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**9618/02**

**For examination from 2021**

**2 hours**

\* 0 1 2 3 4 5 6 7 8 9 \*

You will need: Insert (enclosed)

- Answer **all** questions.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use an HB pencil for any diagrams, graphs or rough working.
- Calculators must **not** be used in this paper.

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.
- The insert contains all the resources referred to in the questions.

This document has **14** pages. Blank pages are indicated.

- 1 (a) Program variables have values as follows:

| Variable   | Value     |
|------------|-----------|
| Today      | "Tuesday" |
| WeekNumber | 37        |
| Revision   | 'C'       |
| MaxWeight  | 60.5      |
| LastBatch  | TRUE      |

- (i) Give an appropriate data type for each variable.

| Variable   | Data type |
|------------|-----------|
| Today      |           |
| WeekNumber |           |
| Revision   |           |
| MaxWeight  |           |
| LastBatch  |           |

[5]

- (ii) Evaluate each expression in the following table.  
If an expression is invalid then write ERROR.

Refer to the **Insert** for the list of pseudocode functions.

| Expression                            | Evaluates to |
|---------------------------------------|--------------|
| MID(Today, 3, 2) & Revision & "ape"   |              |
| INT(Maxweight + 4.2)                  |              |
| LENGTH(MaxWeight)                     |              |
| MOD(WeekNumber, 12)                   |              |
| (Revision <= 'D') AND (NOT LastBatch) |              |

[5]

- (b) Simple algorithms usually consist of input, process and output.

Complete the table to show if each statement is an example of input, process or output.  
Place one or more ticks (✓) for each statement.

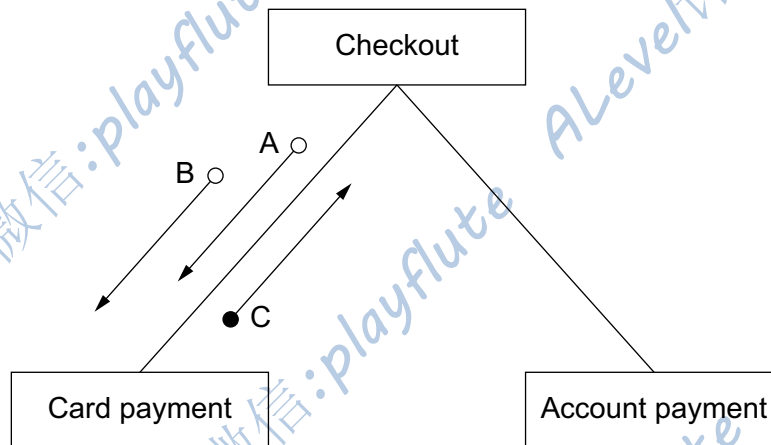
| Item | Statement                              | Input | Process | Output |
|------|----------------------------------------|-------|---------|--------|
| 1    | SomeChars ← "Hello World"              |       |         |        |
| 2    | OUTPUT RIGHT(SomeChars, 5)             |       |         |        |
| 3    | READFILE MyFile, MyChars               |       |         |        |
| 4    | WRITEFILE MyFile, "Data is " & MyChars |       |         |        |

[4]

[4]

[4]

- 2 Roberta downloads music from an online music store. The diagram shows part of a structure chart for the online music store program.



- (a) State **three** items of information that the diagram shows about the design of the program.

1 .....

2 .....

3 .....

[3]

- (b) Examples of the data items that correspond to the arrows are given in the table.

| Arrow | Data item          |
|-------|--------------------|
| A     | 234.56             |
| B     | "Ms Roberta Smith" |
| C     | TRUE               |

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

.....

.....

[3]

- 3 A stack is created using a high-level language. The following diagram represents the current state of the stack. The Top of Stack pointer points to the last item added to the stack.

| Address | Value | Pointer      |
|---------|-------|--------------|
|         |       |              |
| 99      |       |              |
| 100     |       |              |
| 101     | E     | ← TopOfStack |
| 102     | D     |              |
| 103     | C     |              |
| 104     | B     |              |
| 105     | A     |              |

- (a) Two operations associated with this stack are `PUSH()` and `POP()`.

Describe these operations with reference to the diagram.

`MyVar = POP()`

.....

