COMMONWEALTH SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2022

COMPUTING
Paper 1 (Theory)

Name: _____ ( ) Class: _____

SECONDARY FOUR EXPRESS/NORMAL ACADEMIC **Wednesday 31 August 2022**
7155/1 **1130 – 1330**
2 hours

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Approved calculators are allowed.
Candidates will answer on the question paper.

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 total number of marks for this paper is 80.

Name of setter: Mr Cheong HS

For Examiner's Use	
Total	**80**

Parent's Signature: _____

This paper consists of **15** printed pages including the cover page.

[Turn over

1 A loan company uses a spreadsheet to record their loan database.

	A	B	C	D	E	F	G	H	I	J
1	Date	ID	Plan	Loan	Term (Yrs)	Interest	Grant Eligibility		Plan	Rate
2	3-Jan-14	LOA-332	A	$2,000.00	2	$ 160.00			A	4%
3	5-Dec-15	LOA-354	B	$1,500.00	3	$ 225.00	Y		B	5%
4	23-Jun-18	LOA-398	A	$1,200.00	1	$ 48.00			C	6%
5	30-Aug-18	LOA-423	C	$1,400.00	2	$ 168.00				
6	13-Sep-18	LOA-435	B	$2,400.00	2	$ 240.00	Y			
7	8-May-19	LOA-462	A	$2,200.00	3	$ 264.00	Y			
8	24-Feb-20	LOA-522	C	$1,800.00	1	$ 108.00				
9	14-Mar-20	LOA-534	B	$1,700.00	2	$ 170.00				
10	31-Jul-20	LOA-556	A	$2,600.00	3	$ 312.00	Y			
11										

(a) Identify the **most appropriate** data type for the data in the following cell references:

Cell	Data type
A3	
B6	

[2]

(b) The cells in the **Loan** column are highlighted if the loan is above $2000. This is done using a feature found in the spreadsheet.

Describe how a feature can be used to perform this operation.

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[3]

(c) The cell **F2** is calculated by multiplying the loan with the loan term and the interest rate that is based on the loan plan.

Describe the formula that will need to be entered in cell **F2**.

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[3]

(d) The cell **G2** will indicate “Y” in the cell should the interest be more than $200.

Identify the function that will need to be entered in cell **G2**.

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[1]

2 Nikki sets up a new tele-communication company. As most of the staff is new to the company's privacy policies, she decides to brief them on intellectual property.

freeware	**piracy**	**authorise**	**domain**	**expire**
demonstrate	**share**	**cracks**	**infringe**	**shareware**
copyright	**courseware**	**license**	**illegal**	**open**

(a) Some of the following words need to be used to complete her presentation on intellectual property.

The legal right of owners to control the use and distribution of their intellectual property is called …… . They have to apply for a …….. which is an official description of activities that are authorised or forbidden by the owners.
The public …… software refers to software where legal protections have expired while the free and open-source software refers to software where users are free to change, copy, study and …… the software.
Proprietary software refers to commercial software that is …….. to copy, modify or distribute.

[5]

The company's data is partially lost due to poor authorisation. There are no signs of unauthorised access, and the installed firewall showed no signs of irregularity in terms of the transmission of data.

(b) Explain what is meant by authorisation and how it can cause data to be lost.

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[4]

(c) Nikki wants to explore the feasibility of focusing on communication and healthcare technology in their company by finding out how they can impact on society.

Complete the table by describing **one** economical and social impacts on **each** area of technology.

Area	**Impact**	
	Economical	**Social**
Communication	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……
Healthcare	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……

[4]

3 Four parts of the computer architecture are on the left, and five descriptions on the right.

Draw **one** line to link each part to its correct description.

