Surname	Centre Number	Candidate Number	
Other Names		2	



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B500U10-1





COMPUTER SCIENCE – Component 1Fundamentals of Computer Science

A.M. MONDAY, 6 June 2016 2 hours

For Examiner's use only		
	Maximum Mark	Mark Awarded
Total	100	

ADDITIONAL MATERIALS

The use of a calculator is permitted in this examination.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball point pen.

Write your name, centre number and candidate number in the space at the top of this page. Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the need for good English and orderly, clear presentation in your answers.

The total number of marks available is 100.

Answer all questions.

1. (a) Complete the truth table below.

[4]

A	В	A OR B	A AND B	A XOR B	A OR (NOT B)
0	0				
0	1				
1	0				
1	1				

(b) Using the following number:

101011112

Show how a logical operation can be used to discover the state of the most significant (leftmost) bit. [3]

Describe cache memory in a Central Processing Unit (CPU), giving advantages of using memory.	cache [5]
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4.	(a)	State what is meant by the term handshaking.	[1]	Examiner only
	(b)	Name a standard networking protocol, describing its function and importance.	[3]	
	•••••		· · · · · · · · ·	-
				B500U101

(a)	(i)	Using the example 131_{10} , calculate the storage requirements for an integer data type within an unsigned range of 0_{10} to 255_{10} .
	(ii)	In a certain computer system, numbers are represented using sign and magnitude Give the range for a signed integer data type with the same storage requirements as question 5 (<i>a</i>)(i).
(b)	Chai	racter and string are also primitive data types.
	(i)	Describe the use of standardised character sets, such as ASCII. [1]
	(ii)	Giving suitable examples, compare the storage requirements for a character and a string data type which uses a standard character set. [2]

6.

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systems analyst. [6]

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Giving suitable examples, explain how the Computer Misuse Act 1990 aims to improve data security. [3]

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(a)	Convert the hexadecimal numbers $3E_{16}$ and 27_{16} into two binary numbers and, usin binary addition, calculate the number that would result from adding them.
	Convert your answer into a denary number.
	You must show all of your workings.
•••••	

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(b)	Using the number -27 ₁₀ as an example, describe two's complement and sign an
(-)	magnitude representation in an 8-bit register. [5
•••••	
••••	
•••••	
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(c)	(i)	In a certain computer system, real numbers are stored in floating point form using
		two's complementation, an 8 bit mantissa and a 4 bit exponent.

						Ma	ant	tissa	a								ı	Ехр	one	ent		
	•	•																				
Con	ıve	rt th	ie i	nur	nbe	er 8	.75	5 ₁₀ ir	nto 1	this	floa	ıting	g poir	nt for	m.							
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9.	Write a linear	search algorithm	using pseudo-code	, for the following array.
•	vviile a iiiieai	ocaron aigontinin	, doining pocudo ocuc	, for the following array.

(0)	(1)	(2)	(3)	(4)	(5)	(6)
2	7	3	5	8	9	1

myArray

Your algorithm should output the position of the SearchValue if it is found or a suitable message if the SearchValue is not present in myArray.

Your algorithm should be written using self-documenting identifiers.								
	······································							
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	······································							

0.	Clearly showing each step, simplify the following Boolean expression: [6
	A.(A + C) + A.(C + B) + C.(C + B)

11.	Explain the concept of open source software. [4]	Examiner only

12.	Describe syntax analysis in the compilation process. [3]	Examiner only

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[1]

13. The following algorithm sorts integers stored in myArray. It will not work correctly under certain circumstances.

```
Start Procedure SortMyArray
1
2
      n is integer
3
      temp is integer
4
      swapped is boolean
5
6
                                 {returns the length of myArray}
      set n = length(myArray)
7
      repeat
8
            set swapped = FALSE
            for i = 0 to (n - 1)
9
10
                  if myArray[i] <= myArray[i + 1] then</pre>
11
                    temp = myArray[i + 1]
12
                    myArray[i + 1] = myArray[i]
13
                    myArray[i] = temp
14
                    swapped = TRUE
15
                  end if
            end for
16
17
      until (swapped = FALSE)
18
19
      End Procedure
```

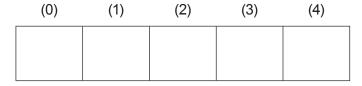
(a)	State the name given to this type of sort and describe its function.	[2]
•		
<u></u>		
• • • • • • • • • • • • • • • • • • • •		

(b) The following data is stored in myArray:

(0)	(1)	(2)	(3)	(4)
1	5	2	6	10

myArray

Show the effect that this algorithm will have on the data in the array below.



myArray

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	(c)	The algorithm will fai	il if mv∆rrav	contains	the following	r data
((6)	THE algorithm will lai	п п шунгтау	Contains	rije joliowiji	j uala.

(0)	(1)	(2)	(3)	(4)
131	4	0	-6	4

myArray

(i)	Explain why the algorithm will fail in this case.	[3]
<u></u>		
(ii)	Suggest a suitable change that could be made to the algorithm to overcome problem.	this [1]
•••••		

		ng features of a procedu		
(b) Descri	be the object-orie	nted approach to progran	nming.	
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			nming.	

5.	Different modes of operation are used for processing data in different operating systems.
	Giving a suitable application for each, describe the main features of two different modes of operation.
	In each case, discuss suitable input and output methods that could be used in the applications you have described.
	You should draw on your knowledge, skills and understanding from a number of areas across your Computer Science course when answering this question. [12]

Examiner only

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