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7155/01

23 August 2024

Candidates answer on the Question Paper.

Write your name, class and index number on the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.

Approved calculators are allowed.

Answer **all** questions.

The number of marks is given in brackets [] at the end of each question or part question. You should show all your working.

The maximum number of marks is 80.

For Examiner's use
Marks
80

Setter: Mrs Leong Wee Choo

Parent's Signature:_____

This question paper consists of **16** printed pages.

1 A computer stores data in bytes.

(a) Convert the following binary integer into denary.

1100 1011

..... [1]

(b) Describe how the denary number 298 is converted into hexadecimal.

.....

 [3]

(c) The MAC (Media Access Control) address of a device is shown below. Fill in the blanks below to indicate what the two groups of numbers represent.

00:B3:A9:12:C9:31
 └───┘ └───┘

--	--

[2]

(d) The IT manager is checking if the device in **(c)** had gained unauthorized access to the company's network. Based on the log files of the network, the last 8 bits of the unauthorized device's MAC address in binary form were identified to be **0111 0001**.

Explain clearly if the above device was the unauthorized device.

.....

 [2]

- 2 Complete the table by writing the name of the **most appropriate** spreadsheet function for each description.

Description	Spreadsheet function
Extract a substring starting from a particular position of a string	
Find the 3rd lowest value in a range	
Search the first column of a table for a specific value and output the data in the same row but in the next column	
Find out the sum of values in a range of cells based on the criteria applied to a different range	
Find out the number of empty cells in a range	

[5]

3 Four items of computer architecture and some descriptions are given.

Draw a line to match the role of the item to its correct description.

Items	Description
Arithmetic logic unit	• Stores data and instructions so they can be quickly accessed by the processor
	• Transports required information from processor to memory
Address bus	• Intermediate or final results produced by the computer; usually in the form of processed data
	• Processes data by performing basic mathematical and logical operations
Output	• Transports required information between memory and processor
	• Stores data that will not be lost when power supply is interrupted
Memory	• Follows instructions and decides when data should be stored, received or transmitted

- 4 (a) Complete the table by defining each of the threats to the privacy and security of data.

Threat	Definition
Trojan horse	
Worm	
Pharming	

[3]

- (b) More learning institutions are using technology.
Describe **one** positive and **one** negative social or economic impact of using technology in education.

Positive

.....

.....

Negative

.....

..... [2]

- (c) Define the term **software piracy**.

.....

..... [1]

5 The following functions are written in pseudo-code.

The function `Check` takes in a parameter `Value` and returns a Boolean.

```
FUNCTION Check(Value)
  Valid = TRUE
  FOR Count = 0 to LEN(Value)-1
    IF Value[Count] != '0' AND Value[Count] != '1'
      Valid = FALSE
      BREAK          // BREAK exits loop
    ENDIF
  NEXT Count
  RETURN Valid
ENDFUNCTION
```

The function `Success` takes in a parameter `Value` and returns a Boolean.

```
FUNCTION Success(Value)
  Total = 0
  FOR Count = 0 to LEN(Value)-1
    IF Value[Count] == '1'
      Total = Total + 1
    ENDIF
  NEXT Count
  IF Total MOD 2 == 0      // MOD returns remainder
    RETURN TRUE
  ELSE
    RETURN FALSE
  ENDIF
ENDFUNCTION
```

The main program in pseudo-code is:

```
Data = INPUT("Enter value")+ '1'
Result = Check(Data)
IF Result == FALSE
  OUTPUT "Error"
ELSE
  Result = Success(Data)
  IF Result == TRUE
    OUTPUT "No Error"
  ELSE
    OUTPUT "Error"
  ENDIF
ENDIF
```

The function `LEN(Value)` returns the length of `Value`.

- (a) Describe the purpose of the variable `Valid` in the function `Check`.

.....

 [2]

- (b) (i) Complete the trace table for the algorithm for the input data:1311

Main program			Check ()			Success ()	
Data	Result	Output	Valid	Count	Value returned	Total	Value returned

[2]

- (ii) Complete the trace table for the algorithm for the input data: 1001

Main program			Check ()			Success ()	
Data	Result	Output	Valid	Count	Value returned	Total	Value returned

[3]

- (iii) The algorithm has been deployed for detecting errors in data transmission. Describe fully the purpose of the function `Success` and state the name of this error-checking method.

Description

.....

.....

.....

Error-checking method [3]

- 6 A program written in Python needs to be translated using an interpreter.

- (a) Identify another translator.

..... [1]

- (b) Describe these two types of translators.

Description for interpreter

.....

.....

.....

.....

Description for the other translator

.....

.....

.....

