UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5668596400

COMPUTING **9691/22**

Paper 2 **May/June 2011**

2 hours

Candidates answer on the Question Paper.

No additional materials are required.

SUITABLE FOR HEARING IMPAIRED CANDIDATES

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **11** printed pages and **1** blank page.

UNIVERSITY of CAMBRIDGE International Examinations

For Examiner's Use

1 Ahmed, a designer, stores the following details of each job that he does in a file.

- job ID (a whole number between 1 and 1000 inclusive)
- job description
- price (greater than $10 and not more than $5000)
- expected completion date
- paid (yes/no)

(a) Complete the following table.

Field Name	Data Type	Size of Field (bytes)
JobID		
JobDescription		
Price		
ExpectedCompletionDate		
Paid		

[10]

(b) The details of the last 200 jobs are stored in the file.

Estimate the size, in kilobytes, of the file. Show your working.

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..... [5]

For Examiner's Use

(c) Choose a high-level programming language. Now write the code to define the record type for the record structure in part **(a)**.

Language .....

Code .....

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..... [3]

(d) Some data will need to be validated when entered.

(i) State what is meant by validation.

.....

..... [1]

(ii) Describe **two** different validation checks that can be performed on the ExpectedCompletionDate field.

1 .....

.....

2 .....

..... [2]

(e) The logic statement to validate the Price field is (Price > 10) AND (Price <= 5000)

Write a similar logic statement to validate each of the following.

JobID .....

.....

Paid .....

..... [4]

For Examiner's Use

(f) The code for the validation will have to be tested.

State **four** items of data you would use to test the JobID validation.
State the reasons for using that test data.

	JobID value	Reason
Test 1		
Test 2		
Test 3		
Test 4		

[8]

2 Raul wants to write a program that will count the number of vowels in a word. He starts by writing some pseudocode that will count the number of letter 'a's.

```
1  INPUT Word
2  Count ← 0
3  LOOP FOR Index ← 1 TO length(Word)
4     IF Word(Index)='a'
5        THEN
6           Count ← Count + 1
7     ENDIF
8  ENDLOOP
```

(a) (i) Complete the trace table for this pseudocode using 'banana' as input.
The first seven rows have been filled in.

For Examiner's Use

Word	Count	Index	Word(Index)	Word(Index)= 'a'
banana				
	0			
		1		
			b	
				false
		2		
			a	

[6]

For Examiner's Use

(ii) Complete this trace table for the pseudocode using 'Ant' as input.

```
1  INPUT Word
2  Count ← 0
3  LOOP FOR Index ← 1 TO length(Word)
4     IF Word(Index)='a'
5        THEN
6           Count ← Count + 1
7     ENDIF
8  ENDLOOP
```

Word	Count	Index	Word(Index)	Word(Index)='a'
Ant				

[3]

(b) Raul wants uppercase 'A' to be counted as well as each lower case 'a'.

Re-write line 4 of the pseudocode so that every 'A' is included in the count.

.....

..... [2]

For Examiner's Use

(c) (i) The pseudocode has features that make it easy to understand. State **two** such features.

Feature 1 .....

.....

Feature 2 .....

..... [2]

Program code is to be produced from the pseudocode.

(ii) State **one** other feature that could be introduced to make the program code easy to understand.

.....

..... [1]

(iii) State **two** reasons why it is important for the program to be easily understood.

Reason 1 .....

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Reason 2 .....

..... [2]

For Examiner's Use

(d) Each letter in the alphabet has an ASCII code.

(i) What form does an ASCII code take?

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..... [1]

(ii) Describe how ASCII codes can be used to arrange two lower case letters in alphabetical order.

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..... [3]

(iii) Describe how two words (lower case letters only) can be arranged in alphabetical order.

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..... [4]

For Examiner's Use

3 Raul writes a program which will keep a tally of the number of times each letter appears in a given text. He uses an array of size 26 to store the totals for each letter. He then initialised each element of the array.

(a) What value should Raul give each element?

.....

[1]

(b) Define the array and initialise each element of the array using a high-level programming language of your choice.

Language .....

Code .....

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[4]

(c) Write the statements required to update the array when a letter has been read.

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[3]

For Examiner's Use

4 The following pseudocode is a recursive function where *n* is an integer.

```
FUNCTION  prod(n)
IF n = 1
   THEN
      prod ← 1
   ELSE
      prod ← n * prod(n-1)
ENDIF
RETURN
```

(a) (i) What value is returned by prod(1)?

.....

[1]

(ii) What value is returned by prod(3)?

.....

[1]

(b) (i) What happens if the parameter passed is -1?

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.....

.....

[2]

(ii) What changes will need to be made to the pseudocode to address the problem in **(b)(i)**?

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[2]

(c) Rewrite this function in pseudocode as an iterative function.

For Examiner's Use

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..... [4]

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