

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education Advanced Subsidiary Level and Advanced Level

CANDIDATE NAME				
CENTRE NUMBER		CANDIDATE NUMBER		

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.



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

For Examiner's Use

- 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.
	(5)

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(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) AND (Price <= 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]

For Examiner's Use

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
```

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(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		
			а	

[6]

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

For Examiner's Use

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

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(c)	(i)	The pseudocode has features that make it easy to understand. State two such features.
		Feature 1
		Feature 2
		[2]
	Pro	gram 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]

(d)	Eac	h 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]

3

give	Il writes a program which will keep a tally of the number of times each letter appears in a en text. He uses an array of size 26 to store the totals for each letter. He then initialised h 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.

```
\label{eq:function} \begin{split} \text{FUNCTION} & & \text{prod}\,(n) \\ \text{IF } n = 1 \\ & & \text{THEN} \\ & & \text{prod} \leftarrow 1 \\ & & \text{ELSE} \\ & & \text{prod} \leftarrow n \ * \ \text{prod}\,(n-1) \\ \text{ENDIF} \\ \text{RETURN} \end{split}
```

		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 (b)(i) ?	in
			••••
			$\Gamma \cap I$

ewrite this function in pseudocode as an iterative function.	
	••••
	••••
	[4]
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