QUESTION 7.

3 When the guarantee on a computer runs out, the owner can take out insurance to c
and repairs.

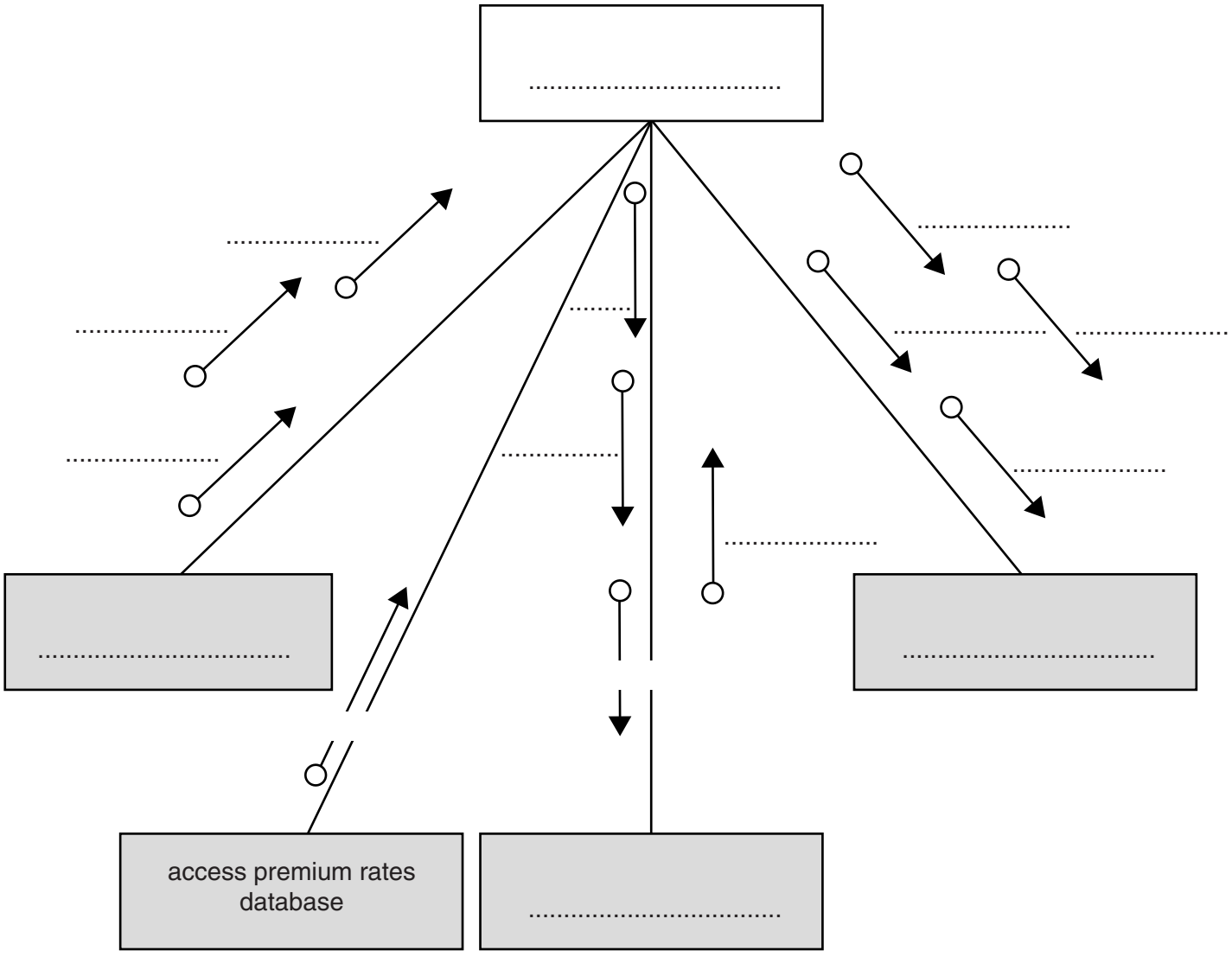
The price of the insurance is calculated from:

- the model of the computer
- the age of the computer
- the current insurance rates

Following an enquiry to the insurance company, the customer receives a quotation letter with the price of the insurance.