Part	Description
Control unit	Used to store data for immediate use in a computer
Bus	Follows instructions and decides when data should be stored, received or transmitted
Storage Media	Way of storing large amounts of data that will not be lost when power supply is interrupted
Memory	Allows users to enter data and instructions into a computer
	Collection of wires that serves as a highway for data to travel on

[4]

4 Hossan is asked to set up a network in his base company in Singapore and connect it to the network in his parent company in Japan.

(a) The base company comprises 4 workers including Hossan. He is considering setting up a peer to peer network.

Explain what is meant by a peer to peer network.

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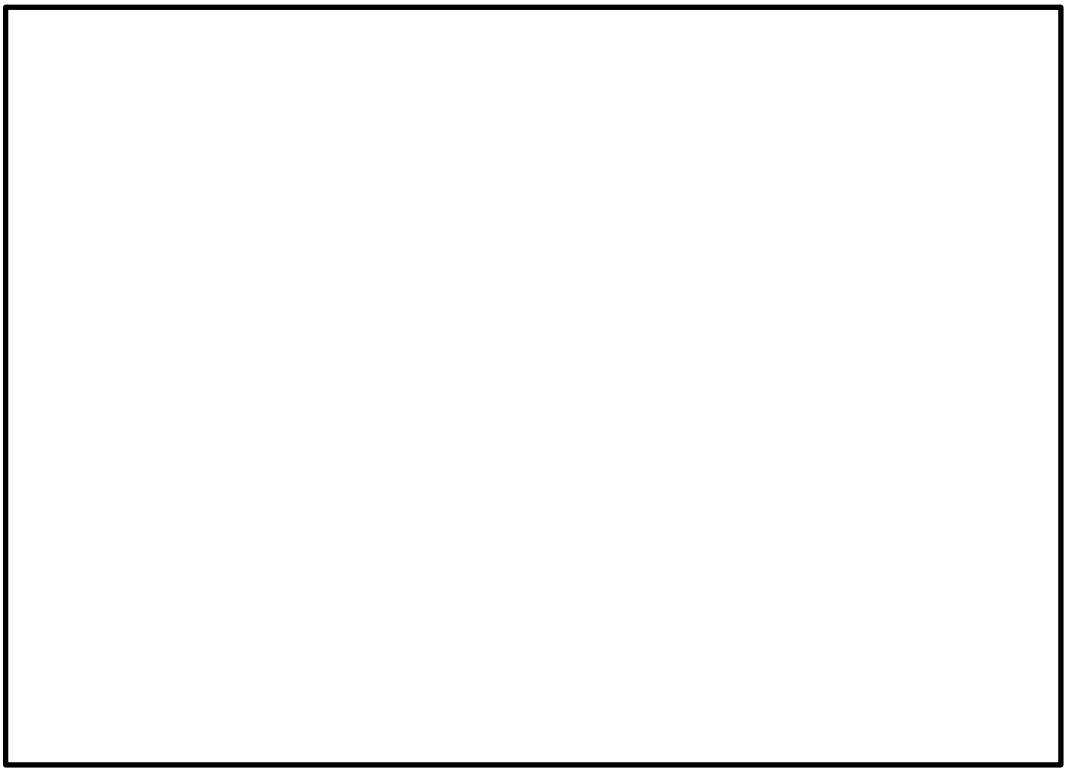
[4]

(b) Hossan's parent company's network is formed using a bus topology. It has a server, three computers and a network printer.

Show, by drawing a diagram in the box below, how the devices may be connected in the topology.



[2]

(c) State whether Hossan's base and parent companies should be a LAN or WAN, and explain why.

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[3]

5 **(a)** Convert the

(i) denary number **63** into a 8-bit binary number.

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[1]

(ii) hexadecimal number **4F** into a denary number.

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[1]

(iii) binary number **11010111** into a hexadecimal number.

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[1]

(b) IPv4 and IPv6 are network addresses used to allow computers to communicate and exchange data over a computer network.
State **two** differences between the two types of network addresses.