..... [4]

7 Computers in a building are connected to a Local Area Network (LAN).

- (a) Describe the differences between a LAN and a Wide Area Network (WAN).

.....

 [2]

- (b) Identify and describe the function of **two** network devices that could be used in the LAN.

Component 1
 Description

 Component 2
 Description
 [4]

- (c) A childcare centre has several classrooms in the building. The staff and teachers use computers which act as clients to access a central database in a server.

Describe the functions of the clients and server in this network.

.....

 [2]

- 8** A group of programmers has been tasked to develop a library system for a school. The system will display a menu that allows the user to borrow, return, check availability of books, check the due date of loan and pay fine for overdue loans. When a book is borrowed or returned, the number of copies available is updated.

(a) A project leader plans the solution using decomposition.

Describe what is meant by **decomposition**.

.....

 [2]

(b) Identify **two** inputs to the system and describe how each will be validated. Each validation technique must be **different**.

Input 1

Validation

.....

Input 2

Validation

..... [2]

(c) Identify **two** outputs the system needs to generate.

Output 1

.....

Output 2

..... [2]

- (d) The program creators are adapting the program to be used for a shop to allow customers to order items.

Identify **two** common elements between this system and the library system.

1

.....

.....

2

.....

..... [2]

- 9 A credit card number is a string of 14 characters in the form dddd-dddd-dddd where d represents a digit.

The function `Remove` takes in a credit card number, removes the non-digits and return the result.

```

01 FUNCTION Remove (Num)
02   NewNum = ""
03   Counter = 0
04   While Counter <= LEN(Num)
05       IF Num[Counter] != "-"
06           NewNum += Num
07       ENDIF
08       Counter = Counter + 1
09   ENDWHILE
10   RETURN Num
11 ENDFUNCTION

```

The main program:

```

12 CardNum = INPUT("Enter card number")
13 OUTPUT "Credit card no: Remove(CardNum) "

```

- (a) The algorithm has **four** logic errors.

Give the line number of each error and write the correct line for each.

Line number

Correction

Line number

Correction

Line number

Correction

Line number

Correction [4]

- (b) Identify and describe **two** other types of program error.

Error type 1

Description

.....

.....

Error type 2

Description

.....

..... [4]

- (c) Program errors are likely to be detected and corrected in one of the stages in the development of a program. Identify this stage.

..... [1]

- (d) The input of the credit card number is tested with normal and error test case conditions.

Identify **one** test data for normal test case condition and **three** different examples of test data for error test case condition.

Test case condition	Test data
Normal	
Error	

[4]

- 10 (a) In most cars, the car alarm system, speaker **A**, would be activated when **either** the car is locked and the shock sensors detect a strong impact, **or** the car is locked and the voltage sensors detect a decrease in voltage.

The inputs to the system are:

Input	Binary	Condition
L	0	Car is not locked
	1	Car is locked
S	0	No strong impact detected
	1	Strong impact detected
V	0	Decrease in voltage
	1	Increase in voltage

The output:

Output	Binary	Condition
A	0	Alarm not activated
	1	Alarm activated

- (i) Write down the Boolean statement for the car alarm system.

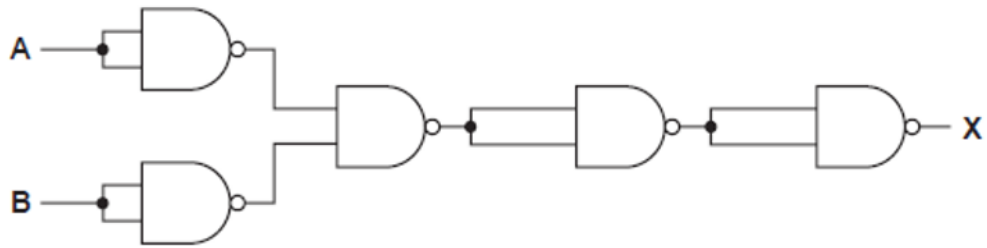
..... [1]

- (ii) Draw the logic circuit diagram for the car alarm system.



[4]

(b) The following logic circuit diagram is only made up of NAND gates.



(i) Complete the following truth table for the above logic circuit diagram.

A	B	Working space	X
0	0		
0	1		
1	0		
1	1		

[2]

(ii) Name a single logic gate that has the same function as the above logic circuit.

..... [1]

- 11** An algorithm is needed to remove the largest value from a list, and to output the resulting list.

For example, if a list contains 2, 5, 10, 10, 9, 4, the resulting list is 2, 5, 9, 4.

Write a function, using pseudo-code or program code to implement the above. You cannot use the `max()` pre-defined function.

..... [5]