A program is to be produced.

The structure chart below shows the modular design for this process:



(a) Using the letters **A** to **D**, add the labelling to the chart boxes on the opposite

Modules	
A	Send quotation letter
B	Calculate price
C	Produce insurance quotation
D	Input computer details

[2]

(b) Using the letters **E** to **J**, complete the labelling on the chart opposite.

Some of these letters will be used more than once.

Data items	
E	`CustomerName`
F	`CustomerEmail`
G	`Model`
H	`Age`
I	`PolicyCharge`
J	`PolicyNumber`

[4]

QUESTION 8.

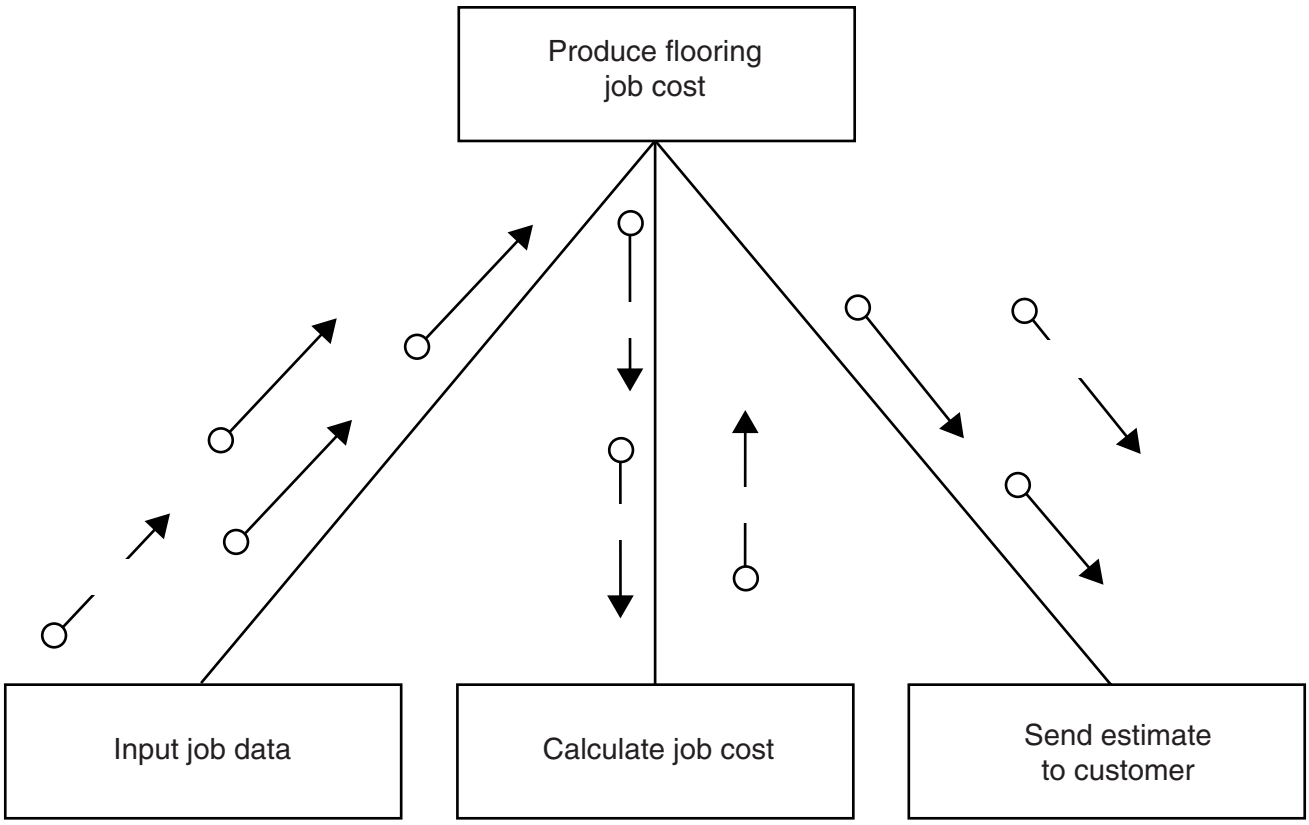
3 A flooring company provides for each customer an estimated price for a new j
given a Job ID.

