Surname	Centre Number	Candidate Number
Other Names		2



GCE AS/A LEVEL

2500U10-1



COMPUTER SCIENCE – AS unit 1Fundamentals of Computer Science

MONDAY, 4 JUNE 2018 - MORNING

2 hours

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For Examiner's use only					
Question	Maximum Mark	Mark Awarded			
1.	4				
2.	3				
3.	8				
4.	8				
5.	9				
6.	5				
7.	5				
8.	8				
9.	9				
10.	11				
11.	11				
12.	8				
13.	11				
Total	100				

ADDITIONAL MATERIALS

A calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Answer all questions.

Write your name, centre number and candidate number in the spaces at the top of this page.

Write your answers in the spaces provided in this booklet. If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

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

The total number of marks available is 100.

Assessment will take into account the quality of written communication used in your answers.

Answer all questions.

1. Complete the following truth table.

[4]

Α	В	С	A OR C	B AND C	(A OR C) XOR (B AND C)	NOT ((A OR C) XOR (B AND C))
0	0	0				
0	1	0				
1	0	0				
1	1	0				
0	0	1				
0	1	1				
1	0	1				
1	1	1				

(a)	DHCP	1

(c)	HTTP	[1]
• • • • • • • • • • • • • • • • • • • •		

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2. State the use of the following network protocols:

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(a)	Describe the dangers that can arise from the	e use of computers to store personal data.
•••••		
•••••		
• • • • • • • • • • • • • • • • • • • •		
(b)	Describe processes that protect the security	and integrity of data.
(b)	Describe processes that protect the security	and integrity of data.
(b)	Describe processes that protect the security	and integrity of data.
	Describe processes that protect the security	

[8]	$A.(\overline{A}+B)+\overline{C}.(A+B)+A.(\overline{B}+C)$	+ <u>B</u> .B
	, , , ,	[8]

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5 .	(a)	Con	vert 31 $_{16}$ and 6D $_{16}$ into binary numbers and add them together using binary addition. [3]
	(b)	(i)	In a certain computer system, real numbers are stored in floating point form using two's complementation, a 12 bit mantissa and a 4 bit exponent.
			Convert the number 16.125 ₁₀ into this floating point form. [3]
		(ii)	In a different computer system, real numbers are stored in floating point form using two's complementation, a 5 bit mantissa and a 3 bit exponent.
			Showing your workings, calculate the largest positive denary number that this computer system can store. [3]

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PhoneRecycle allows customers to trade in their handsets in return for vouchers that can be spent in other retail stores.

The total number of handsets traded-in with each member of staff is recorded each month as shown in the grid below:

Staff	Total number of handsets recycled each month					month
Code	Jan	Feb	Mar	Apr	May	
001	34	43	23	51		
002	26	47	54	14		
003						

(a)	State the full name of this type of data structure and state why this structure is the rappropriate for <i>PhoneRecycle</i> .	nost [2]
(b)	State the most suitable data type for this structure.	[1]
(c)	PhoneRecycle also stores customer details. State the most suitable data structur store this information and justify your choice.	e to [2]

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7.	Certain central processing units (CPUs) use parallel processing and caching to improve performance.	ve
	Explain parallel processing and caching in a CPU.	5]

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8. *EuroTravel* is a travel agency that offers its customers the option of purchasing foreign currency.

Assume the conversion from pounds (£) into euros (€) is:

EuroTravel wants to be able to enter a value in pounds and provide its customers with a conversion into euros for each value £5 below and £5 above the initial value input.

For example, if the user inputs £500.00, the algorithm will output:

£495.00 = £564.30 £496.00 = £565.44 £497.00 = £566.58 £498.00 = £567.72 £499.00 = £568.86 £500.00 = £570.00 £501.00 = £571.14 £502.00 = £572.28 £503.00 = £573.42 £504.00 = £574.56 £505.00 = £575.70

Write an algorithm for *EuroTravel* to meet these requirements, using pseudo-code.

Your algorithm should be written using self-documenting identifiers.

[8]

	 	•••••••••••••••••••••••••••••••••••••••
 	 	••••••

(a)	Explain how these search algorithms operate.	[6]
(b)	Describe appropriate circumstances for the use of each search algorithm.	[3]
()		

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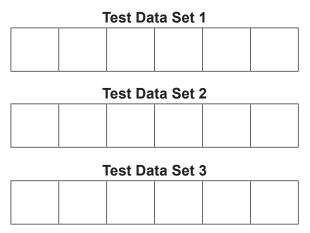
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10. The following bubble sort algorithm attempts to sort integers stored in myArray, but contains an error.

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

(a) Suggest appropriate test data to dry-run this type of algorithm in order to identify possible errors. [3]



(b)	w a bubble sort	-	-		[2]
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(c)	Explain why the bubble sort algorithm in this question will fail. [2]	Examiner only
(d)	Suggest a suitable change that could be made to the algorithm to overcome this problem [1]	i i
(e)	Name and describe a different sort algorithm. [3]	

(a)	Explain the use of a range of utility software in computer systems.	[5]
		••••••
(b)	Explain how an operating system manages computer resources.	[6]
(b)	Explain how an operating system manages computer resources.	[6]
(b)	Explain how an operating system manages computer resources.	[6]
(b)	Explain how an operating system manages computer resources.	[6]
	Explain how an operating system manages computer resources.	[6]
		[6]
		[6]

12.	Compare bespoke and off-the-shelf software. [8]	Examiner only
		•

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	10	
		Exa
3.	An analyst has been commissioned to produce a new computer based system for weather forecasting.	'
	Discuss the purpose of a feasibility study and describe the processes that an analyst would carry out during a feasibility study.	
	Describe the role of the computer in weather forecasting. [11]	

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