**1** Computer parts can be organised into roles. Match each role to its description.

| Role | | Description |
|---|---|---|
| Address bus | • | • Intermediate or final results produced by the computer; usually in the form of processed data. |
| Memory | • | • Processes data and follows instructions; consists of an arithmetic logic unit and a control unit. |
| Output | • | • Stores data, instructions and the results of processing for immediate use. |
| Processor | • | • Stores large amounts of data that will not be lost when power supply is interrupted. |
| Secondary storage | • | • Transports data between memory and processor; bi-directional. |
| | | • Transports required memory location from processor to memory; uni-directional. |

[5]

**2** **(a)** Name one type of external storage.

..... [1]

**(b)** Describe one advantage and one disadvantage of using the type of external storage in **Part (a)**.

Advantage: ……

……

……

Disadvantage: ……

……

……

[2]

**3** A meteorologist wants to determine the date of the day with the lowest amount of rainfall in a certain month for a particular year. State the input, output and process needed to solve the problem. Assume that there are 30 days in that month.

Input: ……

……

……

Output: ……

……

……

Process: ……

……

……

……

……

[5]

**4** Fill in the blanks using the words provided.

| | | |
|---|---|---|
| algorithm | decomposition | flowchart |
| generalisation | incremental | modular |
| pattern recognition | | |

Problem solving techniques are essential in simplifying complex problems. The first technique involves breaking down a complex problem into sub-problems. This is called ..... For this, there are two approaches. The ..... approach involves deriving a solution to a smaller version of the problem then extending the solution to larger versions of the problem. The ..... approach involves separating tasks into distinct sub-problems. The second technique involves identifying similarities among items. This is called ..... The third technique involves replacing similar problems with a single problem. This is called ..... [5]

**5** Predict the expected output of the following Python program.

**(a)**
```
word_A = "INTERNATIONAL"
print(word_A[5:8])
```

..... [1]

**(b)**
```
word_B = "SINGAPORE"
print(word_B[3:8:2])
```

..... [1]

**(c)**
```
word_C = "BUKIT BATOK"
print(word_C[2::3])
```

..... [1]

**(d)**
```
my_input = "BVSS"
print(my_input.isalnum())
```

..... [1]

**(e)**
```
word_D = "hello"
word_E = "world"
print(word_D + " " + word_E.upper())
```

..... [1]

**6** Study the following algorithm represented in pseudo-code.

```
Number = 50
Tries = 5
Won = False
WHILE Tries > 0
     INPUT Guess
     Tries = Tries - 1
     IF Guess > Number
          OUTPUT "Guess lower"
     ELSE
          IF Guess < Number
               OUTPUT "Guess higher"
          ELSE
               Won = True
               Tries = 0
          ENDIF
     ENDIF
ENDWHILE
IF Won = False
     OUTPUT "Game over"
ELSE
     OUTPUT "You win"
```

**(a)** Complete the following trace table for the algorithm. Use the data `25, 75, 50` as input.

| Number | Tries | Won | Guess | OUTPUT |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

[5]

**(b)** State the purpose of the algorithm.

……

……

..... [1]

**(c)** Name and describe two validation checks that can be added to validate the input.

Validation check 1: ……

……

……

Validation check 2: ……

……

……

[4]

**7** Describe the difference between a compiler and an interpreter.

……

……

…… [2]

**8** The following pseudo-code algorithm prompts students to enter the category of their CCA (i.e. 1 for uniformed groups, 2 for performing arts, etc.). When 5 is entered, the program outputs the abbreviation of the most popular category and terminates. The program uses two arrays. The array cca_categories stores the abbreviations of the categories. The array cca_counter stores the number of entries per category. For simplicity, you may assume that all entries are valid and that the number of entries per category are unique.

```
 1  cca_categories = ["UG", "PA", "CS", "GS"]
 2  cca_counter = [0] * 4
 3  exit_program = FALSE
 4  highest_count = 0
 5  highest_count_index = 0
 6  OUTPUT "Enter 1 for Uniformed Groups (UG)"
 7  OUTPUT "Enter 2 for Performing Arts (PA)"
 8  OUTPUT "Enter 3 for Clubs and Societies (CS)"
 9  OUTPUT "Enter 4 for Games and Sports (GS)"
10  OUTPUT "Enter 5 to exit program"
11  WHILE exit_program = TRUE
12       INPUT my_cca
13       IF my_cca = 5
14            exit_program = TRUE
15       ELSE
16            cca_counter[my_cca - 1] += 2
17       ENDIF
18  ENDWHILE
19  FOR i = 0 TO 3
20       IF cca_counter[i] < highest_count
21            highest_count = cca_counter[i]
22            highest_count_index = highest_count
23       ENDIF
24  NEXT i
25  INPUT cca_categories[highest_count_index]
```

There are five errors in the program. For each error, state the number of the line where the error is located and correct the error.