The job cost is calculated from the length (nearest metre) and width (nearest metre) of th

The process for calculating the price is as follows:

- the floor area is calculated with 18% added to allow for wastage
- the job cost is calculated at $50 per square metre

The structure chart shows the modular design for a program to produce a new job cost.



(i) Give the data items corresponding to the labels A to E in the structure chart.

A .....

B .....

C .....

D .....

E .....

[5]

(ii) The procedure below is one of the modules shown on the structure cha

Parameters can be passed 'by value' or 'by reference'.

Complete the procedure header below showing for each parameter:

- its parameter passing mechanism
- its identifier
- its data type

```
PROCEDURE CalculateJobCost( .....
                            .....
                            .....
                            ..... )
  JobCost ← (Length * Width * 1.18) * 50
ENDPROCEDURE
```

[5]

QUESTION 9.

4 **(a)** Structured programming involves the breaking down of a problem into modu

Give **two** reasons why this is done.

1 .....

.....

2 .....

.....

[2]

(b) A team needs to write a program to implement an online shopping system. Customers will access the program via a website.

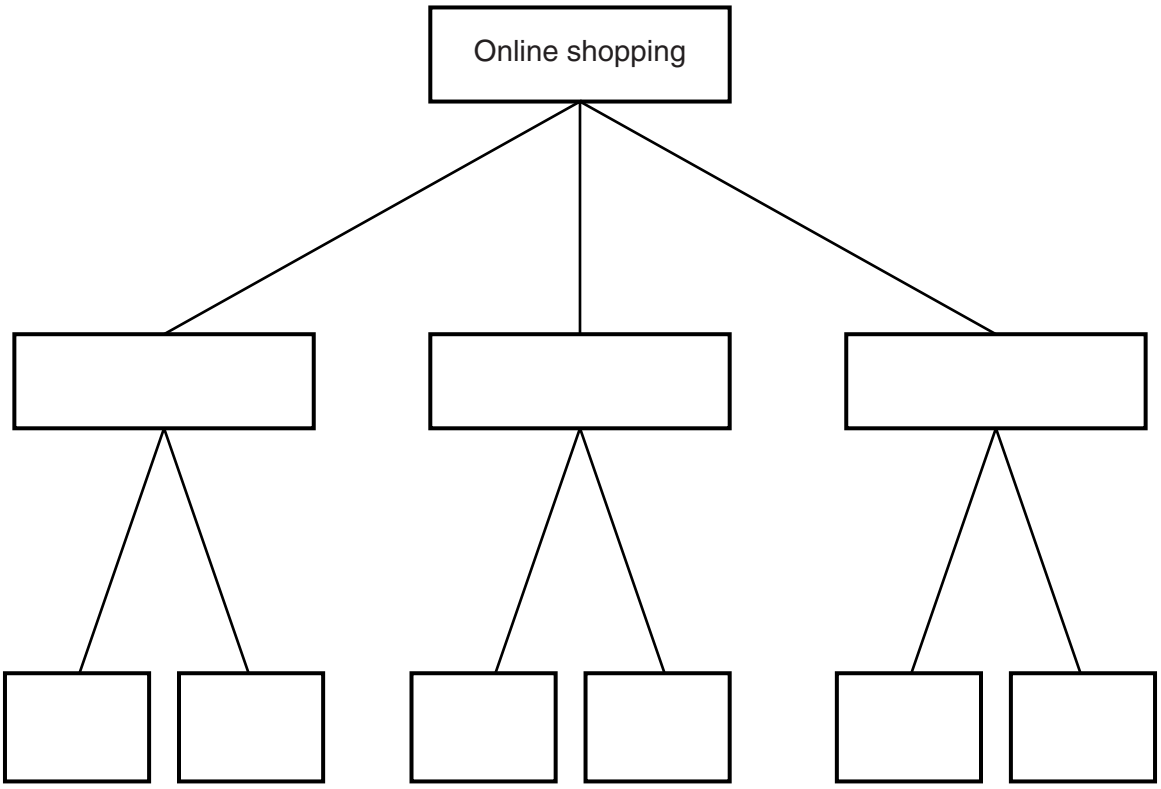
Customers can search for items before adding them to a virtual shopping basket. When they have finished shopping, they pay for the items. The program provides output for the dispatch of the items.