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[2]

6 A collision avoidance system in a car monitors the distance between the car and the car ahead of it, and the speeds of the car and the car ahead. If the distance between the two cars is too close with reference to the two speeds, it will sound an alarm to alert the driver.

(a) Identify the inputs required for the system.

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[2]

(b) One of the stages in program development is testing and refining the codes. Explain briefly the types of test conditions that should be designed to ensure that the program executes as expected.

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[6]

(c) Describe **two** common debugging techniques that can be used to find errors in a program.

1. ……...

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2. .....

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[4]

7 Study the following pseudo-code.

```
01   N = 5
02   K = 0
03   INPUT NAMES
04   WHILE K < N - 1
05        TEMP = NAMES[K]
06        NAMES[K] = NAMES[N - K - 1]
07        NAMES[N - K - 1] = TEMP
08        OUTPUT NAMES
09        K = K + 1
10   ENDWHILE
```

Complete the trace table for the following set of input data.

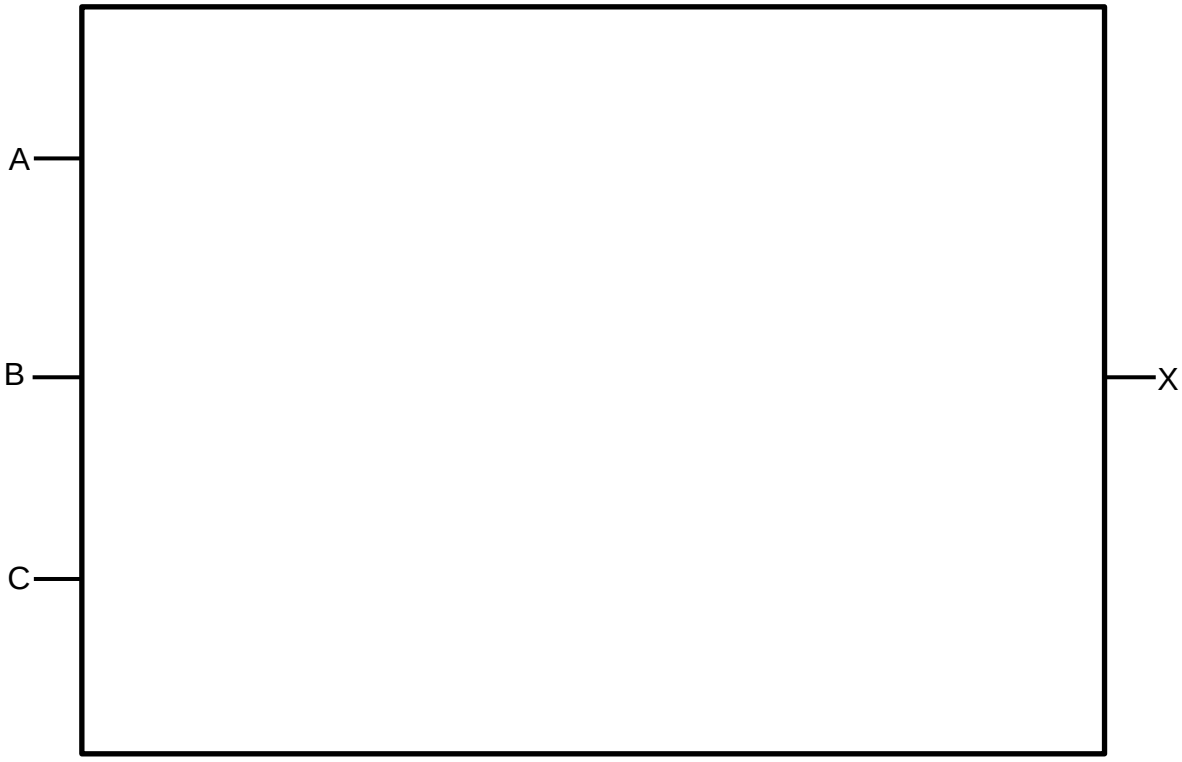
NAMES = [“Ali”, “James”, “Amy”, “Devash”, “Tat Hin”]

N	K	K < N	NAMES

[4]

8 **(a)** Draw the logic circuit to represent the following Boolean statement. Do not simplify the statement.

