



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

CANDIDATE  
 NAME

CENTRE  
 NUMBER

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 NUMBER

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**COMPUTING**

**9691/21**

Paper 2

**May/June 2011**

**2 hours**

Candidates answer on the Question Paper.

No additional materials are required.

**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.







- (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

```





(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 .....

.....

Reason 2 .....

..... [2]

For  
Examiner's  
Use

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

For  
Examiner's  
Use

(i) What form does an ASCII code take?

.....  
..... [1]

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

.....  
.....  
.....  
.....  
.....  
.....  
..... [3]

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

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



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 .....

.....

.....

.....

.....

.....

.....

.....

..... [4]

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

.....

.....

.....

.....

.....

..... [3]

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?

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

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

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

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

*For  
Examiner's  
Use*

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

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