Some of the key features of the system are as follows:

- a customer can add many items to the shopping basket
- payment may be either by credit or debit card, or by adding to a customer account
- the shop may dispatch the items in one or more packages

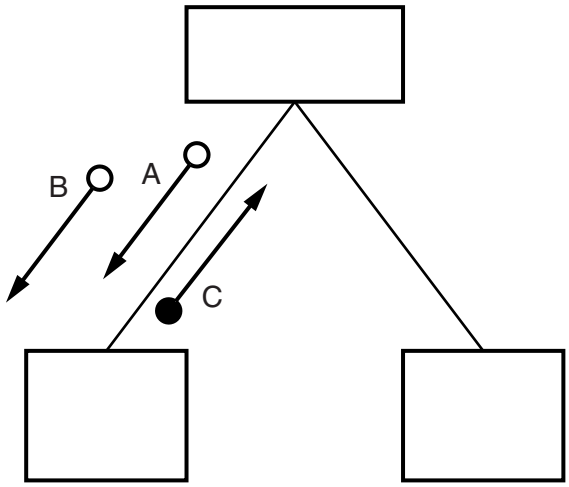
The structure chart below shows the program modules only.

(i) Draw on the chart, the symbols that represent the key features listed in **part (b)** above.



[3]

(ii) A section of the chart in **part (b)(i)** is shown below. It is to show the pa
between the Checkout and Card payment modules.



Name the three data items corresponding to the arrows.

Arrow	Data item
A	
B	
C	

[3]

Question 5 begins on page 13.

QUESTION 10.

4 **(a)** Name **two** features of your chosen high-level programming language t… implementation of a modular design.

1 .....

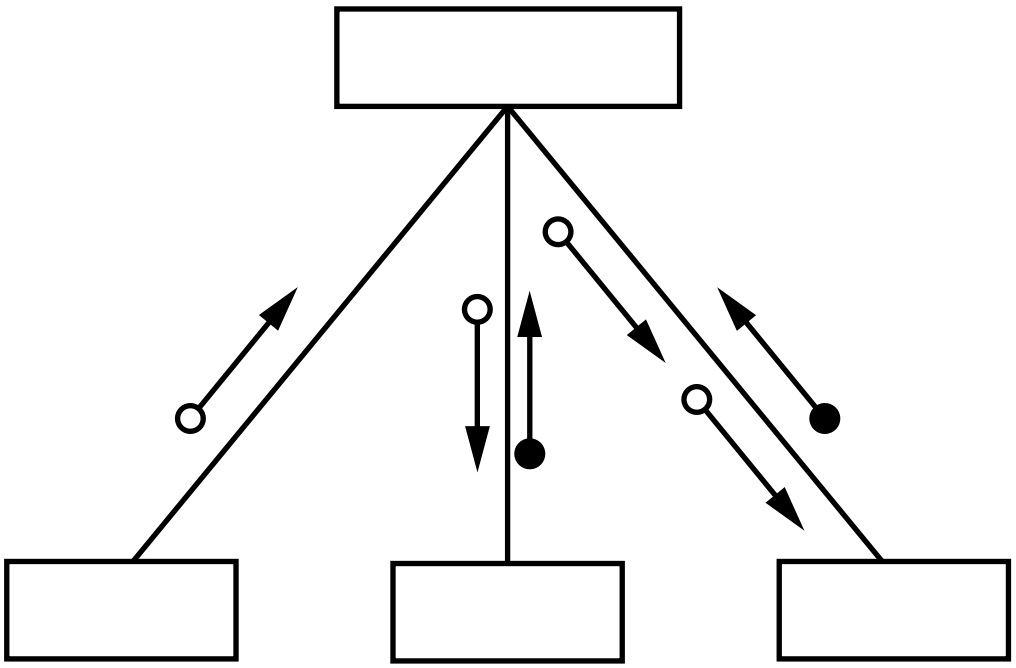
2 .....