.....

.....

`PUSH('Z')`

.....

.....

.....

[4]

- (b) Two programs use a stack to exchange data. Program `AddString` pushes a string of characters onto the stack one character at a time. Program `RemoveString` pops the same number of characters off the stack, one character at a time. The string taken off the stack is different from the string put on the stack.

Explain why the strings are different.

.....

.....

.....

[2]

- 4 (a) Parameter  $x$  is used to pass data to procedure `MyProc` in the following pseudocode:

```

 $x \leftarrow 4$ 
CALL MyProc( $x$ )
OUTPUT  $x$ 

```

$\int$

```

PROCEDURE MyProc( $x$  : INTEGER)
 $x \leftarrow x + 1$ 
OUTPUT  $x$ 
ENDPROCEDURE

```

There are two parameter passing methods that could be used.

Complete the table for each of the two methods:

| Name of parameter passing method | Value output            | Explanation             |
|----------------------------------|-------------------------|-------------------------|
| .....<br>.....<br>.....          | .....<br>.....<br>..... | .....<br>.....<br>..... |
| .....<br>.....<br>.....          | .....<br>.....<br>..... | .....<br>.....<br>..... |

[6]

- (b) The pseudocode includes the use of parameters.

State **two** other features in the pseudocode that support a modular approach to programming.

- 1 .....
- .....
- 2 .....
- .....

[2]

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- 5 A company keeps details of its product items in a 1D array, `Stock`. The array consists of 1000 elements of type `StockItem`.

The record fields of `StockItem` are:

| Field         | Typical value |
|---------------|---------------|
| ProductCode   | "BGR24-C"     |
| Price         | 102.76        |
| NumberInStock | 15            |

- (a) Write pseudocode to declare the record structure `StockItem`.

.....

.....

.....

.....

..... [3]

- (b) Write pseudocode to declare the `Stock` array.

.....

..... [3]

- (c) Write pseudocode to modify the values to element 20 as follows:

- set the price to 105.99
- increase the number in stock by 12

.....

.....

.....

..... [2]



Write pseudocode to output the information for each stock item that has a price of at least 100.

Output the information as follows:

Product Code: BGR24-C Number in Stock: 15

[4]

[illegible][illegible]

- 10

6 Members of a family use the same laptop computer. Each family member has their own password.

To be valid, a password must comply with the following rules:

  - 1 At least two lower-case alphabetic characters
  - 2 At least two upper-case alphabetic characters
  - 3 At least three numeric characters
  - 4 Alpha-numeric characters only

A function, `ValidatePassword`, is needed to check that a given password follows these rules. This function takes a string, `Pass`, as a parameter and returns a boolean value:

  - TRUE if it is a valid password
  - FALSE otherwise

(a) Write pseudocode to implement the function `ValidatePassword`.

Refer to the **Insert** for the list of pseudocode functions.

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[illegible]

- 6** Members of a family use the same laptop computer. Each family member has their own password.
- To be valid, a password must comply with the following rules:
- 1 At least two lower-case alphabetic characters
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(b) The `ValidatePassword` function will be tested.

- (i) Give a valid password that can be used to check that the function returns `TRUE` under the correct conditions.

Password1: ..... [1]

- (ii) Password1 is modified to test each rule separately. Give **four** modified passwords and justify your choice.

Password to test rule 1: .....

Reason: .....

.....

.....

Password to test rule 2: .....

Reason: .....

.....

.....

Password to test rule 3: .....

Reason: .....

.....

.....

Password to test rule 4: .....

Reason: .....

.....

.....

[4]

- (iii) When testing the `ValidatePassword` function a module it is necessary to test all possible paths through the code.

State the name given to this type of validation testing.

..... [1]

- (iv) A program consisting of several functions can be tested using a process known as 'stub testing'

Explain this process.

.....

.....

.....

..... [2]

**7** LogArray is a 1D array containing 500 elements of type STRING.

A procedure, `LogEvents`, is required to add data from the array to the end of the existing text file `LoginFile.txt`

Unused array elements are assigned the value "Empty". These can occur anywhere in the array and should **not** be added to the file.

Write pseudocode for the procedure `LogEvents`.

Refer to the **Insert** for the list of pseudocode functions

[8]

[8]