QUESTION 7.



Ар	rogrammer uses an integrated Development Environment (IDE) for all program development.
(i)	Describe what is meant by an IDE.
	[2]
(ii)	Name three features you would expect to be available in an IDE to help initial error detection or debugging.
	1
	2
	3
	্রি

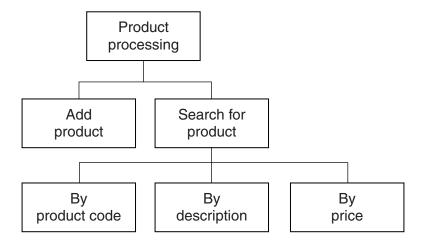
QUESTION 8.

4 A company employs Ahmed as a programmer.

- (a) At College, before joining the company, Ahmed used two items of software for pro-
 - · a text editor
 - a compiler

	Describe how he could have developed programs using these software tools.			
Include in the description the terms 'object code' and 'source code'.				
		[3]		
(b)	Ahn	ned now uses an Integrated Development Environment (IDE) for programming.		
	(i)	State one feature an IDE provides to help with the identification of syntax errors.		
		[1]		
	(ii)	State one feature an IDE provides to carry out white box testing.		
		[1]		
		[1]		

(c) The company maintains a file of product data. Ahmed is to write a program to add a new product and search for a product based on the structure diagram shown:



The program records the following data for each product:



- product code
- product description
- product retail price

The text file PRODUCTS stores each data item on a separate line, as shown below:

File PRODUCTS

0198
Plums(10kg)
11.50
0202
Onions(20kg)
10.00
0376
Mango chutney(1kg)
02.99
0014
Mango (10kg)
12.75

The program uses the variables shown in the identifier table.

Identifier	Data type	Description
PRODUCTS	TEXT FILE	Storing the code, description and retail price for all current products
PCode	ARRAY[1:1000] OF STRING	Array storing the product codes
PDescription	ARRAY[1:1000] OF STRING	Array storing the product descriptions
PRetailPrice	ARRAY[1:1000] OF REAL	Array storing the product retail prices
i	INTEGER	Array index used by all three arrays

	15		
(i)	The first operation of the program is to read a and write them into the three 1D arrays.	Ill the product data held in	
	Complete the pseudocode below.		
	OPEN		
	i ← 1		
	WHILE		
	READFILE ("PRODUCTS",		
	READFILE ("PRODUCTS",		
	READFILE ("PRODUCTS",		
	ENDWHILE		
	CLOSE "PRODUCTS"		
	OUTPUT "Product file contents writ	ten to arrays"	[5
			وا
	nen Ahmed designed the PRODUCTS file, considered the alternative file structure	File PRODUCTS	
_	own opposite.	0198 Plums(10kg)	L1.50
It s	tores one product per line in the text file.	0202 Onions(20kg)	10.00
		0376 Mango chutney(1kg)()2.99
		0014 Mango(10kg)	12.75
(ii)	State one benefit and one drawback of this file	a design	

Benefit

Drawback

.....[2]

(d) To code the 'Search by product code' procedure, Ahmed draws a structure codifferent stages.

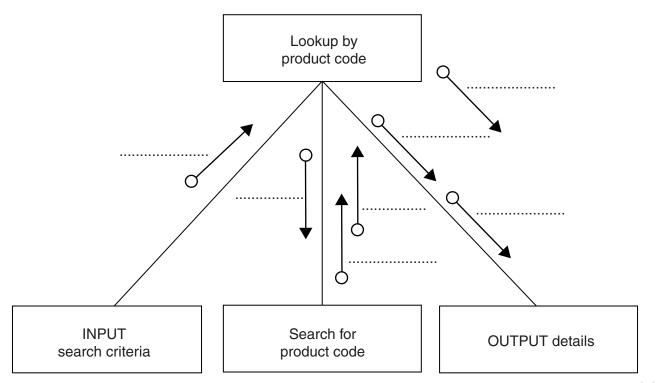


The procedure uses the variables shown in the identifier table.

Identifier	Data type	Description
SearchCode	STRING	Product code input by the user
ThisIndex	INTEGER	Array index position for the corresponding product
ThisDescription	STRING	Product description found
ThisRetailPrice	REAL	Product retail price found

You can assume that before the procedure is run, all the product data is read from file PRODUCTS and then stored in three 1D arrays as described in part (c)(i).

Label the structure chart to show the input(s) and output(s).



(e) A first attempt was made at writing the 'Search for product code' module.

Ahmed designs this as a function ProductCodeSearch.



The function returns an integer value as follows:

- if the product code is found, it returns the index position of the 1D array PCode be, searched
- if the product code is not found, the function returns -1

Write program code for function ProductCodeSearch.

Python: You should show a comment statement for each variable used with its data type.
Programming language

QUESTION 9.

3 (a) A multi-user computer system stores information about users. It use UserNameArray, of type STRING. There are 100 elements in the array.



The format of the string in each element of the array is as follows:

<UserID><UserName>

- UserID is a six-character string of numerals.
- UserName is a variable-length string.

Write pseudocode for a procedure, BubbleSort, to perform an efficient bubble sort on UserNameArray. The array is to be sorted in ascending order of UserID.
You should assume that UserNameArray has been declared as a global variable.