[2]

(b) **(i)** The structure chart shows part of the design of a program for an online shopping system.

The user has already added a number of products to their virtual basket.

Draw on the chart, the symbol to show that the process of modifying the basket contents may be iterated (repeated).



[1]

(ii) Each arrow in the structure chart above represents a parameter.

The table below shows the three data items that the six parameters pass between modules.

Tick (✓) to match each parameter to the correct data item.

Data item	Parameter					
	A	**B**	**C**	**D**	**E**	**F**
Product ID						
Quantity						
Flag Value – indicating operation success or fail						

[4]

QUESTION 11.

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) Ahmed now uses an Integrated Development Environment (IDE) for programming.

(i) State **one** feature an IDE provides to help with the identification of syntax errors.

.....

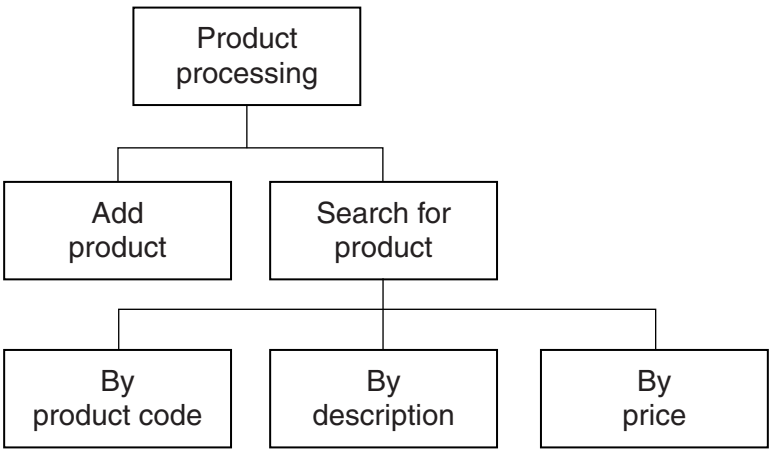
.....[1]

(ii) State **one** feature an IDE provides to carry out white box testing.

.....

.....[1]

(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

(i) The first operation of the program is to read all the product data held i
and write them into the three 1D arrays.

Complete the pseudocode below.

```
OPEN .....

i ← 1

WHILE .....

  READFILE ("PRODUCTS", .....)

  READFILE ("PRODUCTS", .....)

  READFILE ("PRODUCTS", .....)

  .....

  .....

ENDWHILE

CLOSE "PRODUCTS"

OUTPUT "Product file contents written to arrays"
```

[5]

When Ahmed designed the `PRODUCTS` file, he considered the alternative file structure shown opposite.

It stores one product per line in the text file.

File **PRODUCTS**

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

(ii) State **one** benefit and **one** drawback of this file design.

Benefit .....

.....

Drawback .....

.....[2]

