



2.1.3 Corrective Maintenance

May/June 2004

3. (a) State the meaning of the following types of testing.

(i) White box testing.

[1]

Oct/NOV 2005

4. (a) When software is written, the code will probably contain errors.

Describe three methods or tools available for identifying program errors.

[6]

May/June 2007

6. D=1

INPUT X, E

B=E

C=E

FOR I = 1 TO (X-1)

INPUT A

IF A>B THEN B = A

ELSE IF A < C THEN C = A

END IF

END IF

D = D + 1

E = E + A

NEXT

F = E/D

OUTPUT B, C, F

END

(a) State the output values of B, C and F for the following input test data

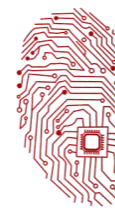
4, 6, 3, 7, 0

[3]

(b) Give three other different sets of test data, explaining what condition each is meant to test.

[3]





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Oct/NOV 2008

2. (b) (i) Describe the technique of white box testing.

[2]

Oct/NOV 2010. P11/P12

2. (c) Explain what is meant by:

(i) white box testing,

[2]

May/June 2011. P21/P22

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

- 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)

(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.

[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.

Job ID

Paid

[4]

(f) The code for the validation will have to be tested.

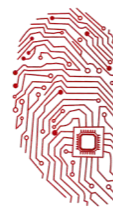
State four items of data you would use to test the `JobID` validation.

State the reasons for using that test data.

	JobID Value	Reason
Test 1		
Test 2		
Test 3		
Test 4		

[8]





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May/June 2011. P23

1 Jodelle needs to write program code that will check the password to her personal computer.

It checks each attempt to enter the password and closes the screen after three wrong attempts.

She wants the log-in screen to display:

- a request to enter the password
- space to enter the password
- how many attempts have been made
- a message if the log-in has been unsuccessful
- a means of returning to the previous screen

Jodelle first produces her solution using pseudocode. She wants the password to be 'poppy', the name of her cat.

Attempt \leftarrow 1

REPEAT

 INPUT Password

 Attempt \leftarrow Attempt +1

UNTIL Password = "poppy" OR Attempt = 3

IF Password = "poppy"

 THEN

 OUTPUT "password correct"

 ELSE

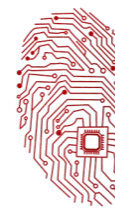
 OUTPUT "no valid password entered"

ENDIF

Jodelle needs to check whether this pseudocode works.

(b) Complete the final row of the trace table for this pseudocode using poppy as input.





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Write **five** sets of test data which test the module for different inputs/outcomes.

For each set of test data, give a reason for your choice.

	Day 1	Day 2	Day 3	Day 4	Day 5
Test 1					
Reason					
Test 2					
Reason					
Test 3					
Reason					
Test 4					
Reason					
Test 5					
Reason					

[10]

Oct/NOV 2012 P21

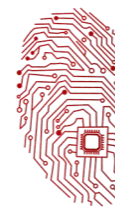
1 Soni works for a software house which has been asked to design software for a cycle hire company, Super Bikes.

Soni decides on the main tasks:

- collecting the information about new bikes
- entering details of repairs
- entering details of hirer
- entering details of payment

(g) (i) Soni will need to test the logic of this program module.





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State whether this is black box testing or white box testing.

[1]

Oct/NOV 2012 P23

Soni works for a software house which has been asked to design software for Super Bikes, a company that specialises in hiring out motorbikes.

1 Soni decides on the main tasks:

- enter bike details
 - bike specification
 - service history
 - hire rates
- enter bike hire details

(e) (i) All bike registrations are five characters long, and have the format BKXXX, where X is a digit.

For example, BK572 is a valid registration.

In a high-level programming language write code that will validate the format of a registration input into the variable BikeReg. [10]

(f) The code in part (e)(i) will be subject to black box testing and white box testing.

Explain how this testing will be carried out.

(ii) White box testing

Oct/Nov 2013.P22

1 Jemma is designing a program that will work out the end of year bonuses for her employees. The main steps are:

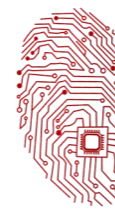
- input employee's data
- calculate the bonus
- calculate deductions
 - tax
 - optional contribution to charity
- print out the bonus

(d) Jemma is designing a range validation check for the input of an employee's pay. The pay range depends on the employee's job type, which may be P(part-time), F(full-time) or C(commission only).

