input X

        until (X < 0)

        output Y
        output Z

endmainprog
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(a) Complete the table below to show how **each** variable changes when the algorithm is performed on the test data given.

Test data: 30 18 22 77 −1

X	Y	Z
	0	100
30		

[5]

(b) Briefly describe the purpose of −1 in the test data. [1]

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11. Below is an algorithm.

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Algorithm Calculation Area

Pi = 3·142
Radius is real


    declare subprocedure FindArea {procedure to calculate the area of a circle}

    Area is real

    start

            Area = Pi * Radius * Radius


    End
Startmainprog
    output "Type in the radius"
    input Radius

    call FindArea

    output "The area is ",Area

endmainprog
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(a) Give an example of a local variable, an example of a global variable and an example of a constant from the above algorithm. [3]

Local variable = ...

Global variable = ...

Constant = ...

(b) Explain why the following line from the algorithm will produce an error.

output "The area is ",Area [1]

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(c) Amend the algorithm to correct this problem. You may cross out and replace any lines of the algorithm. [2]

WRITE IN THE BOX - DO NOT WRITE ANYTHING HERE

12. Below is a segment of an algorithm.

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input Search Value

set i = 1                [initialise variables]
set Position = 0
set Found = false

repeat
        if Search Value = SearchArray[i] then
                Found = true
                Position = i
        else
                set i = i + 1
        endif

until (Found = true) OR (i > 7)

if Found = true then
        output "item found in array at ", Position
else
        output "item not found in array"
endif
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(a) Write down **one** example of a meaningful identifier from the algorithm and explain why programmers use meaningful identifiers. [2]

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(b) Using an example from the algorithm, describe in detail the purpose of *selection* in computer programs. [3]

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13. *(a)* Briefly describe the circumstances in which **each** of the two types of maintenance *corrective* and *adaptive* would typically be carried out. [2]

Corrective ....

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Adaptive ....

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(b) Three testing methods often used are *alpha*, *beta* and *acceptance* testing. Briefly describe **who** would carry out **each** of the three methods. [3]

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14. An on-line music store allows customers to download music, movies and other files. When logged in, customers are able to view past downloads and change contact and payment details. Without suitable preventative measures, some of this data could be subject to *accidental* or *malicious* damage.

(a) Define **each** of the terms *accidental* and *malicious* damage. Describe who is likely to cause **each** type of damage to data stored at the on-line music store. [4]

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(b) Describe **in detail** the procedures the store should adopt to ensure that data can be restored after damage has occurred. [2]

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15. Three different modes of operation in computer systems are *real time control processing, real time transaction processing* and *batch processing.*

For **each** of the above modes of operation describe an application for which it would be the most suitable. In **each** case describe **in detail** the mode of operation and explain why it is the most suitable. [12]

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Question number	Additional page, if required. Write the question numbers in the left-hand margin.	Examiner only

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