SERANGOON SECONDARY SCHOOL

(

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PRELIMINARY EXAMINATION 2019

SECONDARY 4 EXPRESS

COMPUTING

PAPER 1

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READ THESE INSTRUCTIONS FIRST

Do not open the question papers until you are told to do so. Write in dark blue or black pen in the spaces provided on the Question Paper. You may use a soft pencil for any diagrams, graphs, music or rough working. Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions.

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together. The number of marks is given in brackets [] at the end of each question or part question.





Class: Sec _____

7155/01

2 hours

1 The following diagram shows five network terms and six descriptions.

Draw a line between each network term to the most appropriate description.

Network Term

Description

A 32-byte long string that identifies a wireless access point and all devices connected to it.

IP Address

MAC Address

Ring Topology

Service Set Identifier

Star Topology

A network configuration that requires a central device such as a hub or a bridge to manage the transmission of data.

A network configuration where all computers are connected together through a single common cable.

A network configuration where the entire network may fail whenever any computer in the network fails.

An identifier that is automatically assigned by a router. It is required to receive and forward data packets out of a network

An identifier that is required to receive and forward data packets within a network through a network bridge.

2	(a)	Convert the binary number (10000101) ₂ into a denary number. Show your workings.
		[2]
	(b)	Convert the hexadecimal (FB) ₁₆ into a binary number. Show your workings.
		[2]
	(c)	Convert the binary number (11110) ₂ into a hexadecimal number. Show your workings.
		[2]
	(d)	Convert the hexadecimal (365) ₁₆ into a denary number. Show your workings.
		[2]

- 4
- **3** Study the following algorithm very carefully.

```
1
    Highest = 1
2
    OUTPUT "Enter the first integer: "
3
    INPUT Num1
    OUTPUT "Enter the second integer: "
4
5
    INPUT Num2
6
    Range = Num1
    IF Num1 > Num2 THEN
7
        Range = Num2
8
9
    ENDIF
10
    FOR i = 1 to Range:
         IF Num1%i == 0 AND Num2%i == 0:
11
             Highest = i
12
13
         ENDIF
    NEXT i
14
    OUTPUT Highest
15
```

(a) (i) Complete the following trace table for the algorithm.

Use the data 15, 6 as input.

Highest	Numl	Num2	Range	i	OUTPUT
1					

- (ii) State the purpose of the algorithm. Assume that users enter only positive integers for inputs Num1 and Num2.[1] (b) The algorithm does not include validation on input. (i) Name and describe one validation check that could be added to validate the input(s) in the given algorithm.[2] (ii) Name two different validation checks, other than your answer to part (b)(i). 1
- (c) Once complete, the algorithm is tested with data for normal conditions.

Identify two other test case conditions that could be used to test the algorithm.

For each condition, give an example of test data for this algorithm.

Test Case Condition	Test Data

[4]

- 4 Unauthorised access occurs whenever data owned by someone is used by someone else, such as an intruder or an unknowing individual, without their permission.
 - (a) State two reasons why unauthorised access occurs.

(b) Describe two safety measures to prevent unauthorised access.

Safety measure 1
Safety measure 2
[2]

(c) Intruders often use different forms of cyberattacks to gain unauthorised access to digital information.

Name and describe two forms of cyberattacks.

- **5** A computer is a device that can be programmed to accept data inputs, process it into useful information, and output the information meaningfully or store the information away.
 - (a) The following table contains **two** household devices typically found at home with computers in them. For each device, name **one input** and **one output** component that can be found in them.

Household Device	Input Component	Output Component
Washing Machine		
Smart Mobile Phone		

[4]

(b) Name the component that is responsible for processing data in a computer and describe its functions.

(c) Identify **one** type of secondary storage. Give an example of the storage device, state the medium of storage and state one advantage of the named storage device.

Storage device
Medium of storage
Advantage
[3]

6 An alarm, X, sends a signal (X = 1) when certain fault conditions in a chemical manufacturing plant are detected. The inputs are:

Input	Binary Value	Condition
E	1	Overflow detected
Г	0	Overflow not detected
т	1	Temperature >= 185 °C
I	0	Temperature < 185 °C
В	1	Pump ON
	0	Pump OFF

The alarm, X, returns a value of 1 if:

- either (i) Temperature >= 185 °C AND Overflow detected
- or (ii) Overflow detected AND Pump is OFF
- (a) Draw the logic circuit for the above system.



F	т	Р	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]

(b)	Complete	the truth	table for th	e above system.
-----	----------	-----------	--------------	-----------------

- 7 A pseudo-code algorithm:
 - allows player 1 to input a number
 - allows player 2 to guess and input the number entered by Player 1 until the correct answer in given
 - stores the wrong guesses into a list
 - outputs a message to show if the guess is wrong
 - outputs a message to show if the guess is correct
 - stops getting inputs from player 2 when a correct guess is given
 - outputs the number of tries
 - outputs all the wrong guesses

```
1
    OUTPUT "Player 1, please enter a number: "
2
    INPUT Answer
3
    Count = 0
4
    Guess = ""
5
    WHILE Guess == Answer
6
         OUTPUT "Player 2, make your guess: "
7
         INPUT Guess
8
         IF Guess == Answer THEN
9
             OUTPUT "Well Done! Correct Guess!"
10
             CONTINUE
11
         ELSE
12
             OUTPUT "Wrong Guess. Try again."
13
             Guess = Record[Count]
14
         ENDIF
15
    Count = Count + 1
16
    ENDWHILE
17
    OUTPUT LEN(Record)
18
    OUTPUT Record
```

There are **four** errors in the given algorithm.