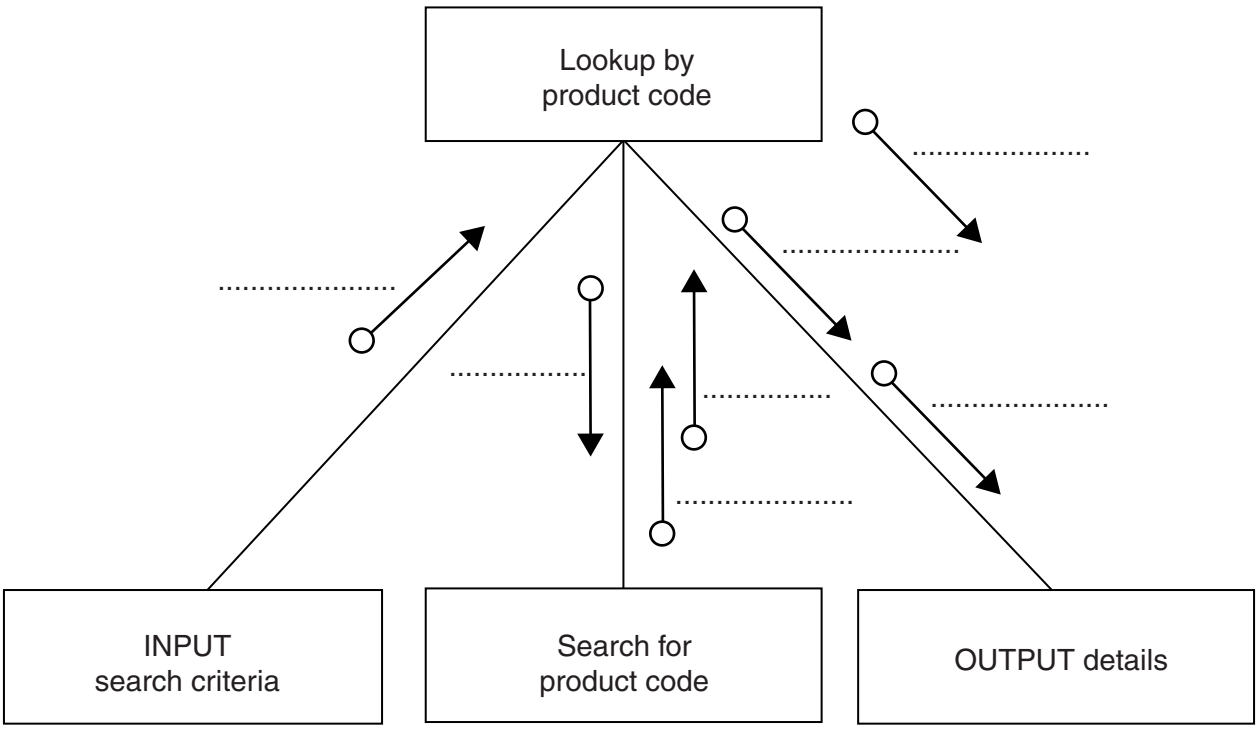
(d) To code the 'Search by product code' procedure, Ahmed draws a structure c… different stages.

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).



[4]

(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`.

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 .....

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.....[6]

QUESTION 12.

4 **(a)** A structure chart is a tool used in modular program design.

State **three** pieces of information that a structure chart can convey about a progra

1 .....

.....

2 .....

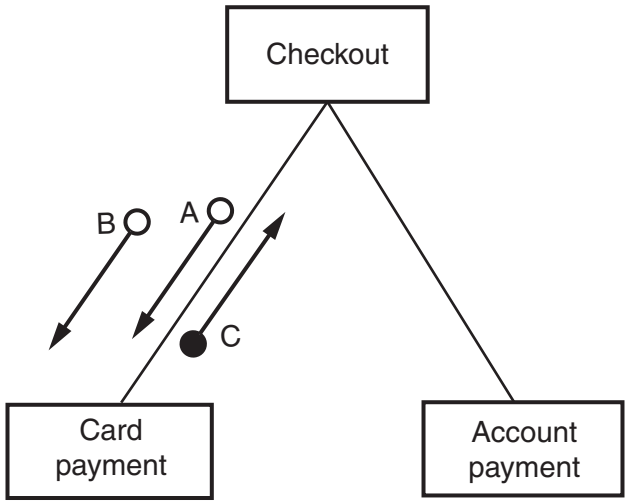
.....

3 .....

.....

[3]

(b) The following diagram shows part of a structure chart.