- A part-time employee will earn between \$100 and \$10000 a year.
- A full-time employee will earn between \$5000 and \$50000 a year.
- A commission only employee will earn between \$0 and \$80000 a year.

Complete the table showing five more rows of test data. Give a different reason for each, describing what is being tested.





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Job type	Pay	Reason
F	25000	Normal data – within pay range for full-time

[5]

3 Aisha wants to write a program that checks the password to her personal computer. The program should check each attempt to enter the password correctly and should terminate after three wrong attempts.

She wants the log-in screen to display:

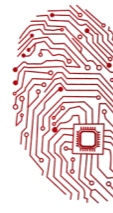
- a prompt to enter the password
- space to enter the password
- how many attempts have been made
- if the log-in has been successful or not
- a means of cancelling the log-in process

Aisha writes her first try at designing the code in pseudocode. She wants the password to be "Aisha", her name.

```
1  Attempt ← 0
2  REPEAT
3      INPUT Password
4      Attempt ← Attempt + 1
5  UNTIL (Password = "Aisha") OR (Attempt > 3)
6  IF Password = "Aisha"
7      THEN
8          OUTPUT "Password correct"
9      ELSE
10         OUTPUT "No valid password entered"
11  ENDIF
```

(b) (i) Complete the trace table using "Aisha" as input.





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Attempt	Password	Password = "Aisha"	Attempt > 3	Password = "Aisha" OR Attempt > 3	Output
0					
	Aisha				

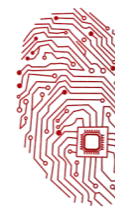
[3]

(ii) Complete the trace table using the following sequence of inputs:

"aisha", "Asha", "AISHA"

Attempt	Password	Password = "Aisha"	Attempt > 3	Password = "Aisha" OR Attempt > 3	Output
0					

[5]



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(c) This piece of code does not do what Aisha intended. There is an error.

(i) State the type of error.

[1]

(ii) There are several ways to correct this. One is to change line 5.

Rewrite line 5.

[1]

May/June 2015.P21/P22

3 A board game is designed for two players, O and X.

At the beginning, all cells of a 3 x 3 grid are empty.

The players take turns in placing their marker in an empty cell of the grid; player O always starts.

The game ends when one player completes a row, column or diagonal or the grid is full.

Here is one example after three turns:

		O
	O	X

Ali wants to write a program to play the game.

(h) When Ali has tested all individual modules he plans to do further testing. Give two types of testing Ali should do.

[2]

May/June 2015.P23

3 (a) Meena has written the algorithm below and wants to check that it works correctly.

```
FOR i ← 1 TO 4
```

```
    FOR j ← 1 TO 4
```

```
        IF Numbers[j] > Numbers[j + 1]
```

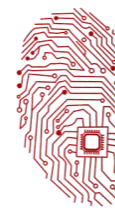
```
            THEN
```

```
                w ← Numbers[j]
```

```
                Numbers[j] ← Numbers[j + 1]
```

```
                Numbers[j + 1] ← w
```





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ENDIF

ENDFOR

ENDFOR

(b) Meena has written the algorithm with some features that make it easier to understand.

(i) State one such feature.

[1]

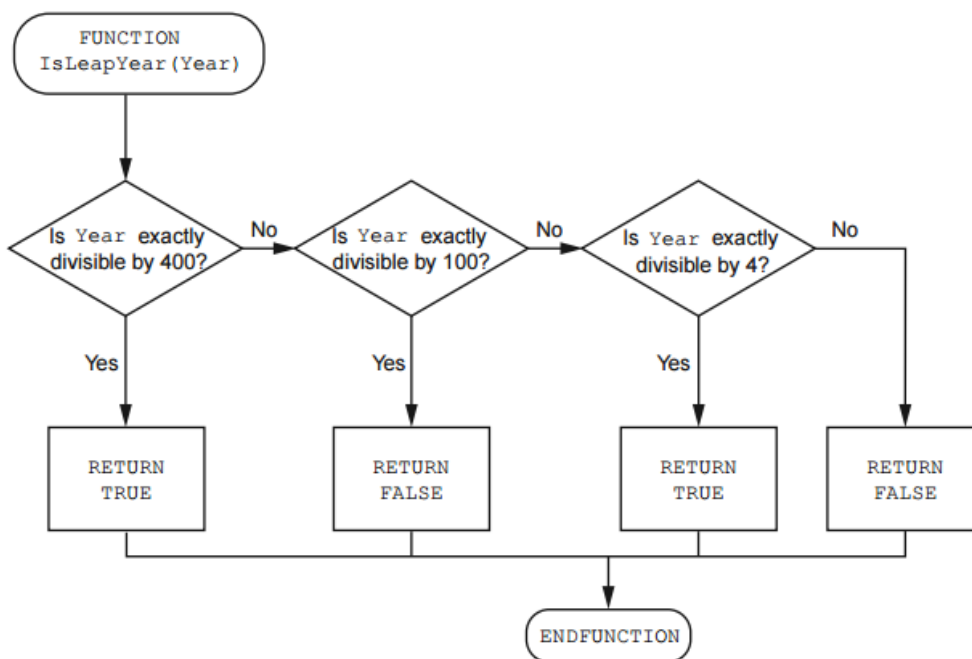
(ii) State one other feature that Meena could introduce to this algorithm to make it easier to understand.

