HANDOUT FOR CHAPTERS 10 AND 11

PSEUDOCODE, FLOWCHARTS AND PROGRAMS

Past questions

1 Five data types and five data samples are shown below.

Draw a line to link each data type to the correct data sample.

Data type	Data sample
Integer	'a'
Real	2
Char	2.0
String	True
Boolean	"Twelve"

[4]

2 Explain the difference between a variable and a constant in a program.

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.....[2]

3 Identify **three** different loop structures that you can use when writing pseudocode.

a. .....

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b. .....

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c. .....

.....[3]

4 Four programming concepts and four examples of programming code are shown below.

Draw a line to link each programming concept to the correct example of programming code.

Programming concept	Example of programming code
Counting	`Sum = Sum + Value[n]`
Repetition	`IF Value = 10 THEN PRINT 'X'`
Selection	`FOR Counter = 1 TO10`
Totalling	`Amount = Amount +1`
	`Sum = Num1 + Num2`

[4]

5 Read this section of program code that inputs 10 positive numbers and then outputs the smallest number input.

```
1    Small = 1000
2    Counter = 0
3    REPEAT
4INPUT Num
5IF Num < Small THEN Small = Num
6Counter = Counter + 1
7    UNTIL Counter = 10
8    PRINT Small
```

Identify **three** changes you would need to make to find the largest number input instead of the smallest number.

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(ii) Rewrite the program code with your changes.

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6 A program will be written to store information about members of a swimming club. The following membership details will be recorded:

Name
Gender
Status:
- Senior
- Junior

Fee
Team member (Yes or No)

Choose a suitable data type for each of the membership details to be recorded.

Membership details	Data type
Name	
Gender	
Status	
Fee	
Team member	

[5]

7 `REPEAT ... UNTIL` is one type of loop structure.

Identify and describe **two** other types of loop structure that you could use when writing pseudocode.

Loop structure 1 .....

Description.....

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Loop structure 2 .....

Description.....

.....[4]

8 Read this section of program code that inputs 10 positive numbers and then outputs the total.

```
1    Total = 0
2    Counter = 0
3    REPEAT
4INPUT Num
5Total = Total + Num
6PRINT Total
7Counter = Counter + 1
8    UNTIL Counter = 10
```

This code works, but it is inefficient.

Suggest **three** improvements that could be made.

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(ii) Rewrite the program code with your improvements.

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9 Four statement types and four examples are shown below.

Draw a line to connect each statement type to the correct example.

Statement type	Example
Assignment	`FORX ← 1TO10`
Iteration	`READ X`
Input	`PRINT X`
Output	`X ← Y+Z`

[3]

10 Identify **two** different selection statements that you can use when writing pseudocode.

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11 Write an algorithm, using pseudocode, to input a number between 0 and 100 inclusive. The algorithm should prompt for the input and output an error message if the number is outside this range.

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12 **(a)** Write an algorithm to input three different numbers, and then output the largest number. Use **either** pseudocode **or** a flowchart.

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(b) Give **two** sets of test data to use with your algorithm in **part (a)** and explain why you chose each set.

Test data set 1 .....

Reason .....

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Test data set 2 .....

Reason .....

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[4]

13 An algorithm has been written in pseudocode to input 100 numbers and print out the sum. A `REPEAT … UNTIL` loop has been used.

```
Count ← 0
Sum ← 0
REPEAT
  INPUT Number
  Sum ← Sum + Number
  Count ← Count + 1
UNTIL Count > 100
PRINT Sum
```

(a) Find the error in the pseudocode and suggest a correction.

Error.....

Correction .....

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[2]

(b) Rewrite the correct algorithm using a more suitable loop structure.

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14 (a) Write an algorithm to input 1000 numbers. Count how many numbers are positive and how many numbers are zero. Then output the results. Use **either** pseudocode **or** a flowchart.

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(b) Give one change you could make to your algorithm to ensure initial testing is more manageable.

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15 Explain the difference between the programming concepts of **counting** and **totalling**. Include an example of a programming statement for each concept in your explanation.

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16 **(a)** Draw a flowchart for an algorithm to input numbers. Reject any numbers that are negative and count how many numbers are positive. When the number zero is input, the process ends and the count of positive numbers is output.

(b) Explain the changes you will make to your algorithm to also count the negative numbers.

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.....[2]

17 An algorithm is written in pseudocode:

```
INPUT Number
IF Number > 100
   THEN OUTPUT "The number is too large"
   ELSE OUTPUT "The number is acceptable"
ENDIF
```

(a) Describe the purpose of the algorithm.

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(b) **(i)** The algorithm only allows one attempt at inputting an acceptable value.

State how you would change the algorithm so that it continues until a suitable input is supplied.

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(ii) Re-write the algorithm in full, using pseudocode, to implement your answer to **part (b)(i).**

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18 Describe each of the following data types used in programming. In each case, give an example of a piece of data to illustrate your answer. Each example must be different.

Char

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String

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Boolean

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[6]

19 **(a)** Give an example of a conditional statement using pseudocode.

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(b) Describe the purpose of a conditional statement.

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..... [2]

20 For each of the **four** groups of statements in the table, place a tick in the correct column to show whether it is an example of **Selection** or **Repetition**.

Statements	Selection	Repetition
FOR A ← 1 TO 100 B ← B+1 NEXT A		

CASE A OF
  100: B ← A
  200: C ← A
ENDCASE		

IFA>100 THEN B ← A ENDIF		
REPEAT A ← B*10 UNTIL A > 100		

[4]

21 Identify and describe **three** loop structures that are available in pseudocode.

Loop structure 1 .....

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Description .....

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Loop structure 2 .....

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Description .....

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Loop structure 3 .....

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Description .....

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[6]

22 Most programming languages include basic data types. Ahmad is describing the basic data types he has used.

State the data type that Ahmad is describing in each sentence.

Choose the data type from this list of programming terms.

Array **Boolean** **Char** **Constant** **Function** **Integer**

Iteration **Procedure** **Real** **String** **Variable**

A number with a fractional part that can be positive or negative and used in calculations

Data type .....

A whole number that can be positive, negative or zero and used in calculations

Data type .....

A single number, symbol or letter

Data type .....

A sequence of characters

Data type .....

A data type with two values, True or False

Data type .....

[5]

23 Draw a line to connect each **Description** to the most appropriate **Pseudocode example**.

Description	Pseudocode example
A loop that will iterate at least once	`CASE … OF … OTHERWISE … ENDCASE`
A loop that will not be executed on the first test if the condition is false	`Number ← Number + 1`
A conditional statement	`WHILE … DO … ENDWHILE`
Totalling	`Sum ← Sum + NewValue`
Counting	`REPEAT … UNTIL`

[4]

24 Draw the flowchart symbol for **Decision** and the flowchart symbol for **Process**.

Decision	Process

[2]