X = ((A NAND B) NOR C) AND (B OR C)



[4]

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

X = ((A NAND B) NOR C) AND (B OR 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]

9 The “Rock”-“Paper”-“Scissors” game is a game between a player and the computer. The player first decides the number of rounds to play.

During each round, the player is asked to decide whether to choose “R”, “S” or “P”. The game generates a random number between 1 and 3 inclusive using a function called random. If the number is 1, the computer’s selection is “R”; if the number is 2, the computer’s selection is “S”; otherwise, the computer’s selection is “P”.

The winner is decided based on the following rules:

“R” **beats** *“S”; “S”* **beats** *“P”; “P”* **beats** *“R”*

A tie break if both selections are the same.

The result is declared after comparing the final score at the last round.

The function `random(a,b)` returns a number between `a` and `b`, both inclusive.

The game is shown in pseudo-code.

```
01   round, PW, CW = 0, 0, 0
02   INPUT no_of_rounds
03   WHILE no_of_rounds < round
04     comp_select = "   "
05     INPUT user_select
06     comp_choice = RANDOM(1,3)
07     IF comp_choice == 1 THEN
08          comp_select = "R"
09     ELSEIF comp_choice == 2 THEN
10          comp_select = "S"
11     ELSE
12          comp_select = "P"
13     ENDIF
14     IF user_select == comp_select THEN
15          OUTPUT "IT'S A TIE!"
16     ELSEIF user_select == "R" AND comp_select == "S" THEN
17          OUTPUT "PLAYER WINS!"
18          PW = PW + 1
19     ELSEIF user_select == "S" AND comp_select == "R" THEN
20          OUTPUT "PLAYER WINS!"
21          PW = PW + 1
22     ELSEIF user_select == "P" AND comp_select == "R" THEN
23          OUTPUT "PLAYER WINS!"
24          PW = PW + 1
25     ELSE
26          OUTPUT "COMPUTER WINS!"
27     CW = CW + 1
```

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28      ENDIF
29      round = round + 1
30    ENDWHILE
31    IF CW > PW THEN
32      OUTPUT "Computer Wins!"
33    ELSEIF CW < PW THEN
34      OUTPUT "Player Wins!"
35    ELSE
36      OUTPUT "A Tie in the end"
37    ENDIF
```

There are **four** logic errors in this pseudo-code. Locate the errors and suggest the appropriate corrections.

Error 1

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Correction

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Error 2

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Correction

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Error 3

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Correction

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Error 4

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Correction

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[8]

10 A restaurant has eight 2-seater tables, six 4-seater tables, four 6 seater-tables, four 8-seater-tables and six 10-seater tables.

A system is created to help the restaurant monitor the occupancy of each type of tables. This is done by creating a list with the original number of tables for each type, i.e. [8,6,4,4,6].

If the size of a group of customers is 1 or 2, the 2-seater table is offered to them and the number of 2-seater tables is reduced by 1. The rest of the table types are offered similarly based on the number of customers. If any type of tables is fully occupied, an output stating that "`Occupancy is full`". The restaurant does not intent to provide bigger tables for smaller number of customers, i.e. the restaurant will not let a group size of 6 customers occupy an 8-seater or 10-seater table.

A pre-defined function called `bill_table()` is created to return an integer between 0 and 5. The integer 0 means that one 2-seater table has been freed and the number of the 2-seater table in the list is incremented by 1. An integer 5 means that there are no customers making any payment.

The whole system is expected to run throughout 24 hours a day.

Write an algorithm, using pseudo-code, to create the system. You do **not** need to validate the input.

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[8]

END OF PAPER