



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

CANDIDATE
 NAME

CENTRE
 NUMBER

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CANDIDATE
 NUMBER

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* 5 0 9 4 0 7 1 2 0 9 *

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.



(c) In a high-level programming language of your choice, write the code to define the record type for the record structure in part (a).

Language

Code

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [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 $(Price > 10) \text{ AND } (Price \leq 5000)$

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

JobID

.....

Paid

..... [4]

- (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]

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

For
Examiner's
Use

```

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]

(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.

(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]

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.

.....

.....

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.....

[4]

*For
Examiner's
Use*

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