State each error **and** write the correct pseudo-code.

Error 1	
Correction	
Error 2	
Correction	
Error 3	
Correction	
Error 4	
Correction	
	[8]

8 The following spreadsheet shows the records of electricity usage and charges for a housing estate.

	А	В	С	D	E	F	G	Н	
1									
2	Price per KWH:	\$ 0.1789							
3							SUMMA	RY	
4	Account Number	Apartment Type	Utilisation (KWH)	Charges (\$)		Apartment Type	No. Of Households	Average Consumption (KWH)	
5	ELEC-12256508	2 ROOM	1560	\$ 279.08		2 ROOM	3	926.7	
6	ELEC-03672919	3 ROOM	1685	\$ 301.45		3 ROOM	6	858.3	
7	ELEC-73479586	5 ROOM	1668	\$ 298.41		4 ROOM	5	1017.6	
8	ELEC-97436236	5 ROOM	730	\$ 130.60		5 ROOM	4	1009.3	
9	ELEC-23916181	5 ROOM	1416	\$ 253.32					
10	ELEC-41029318	5 ROOM	223	\$ 39.89		R	eport generated on:	30/6/2019	
11	ELEC-96172988	3 ROOM	533	\$ 95.35					
12	ELEC-11280468	3 ROOM	725	\$ 129.70					
13	ELEC-36804960	4 ROOM	479	\$ 85.69					
14	ELEC-36282925	4 ROOM	901	\$ 161.19					
15	ELEC-98438572	4 ROOM	1141	\$ 204.12					
16	ELEC-88505581	3 ROOM	547	\$ 97.86					
17	ELEC-84419255	2 ROOM	1108	\$ 198.22					
18	ELEC-11749242	4 ROOM	1505	\$ 269.24					
19	ELEC-28182752	3 ROOM	. 828	\$ 148.13					
20	ELEC-13545731	4 ROOM	1062	\$ 189.99					
21	ELEC-05194032	2 ROOM	112	\$ 20.04					
22	ELEC-66941685	3 ROOM	832	\$ 148.84					
23	23 Average Consumption		947.5	\$ 169.51					
24	Н	ighest Consumption:	1685	\$ 301.45					
25	L	owest Consumption:	112	\$ 20.04					
26									

(a) State the type of data that is held in each of the following cells.

A5		 	
D5		 	
H1()	 	[3]

(b) Write down a formula that has been entered in cell D5 to calculate the charges for electrical usage for account number ELEC-12256508.

=[2]

(c) Write down a formula that has been entered in cell D24 to find the highest electrical charges payable by a household in the list.

=[2]

9 When data is transmitted from one computer to another, errors often occur during the transmission process resulting in data corruption. Parity checks are often used to detect an error during the transmission process.

Parity Check Algorithm 1:

When one byte of data is collected, a system transmits the data using **odd parity** by inserting a parity bit at the left-most position.

Eight bytes of data were collected and transmitted. The following eight bytes of data were received by the other computer.

	parity bit	column 2	column 3	column 4	column 5	column 6	column 7	column 8	column 9
byte 1	1	1	1	0	0	0	0	1	1
byte 2	0	1	0	0	0	1	0	1	0
byte 3	0	0	0	0	0	0	1	0	0
byte 4	1	1	0	0	1	0	0	0	0
byte 5	1	1	0	1	0	0	0	0	1
byte 6	0	1	0	0	1	1	0	0	0
byte 7	1	0	0	0	0	0	1	0	0
byte 8	0	0	1	1	0	0	1	0	0

(a) Study the data received using Parity Check Algorithm 1 and identify which of the eight bytes of data contain errors.

.....[2]

Parity Check Algorithm 2:

For every eight bytes of data sent, a ninth parity byte is added to the collected data to perform parity checks on the columns of data and transmitted.

	parity bit	column 2	column 3	column 4	column 5	column 6	column 7	column 8	column 9
byte 1	0	1	0	0	1	0	0	0	1
byte 2	1	0	1	1	0	0	0	1	1
byte 3	1	1	0	1	0	0	1	0	0
byte 4	0	1	1	0	1	1	1	0	0
byte 5	0	0	0	1	0	0	1	0	1
byte 6	1	0	1	0	0	1	0	1	1
byte 7	0	0	0	1	0	0	1	0	1
byte 8	1	1	0	0	0	0	0	0	1
parity byte	1	1	0	1	1	1	0	1	1

The following nine bytes of data were received by the other computer.

(b) Study the data received using Parity Check Algorithm 2.

(i) Identify which byte contains an error.

.....[1]

(ii) Identify which column contains an error.

.....[1]

(iii) The incorrect bit is indicated at the intersection of the row and column with errors.

Give the corrected byte.

			[1]

(iv) Name an advantage of using Parity Check Algorithm 2 over Parity Check Algorithm 1.

......[1]

10 Your computing teacher, Mr Tan, would like to design a computer program that stores the practical exam marks of the class to perform analysis of the performance of the class. The class consists of only 32 students.

You have been tasked to write an algorithm using only pseudo-code or a program flowchart, that:

- inputs up to 32 student names and the practical exam scores
- stores the names and scores in arrays or lists
- stops if the student name entered is "DONE"
- outputs the name and score of the top student; if more than one student achieve the best score, output the names of all the top students.

 ••••
 ••••
 ••••
 ••••

16

 [6]

END OF PAPER