



**ADVANCED SUBSIDIARY GCE
COMPUTING**

Programming Techniques and Logical Methods

F452

Candidates answer on the question paper

OCR Supplied Materials:
None

Other Materials Required:
None

**Monday 12 January 2009
Afternoon**

Duration: 1 hour 30 minutes



* C O P / T 6 4 0 1 6 *

Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **100**.
- This document consists of **20** pages. Any blank pages are indicated.

1 A Computing student has written a program which stores and prints recipes. The program has a graphical user interface (GUI).

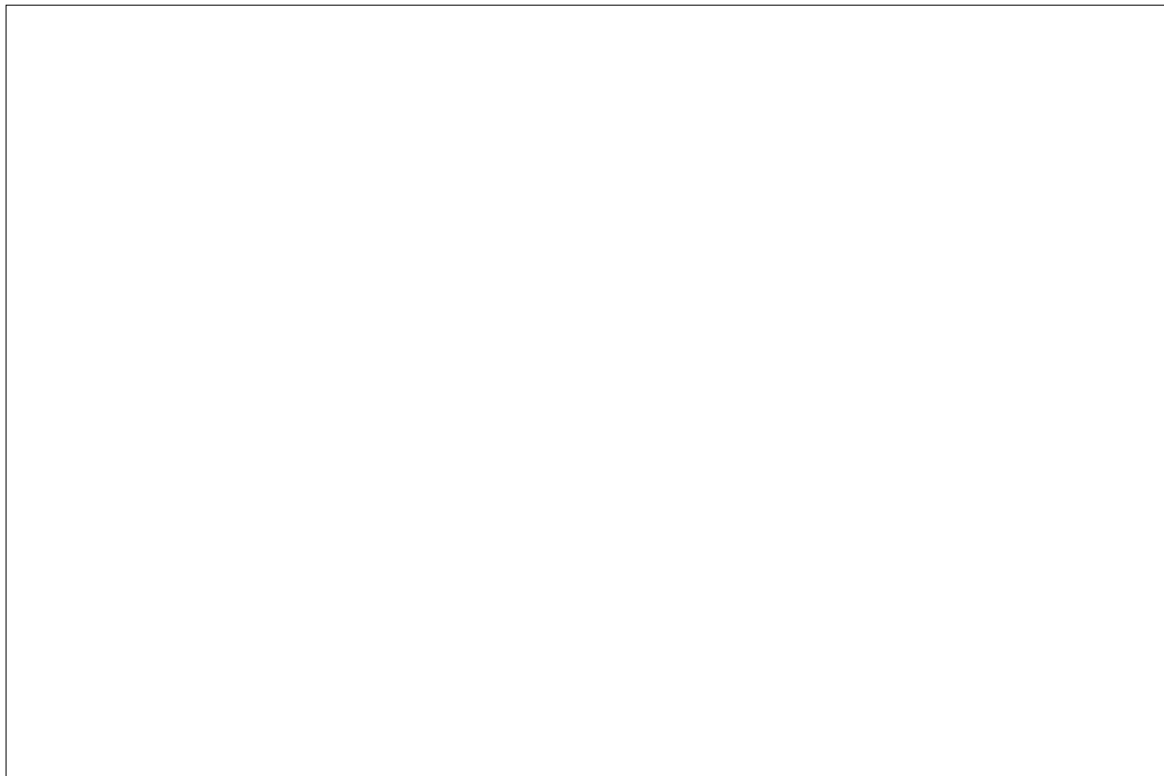
(a) Describe how a good design of the GUI can make the program easier to use.

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..... [4]

(b) The data entry screen allows the user to enter the following data about each recipe.

- The name of the recipe (e.g. Sponge Cake)
- The number of people the recipe caters for (e.g. 6)
- A table of the ingredients of the recipe with 3 columns
 - the name of the ingredient (e.g. flour)
 - the quantity required (e.g. 300)
 - the units in which the quantity required is measured (e.g. grams).

On the blank screen below, show a suitable layout for the data entry screen.



[8]

(c) Each recipe is saved as a separate serial file.

(i) Describe what is meant by a serial file.

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

(ii) State **two** reasons why a serial file is better than a sequential file for storing the data about a recipe.

Reason 1
.....
Reason 2
..... [2]

The student has written the following algorithm for creating the serial file.
(In this algorithm a *WRITE* command writes a string into a text file and moves to the next line.)

```
OPEN OutputFile in Write Mode
WRITE RecipeName to OutputFile
WRITE NumberOfPeople to OutputFile
FOR each ingredient
    WRITE NameOfIngredient, ";", Units, ";", Quantity to OutputFile
NEXT ingredient
CLOSE OutputFile
```

(d) The student plans to test this algorithm with the following recipe.