Examples of the data items that correspond to the arrows are given in this table:

Arrow	Data item
A	`234.56`
B	`"Mr Robert Zimmerman"`
C	`True`

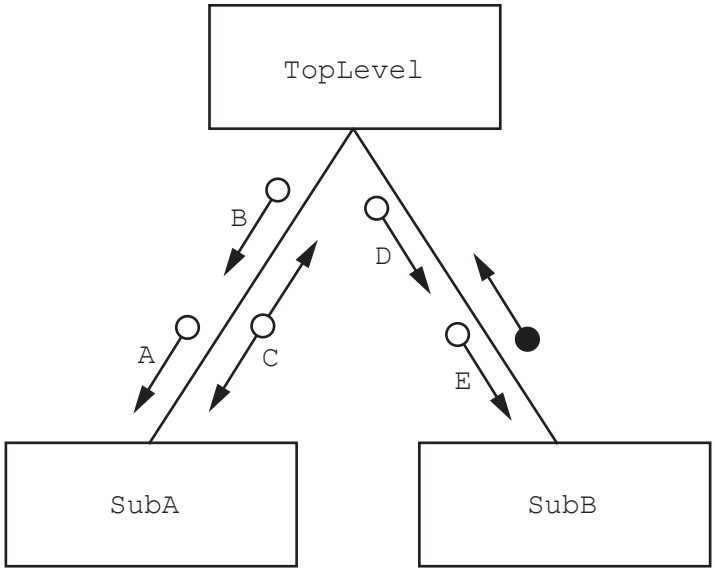
Use **pseudocode** to write the function header for the **Card payment** module.

.....

.....[3]

QUESTION 13.

3 The following structure chart shows the relationship between three modules.



Parameters `A` to `E` have the following data types:

```
A, D : STRING
C    : CHAR
B, E : INTEGER
```

(a) (i) Write the **pseudocode** header for module `SubA()`.

.....

.....

..... [3]

(ii) Write the **pseudocode** header for module `SubB()`.

.....

.....

..... [3]

(b) Module hierarchy and parameters are two features that may be represented on a structure chart.

State **two other** features than can be represented.

Feature 1 .....

Feature 2 .....

[2]

Question 4 begins on the next page.

QUESTION 14.

3 The following pseudocode represents three separate modules from an algorit
module contents are not shown.

```
FUNCTION Search(AA : INTEGER, BB : STRING) RETURNS INTEGER
  /
ENDFUNCTION


FUNCTION Allocate() RETURNS BOOLEAN
  /
ENDFUNCTION


PROCEDURE Enable(CC : INTEGER, BYREF DD : INTEGER)
  /
ENDPROCEDURE
```

A fourth module, `Setup()`, refers to the previous three modules as follows:

```
PROCEDURE Setup()
/
  WHILE Authorised = TRUE
    /
    ThisValue ← Search(27, "Thursday")
    /
    Authorised ← Allocate()
    /
    CALL Enable(ThisValue, 4)
    /
  ENDWHILE
/
ENDPROCEDURE
```

(a) Draw a structure chart to show the four modules and the parameters that the… them.

[6]

(b) The algorithm is implemented in a high-level language. Changes are required and the program is given to Albert, who is an experienced programmer. He is not familiar with the language that has been used.

Explain why Albert would be able to understand the program.

.....

.....

.....

..... [2]

QUESTION 15.

2 **(a)** A structure chart is often used in modular program design. One feature shown is the order 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 16.

5 The module headers for three modules in a program are defined in pseudocode a

Pseudocode module header
`PROCEDURE Lookup(P4 : INTEGER, BYREF M4 : STRING)`
`FUNCTION Update(T4 : INTEGER) RETURNS INTEGER`
`FUNCTION Validate(S2 : INTEGER, P3 : STRING) RETURNS BOOLEAN`

A fourth module, `Renew()`, calls the three modules in the following sequence.

```
Validate()
Lookup()
Update()
```

Draw a structure chart to show the relationship between the four modules and the parameters passed between them.

[7]

Question 6 begins on the next page.

QUESTION 17.

3 Three program modules process updating of passwords in a file. A description of
between the modules is summarised as follows:

Module name	Description
`GetPassword()`	• Takes two parameters: `AccountID` and `OldPassword` • Returns a string containing the new password
`UpdateFile()`	• Takes two parameters: `AccountID` and `NewPassword` • Returns a Boolean value to indicate whether or not the update was successful
`ChangePassword()`	• Calls `GetPassword()` to obtain the new password then calls `UpdateFile()` to write the new password to the file

Draw a structure chart to show the relationship between the three modules and the parameters passed between them.

[5]