[8]

(b) The value of UserID should be unique for each user but a problem have repeated UserID values may have been issued.



The array is sorted by UserID, so any repeated UserID values will appear in conarray elements.

A procedure, FindRepeats is required.

This will:

- compare each element with the previous element and output the <code>UserID</code> and <code>UserName</code> if the <code>UserID</code> is repeated
- output the total number of UserIDs that are repeated.

For example, the UserNameArray contains the following entries.

Array element	Comment
122222Jim Moriarty	
123456Fred Smith	
123456Eric Sykes	Repeated User ID
123456Kevin Turvey	Repeated User ID
222244Alice Chan	
222244Myra Singh	Repeated User ID
333333Yasmin Halim	

For this example, the output is:

123456Eric Sykes 123456Kevin Turvey 222244Myra Singh There are 3 repeated UserIDs

If no repeated UserIDs are found, the output is:

The array contains no repeated UserIDs

You should assume that UserNameArray has been declared as a global varia.
Visual Basic and Pascal: You should include the declaration statements for variables Python: You should show a comment statement for each variable used with its data type
Programming language
Program code
[8]

(c) ((i)	The FindRepeats procedure forms part of a program.	1
		Name three stages in a program development cycle.	
		1	
		2	
		3	
			[3]
(i	ii)	The program containing FindRepeats will be created using an IDE.	
		State what is meant by IDE.	
			.[1].
(ii	ii)	Name two features provided by an IDE that assist in the program development cycle	
		1	
		2	
			[2]
(iv	v)	The procedure, FindRepeats, is written assuming there are 100 elements UserNameArray.	in
		In the main program, the global array, <code>UserNameArray</code> , has been declared with constant to the second secon	nly
		State the type of error this will cause.	
			[1]

4 Programming languages provide built-in functions to generate random numbers.

To be truly random, the frequency of each number generated should be the same.



You are required to write program code to test the random number generator of your language.

The test should:

- generate a given number of random numbers between 1 and 10 inclusive
- keep a count of the number of times each number is generated
- calculate the expected frequency of each number 1 to 10
- output the actual frequency of each number 1 to 10
- output the difference between the actual frequency and the expected frequency.

The program code should be written as a procedure. In pseudocode, the procedure heading will be:

```
PROCEDURE TestRandom (Repetitions AS INTEGER)
```

The parameter, Repetitions, contains a value representing the total number of random numbers that should be generated.

The following example shows the expected output for the procedure call, TestRandom(200).

The expected frequency is 20.

Number	Frequency	Difference	
1	17	-3	
2	21	1	
3	12	-8	
4	28	8	
5	20	0	
6	19	-1	
7	21	1	
8	16	-4	
9	24	4	
10	22	2	

(a)	Write program code for the procedure, TestRandom.
	Visual Basic and Pascal: You should include the declaration statements for variab. Python: You should show a comment statement for each variable used with its data.
	Programming language
	Program code

(b)	Name three features of a typical IDE that would help a programmer to debug
	Explain how each of these could be used in the debugging of the TestRandom from part (a).
	Feature 1
	Explanation
	Feature 2
	Explanation
	'
	Feature 3
	Explanation
	[6]
(c)	The procedure is developed and run using the call <code>TestRandom(200)</code> . No system errors are produced.
	To ensure that the procedure works correctly, you need to check the output.
	Describe two checks you should make to suggest the program works correctly.
	1
	2

QUESTION 11.

(a) A student is learning about arrays. She wants to write a program to:



- search through a 1D array of 100 elements count the number of elements that contain the string "Empty"
- output the number of elements containing "Empty" together with a suitable messay

Use structured English to describe the algorithm she could use.
She uses the process of stepwise refinement to develop her algorithm.
Explain this process.
Explain this process.
[

(c)	The student is learning about file handling.
	She has been told that there are different file modes that can be used when ope file. She wants to make sure that the existing contents are not deleted when the file is
	Identify two file modes she could use and describe their use.
	Mode
	Description
	Mode
	Description
	[4]
(d)	The student has completed the design of her program and is ready to use an Integrated Development Environment (IDE).
	Describe the features of an IDE that she can use to write, translate and test her program.
	[3]



Question 3 begins on the next page.

QUESTION 12.

(a) A structure chart is often used in modular program design. One feature shown of module execution. State **four** other features that may be shown. Feature 1 Feature 2 Feature 3 Feature 4 [4] (b) Identify and describe one feature of an Integrated Development Environment (IDE) that can help with program presentation. Feature Description [2] (c) By value is one method of passing a parameter to a subroutine. Identify and describe the other method. Method Description [2] (d) Explain the term adaptive maintenance.

.....[2]

QUESTION 13.

(a) Describe the program development cycle with reference to the following:

<u> </u>	

•	source	code

_	a b		
•	OD	lecι	code

	object code	
	corrective maintenance.	
	• corrective maintenance.	
		[3]
		1-1
/I- \	IN Ohio Money forthweet of an Internated Developmen	at Facility and (IDF) that are halo with
(b)		nt Environment (IDE) that can help with
	initial error detection while writing the program.	
	1	
	2	
	3	
		[3]
		[၁]