[1]

4 A leap year is a year with special numerical properties.

Ahmed is planning to write a function to check whether a year is a leap year.

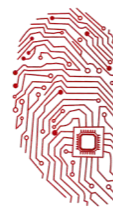
He starts by drawing a flowchart.



(b) Ahmed wants to carry out white box testing of the function.

Give four integers which thoroughly test the function. For each one, give the expected return value and justify your choice.





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	Year	Expected return value	Justification
1		
2		
3		
4		

[4]

(c) When Ahmed has tested the function, he plans to use it in a program.

Give **two** types of testing that Ahmed could do with the completed program.

[2]





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Computer Science (9608)

May/June 2015. P22/23

1 A marathon runner records their time for a race in hours, minutes and seconds.

An algorithm is shown below in structured English.

INPUT race time as hours, minutes and seconds

CALCULATE race time in seconds

STORE race time in seconds

OUTPUT race time in seconds

(c) The program code will be tested using white-box testing. (i) Explain what is meant by white-box testing. [2]

(ii) Complete the table heading. Complete Test Number 1.

Add the data for Test Number 2 and Test Number 3.

Test number	Input values				Output	
	Race hours	Race minutes	Race seconds	Total time (seconds)	Message
1	3	4	13	11053	11053	
2				11053		
3				11053		

[6]

Oct/Nov 2016. P21/P23

2 A sensing device sends bit values to a computer along data channels.

- Channel 1 transmits a sequence of binary values from a sensor
- Channel 2 transmits at regular intervals to indicate whether the sensor is switched on or off:
- 0 indicates switched off
- 1 indicates switched on

A program tests the bits received from the sensing device.

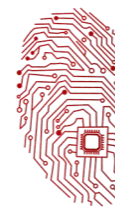
A program reads the signal from Channel 2 after every six values from Channel 1.

A built-in function READ (<ChannelNumber>) reads a value from the specified channel.

Pseudocode for the program is as follows:

```
01 BitCount 0
02 Status2 READ(2)
03 WHILE Status2 = 1
04
```





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Oct/Nov 2016. P22

2 You will need to refer to the list of pseudocode string-handling functions in the **Appendix**.

A computer program is to simulate the reading and processing of a string of characters from an input device.

The character string consists of:

- a number of digit characters
- one or more `<*>` characters, each used as a separator
- a final `<#>` character.

A typical input character sequence, stored as `InputString` is:

13*156*9*86*1463*18*#

Study this pseudocode.

```
01 DECLARE Numbers ARRAY [1:100] OF INTEGER
02 DECLARE InputString : STRING
03 DECLARE NextChar : CHAR
04 DECLARE NextNumberString : STRING
05 DECLARE i : INTEGER // Numbers array index
06 DECLARE j : INTEGER // InputString index
07
08 OUTPUT "String ... "
09 INPUT InputString
10 j ← 1
11 NextChar ← ONECHAR(InputString, j)
12
13 i ← 1
14 WHILE NextChar <> '#'
15     NextNumberString = ""
16     WHILE NextChar <> '*'
17         NextNumberString ← NextNumberString & NextChar
18         j ← j + 1
19         NextChar ← ONECHAR(InputString, j)
20     ENDWHILE
21
22     // store the next integer to the array
23     Numbers[i] ← TONUM(NextNumberString)
24     i ← i + 1
25     j ← j + 1
26     NextChar ← ONECHAR(InputString, j)
27 ENDWHILE
28
29 CALL DisplayArray()
```

(d) (i) Complete the trace table below for the given pseudocode as far as line 27.

The input string is: 23*731*5*#



