

AS Level Computer Science

H046/02 Algorithms and problem solving

Tuesday 14 June 2016 – Afternoon

Time allowed: 1 hour 15 minutes



Do not use: • a calculator		



First name	
Last name	
Centre number	Candidate number

INSTRUCTIONS

- Use black ink.
- · Complete the boxes above with your name, centre number and candidate number.
- · Answer all the questions.
- Write your answer to each question in the space provided.
- If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the barcodes.

INFORMATION

- The total mark for this paper is **70**.
- The marks for each question are shown in brackets [].
- Quality of extended responses will be assessed in questions marked with an asterisk (*).
- · This document consists of 16 pages.

its name and give a working example.
Construct 1:
Example:
Construct 2:
Example:
Construct 3:
Example:
[6]

iscuss the content of this policy and why it is required.	[9]

3	(a)	A software development company is planning to produce a bespoke monitoring system for a factory which produces hazardous chemicals. One testing strategy is whitebox testing.
		State the name of three other testing strategies that the company could use.
		1
		2
		3 [3]

(b)	The company decide to use whitebox testing. Justify why whitebox testing is used in this case.
	[3]

- (c) A temperature control system monitors and regulates temperature by switching a heater on or off. The temperature sensor of the system provides a reading accurate to 3 decimal places (e.g. 87.489). There are two warning lights, amber and red. The system controls the temperature and warning lights as follows:
 - The heater is turned off when the sensor reading is 97.500.
 - The heater is turned on when the sensor reading is 95.000.
 - The red warning light is on when the sensor reading is 98.100 or above.
 - The amber warning light is on when the sensor reading is outside the range 95.000 to 97.500 (inclusive), and the red warning light is **not** on.

Complete the boundary test table below.

Sensor value	Output	On/off
94.999	Amber light	on
95.000	Heater	
95.000	Amber light	
97.500	Heater	
97.500	Amber light	
97.501	Amber light	
98.099	Amber light	
96.099	Red light	
98.100	Amber light	
90.100	Red light	

4	(a)	Describe the steps involved in a binary search to find the value 47 in the list below.
		4, 7, 8, 21, 46, 47, 51
		[4]

(b)	A programmer has been tasked with writing a function that uses a binary search to return a Boolean value. The function should return \mathtt{true} if the target integer is found in a list of integers. Using pseudocode, write an algorithm for the function.
	[8]

(c) The target integer 8 exists in a list of integers 1, 4, 6, 9, 8, 12, 15 but is not found during a

bina	ry search. There are no errors in the code.
(i)	Give the reason why the target integer 8 is not found.
	[1]
(ii)	Identify and describe an alternative search algorithm that could be used.

(d)	between order with	two sub-system	nory, is being used to pass a single variable length ASCII string is. The string is placed in the stack one character at a time in reverse olding the number of characters pushed i.e the text "SILVER" would
		6	← Top
		S	· 10p
		I	
		L	
		V	
		E	
		R	
			a procedure that will take a text string passed to it and push it to the d above. You may assume any given input will fit in the stack.

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A car racing team uses a car simulator to test their drivers in a range of cars on different race

uac	JNO.
(a)	The car simulator uses an abstraction of the real car and race track. Identify two ways in which the simulator could use abstraction.
	1
	2
	[2]
(b)	Identify three inputs that will be required to configure the initial conditions for running the simulation.
	1
	2
	3[3]

5

(a) A programmer is going to design a procedure that will prompt for and receive two values, A and B. The procedure will then compare them. The procedure will also write a suitable message to a file on disk depending on whether:

• the values are the same
• A is less than B, or
• B is less than A.

Use pseudocode to write the procedure.

.....[5]

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(b) The code below uses a procedure:

```
name = "Sam"
  addMessage(name)
  print(name)
  procedure addMessage(inText:byVal)
     inText = "Hello " + inText
  endprocedure
  Explain why this program outputs Sam rather than Hello Sam.
(c) Explain the advantages of writing an application using a modular approach.
  .....[6]
```

7 Given the following pseudocode:

```
d = 5
   if ((a > b) OR (b >= c)) then
       if ((c < a ) XOR (c < b)) then // Check to see if one or the other
                                        // comparisons are TRUE, but not both
          d = 15
       else
          d = 16
       endif
   else
       d = 14
   endif
   print(d)
(a) State the value of d if a=42, b=41 and c=42
                                                                 .....
(b) State the value of d if a=42, b=36 and c=4
                                                                 .....
(c) State the value of d if a=42, b=36 and c=36
                                                                 .....
(d) Give one potential value of b if the output value of a=42, c=44
   and d=14.
                                                                 .....
                                                                            [4]
```

END OF QUESTION PAPER

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ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).		

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