Pasta Bake (for 4 people) <i>Ingredients:</i> 200 g pasta bows 500 ml milk 150 g cheese

Write down how this recipe will be stored in the output file using the algorithm given.

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[4]

2 A software company is producing software for a city council.

(a) The company uses Rapid Application Development (RAD) to develop software.

Describe RAD and state **one** advantage of using it.

RAD

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Advantage

..... [4]

(b) Before releasing the software, it is tested using a variety of strategies.

Describe the following test strategies.

(i) Black box testing

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..... [2]

(ii) Alpha testing

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..... [2]

(iii) Acceptance testing

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..... [2]

- (c) The software calculates the cost of parking at the city council's car parks as follows.
- Free from 5am to 8am
 - £3 per hour or part of an hour between 8am and 5pm
 - Free from 5pm to 12 midnight
 - No parking from 12 midnight to 5am

Fill in the table below with test data for **three** different tests that can be used to test whether the program charges the correct amount when given **valid** start and finish times.

For each set of data, state the purpose of that test and the expected outcome.

Test data		Reason for test	Expected outcome
Start time	Finish time		

[9]

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3 A computer program is used to monitor a printer and display its status via an LCD display in the front panel. The program includes the following algorithm.

```
01 IF NOT(PaperTrayEmpty) AND (FilesWaiting > 0) THEN
02     OUTPUT "PRINTING..."
03 ELSE
04     OUTPUT "PLEASE ADD PAPER"
05 END IF
```

(a) The algorithm is tested when the values of the variables are
PaperTrayEmpty = TRUE FilesWaiting = 3

(i) State the value of NOT(PaperTrayEmpty)

..... [1]

(ii) State the value of (FilesWaiting > 0)

..... [1]

(iii) State the value of NOT(PaperTrayEmpty) AND (FilesWaiting > 0)

..... [1]

(iv) State the output of the algorithm

..... [1]

(b) State the output of the algorithm when the values of the variables are as follows.
Justify your answer in each case.

(i) PaperTrayEmpty = FALSE FilesWaiting = 1

Output

Justification

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.....
.....
..... [4]

(ii) PaperTrayEmpty = FALSE FilesWaiting = 0

Output

Justification

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..... [4]

(c) Rewrite the algorithm so that when PaperTrayEmpty is False and FilesWaiting is 0, the output is "STATUS OK".

(The output in other cases should not change.)

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..... [4]

- 4 The following algorithm finds the total of all the digits in a number.
You do not need to trace this algorithm.

```
01 INPUT N
02 T = 0
03 WHILE N > 0
04 L = N MOD 10
05 R = N DIV 10
06 T = T + L
07 N = R
08 END WHILE
```

- (a) Explain the purpose of the instruction in line 02.

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..... [2]

- (b) Explain why it would be incorrect to rewrite line 06 as $T + L = T$

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..... [2]

- (c) One way to improve the readability of the algorithm is to include comments.

Describe **two** other ways to improve the readability of the algorithm.

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..... [4]

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5 (a) A computer program consists of many statements which are sometimes organised into subroutines such as functions.

(i) Explain what is meant by a statement.

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..... [2]

(ii) Explain what is meant by a function.

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..... [2]

(b) A coin-operated vending machine has 2 slots. Slot A is for 10p coins, and slot B is for 5p coins.

The software of the machine has a function called `CoinValue` which takes a single character "A" or "B" and returns the value of a coin which has dropped in that slot as an integer. Any other character will produce an error.

State the result of evaluating each of the following expressions.

(i) `CoinValue("A")`

..... [1]

(ii) `CoinValue("B") = 5`

..... [1]

(iii) `CoinValue("AA")`

..... [1]

- (c) The machine records the coins that have been entered using a string of the characters A and B. (So "ABB" means that a 10p coin was entered followed by two 5p coins.)

The software in the machine uses the following recursive function.

```

01 BEGIN Function Calculate(CoinString)
02     IF Length of CoinString = 1 THEN
03         Calculate = CoinValue(CoinString)
04     ELSE
05         First = First Character in CoinString
06         Rest = All the characters in CoinString after the first
07         Calculate = CoinValue(First) + Calculate(Rest)
08     END IF
09 END Function
    
```

- (i) State what is meant by recursion.

.....
 [1]

- (ii) In which line of the algorithm does the recursion happen?

..... [1]

- (d) State the result of the function if it is called with the following arguments.

- (i) Calculate("AA")

..... [1]

- (ii) Calculate("BABAA")

..... [1]

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