Line: ……

Correction: ……

Line: ……

Correction: ……

Line: ……

Correction: ……

Line: ……

Correction: ……

Line: ……

Correction: ……

[5]

**9** **(a)** Describe how phishing works and state two tell-tale signs of a phishing attack.

……

……

……

……

..... [3]

**(b)** Besides phishing, name one other type of cyberattack.

..... [1]

**10** **(a)** Convert the denary number 155 into 8-bit binary. Show your working clearly.

……

……

……

……

..... [2]

**(b)** Convert the binary number 00111100 into a hexadecimal number.

……

……

..... [1]

**(c)** Convert the hexadecimal number 10E1 into a denary number. Show your working clearly.

……

……

……

……

..... [2]

**11** **(a)** Describe how the binary and the hexadecimal number systems are used in RGB colour coding.

……

……

..... [1]

**(b)** Besides RGB colour coding, name one other application that use the binary and the hexadecimal number systems.

..... [1]

**12** **(a)** Draw the logic circuit to represent the following Boolean statement.

X = NOT((A AND B) OR (NOT C))

[4]

**(b)** Complete the following truth table for the Boolean statement:

X = NOT((A AND B) OR (NOT C))

| A | B | C | Working Space | X |
|---|---|---|---|---|
| 0 | 0 | 0 | | |
| 0 | 0 | 1 | | |
| 0 | 1 | 0 | | |
| 0 | 1 | 1 | | |
| 1 | 0 | 0 | | |
| 1 | 0 | 1 | | |
| 1 | 1 | 0 | | |
| 1 | 1 | 1 | | |

[4]

**13** The following spreadsheet allows John to track his repayments for a car loan he took from the bank.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Loan Amount | $81,130.00 | | Number of Monthly Instalments Made | 5 |
| 2 | Interest Rate (per annum) | 2.48% | | Repaid Amount | $5,265.44 |
| 3 | Loan Period (months) | 84 | | Outstanding Amount | $83,194.00 |
| 4 | Monthly Instalment | $1,053.09 | | | |
| 5 | Repayment Amount | $88,459.33 | | | |
| 6 | | | | | |
| 7 | **Date:** | **Paid** | | | |
| 8 | 2/1/2019 | $1,053.09 | | | |
| 9 | 2/2/2019 | $1,053.09 | | | |
| 10 | 2/3/2019 | $1,053.09 | | | |
| 11 | 2/4/2019 | $1,053.09 | | | |
| 12 | 2/5/2019 | $1,053.09 | | | |

**(a)** Name the spreadsheet function used in Cell B4 to derive the monthly instalment.

..... [1]

**(b)** Name the spreadsheet function used in Cell E1 to derive the number of monthly instalments made.

..... [1]

**(c)** Name the spreadsheet function used in Cell E3 to correct the outstanding amount to the nearest dollar.

..... [1]

**(d)** Write the formula used in Cell E2 to derive the repaid amount.

..... [1]

**(e)** Predict two cells whose values will be automatically recalculated when the value of Cell B3 is changed.

..... [2]

**14** Give two advantages and two disadvantages of using a computer network.

Advantage 1: ……....

……....

……....

Advantage 2: ……....

……....

……....

Disadvantage 1: ……...

……....

……....

Disadvantage 2: ……...

……....

……....
[4]

**15** Name the network device that is used to convert digital data into a form suitable for transmission and vice versa.

…… [1]

**16** Explain why wired networks are more reliable than wireless networks.

……....

……....

…… [2]

**17** Sketch a clearly labelled diagram to depict how local area networks can be connected to form a wide area network.

[2]

**18** Draw a flowchart to represent an algorithm that

- prompts the user to enter a string between five and ten characters inclusive;
- counts the number of letters and the number of digits in the string while looping through the characters in the string only once; and
- returns the number of letters and the number of digits in the string.

You may assume that the input is always valid.

Sample output

```
Enter string: IPHONE11
Number of letters is 6.
Number of digits is 2.
```

[6]

- End of Paper -