

新加坡海星中学 MARIS STELLA HIGH SCHOOL

PRELIMINARY EXAMINATION SECONDARY FOUR

COMPUTING

Paper 1 Written

7155/01 23 August 2022 2 hours

Candidates answer on the Question Paper. No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your class, index number, Centre number, O level index number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use a HB pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Approved calculators are allowed.

Answer **all** the 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.



This document consists of 14 printed pages.

1 Five data loss issues are shown on the left.

Six possible methods of data recovery or protection are shown on the right.

Draw one line to link each issue to its correct method .

Data loss caused by hard disk head crash

Data Loss Issue

Hacking into files and changing or deleting data

A computer program that attaches itself to a harmless program and modifies it

An intruder with physical access to a storage device accessing files or folders

Software that logs/records all key presses on your computer without you knowing

Method

Anti-virus software

Encryption

Read policy privacy

Anti-spyware software

Create back-up files

Use of passwords and firewall

[5]

2 There are five stages in developing a program.

Identify three stages and elaborate the process of each stage.

[6]

3 (a) Read the following section of a program code that inputs twenty numbers and then outputs the largest number input.

	1	highest = 0	
	2	count = 0	
	3	while count < 20:	
	4	number = int (input ("Please enter a number: "))	
	5	if number < highest:	
	6	number = highest	
	7	count = count + 1	
	8	print ("The highest number is ", highest)	
	The	re are three errors in this code.	
	Loc	ate these errors and suggest a corrected piece of code.	
	Errc	or 1 Line	
	Errc	or 1 Correction	
	Errc	or 2 Line	
	Erro	or 2 Correction	
	Erro	or 3 Line	
	Errc	or 3 Correction	[3]
(b)	(i)	Identify the type of errors found in part (a)	[-]
			[1]
	(ii)	Identify and describe another type of error not found in part (a)	
		Type of Error	
		Describe	
			[2]
(c)	The	program code is to be interpreted rather than compiled.	
	Give	e one difference between these two methods.	
			[1]

3

4 The table contains statements about types of memory and secondary storage.

Tick (\checkmark) **one** or **more** boxes in each row to indicate if the statement is about RAM, ROM or Secondary Storage.

Statement	Secondary Storage	RAM	ROM
Data is retained when electrical supply is cut off			
Stores data that is currently being used by the processor			
Data is lost when the power is switched off			
Data can be stored in this device while the computer is running			

[4]

5 (a) Complete the truth table for the following logic circuit:



А	В	С	Working Space	Х
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

.....

(b) What could replace the whole logic circuit?

[4]

(c) Draw the logic circuit for the following logic statement:

X = 1 if (A is NOT 1 AND B is 1] AND (B is NOT 1 OR C is 1]



[5]

6 A program has been written to process students' marks in a set of tests.

(a) Describe **two** validation checks that could be made on a student's name.

	1	
	2	
(b)	Describe two validation checks that could be made on the test marks.	
	1	
	2	
		[4]

7 An encryption system assigns a value to each letter of the alphabet:

A = 1, B = 2, C = 3,, Y = 25, Z = 26

Each letter is stored in a 12-bit binary register. The letters "S" (19th letter) is stored as:

 2048	1024	512	256	128	64	32	16	8	4	2	1
0	0	0	0	0	0	0	1	0	0	1	1

A 4-bit register is used to store the encryption key. This register shows how many places the bits are shifted to the left in the 12-bit register when it is encrypted. For example,



means each bit in the 12-bit register is shifted 5 places to the left and the register now becomes:

2048	1024	512	256	128	64	32	16	8	4	2	1
0	0	1	0	0	1	1	0	0	0	0	0

Therefore, the letter "**S**" would be transmitted with the 4-bit register and the 12-bit register as a 16-bit register as follows:



(a) **"W**" is the 23rd letter of the alphabet.

(i) How is the letter "W" represented in the 12-bit register, before encryption?



(ii) The 4-bit register contains the following value:



How is the letter "W" stored in the 12-bit register, after encryption?



[1]

A 4-bit register and a 12-bit register is shown below. (b) Which letter of the alphabet has been transmitted? (Explain how you got your answer.) Data bits **Encryption Key** 0 1 0 0 0 0 1 1 0 0 0 0 0 0 1 1 [2] (c) What is the largest encryption key that can be stored in the 4-bit register? (i) 2 [1] (ii) Convert this into denary (base 10). [1] (iii) If this encryption key were used, what problem would it cause? [1]

8 Study the following flowchart very carefully.



(a) Complete the trace table for this flowchart using the following test data:

7, 3, 2, 4, 9

[А	В	С	D	E	К	Х	
-								
-								
l								ſ
۱	What values	s are output	from the flow	wchart using	the above	test data?		
١	What is the	purpose of t	he algorithn	n?				_
				<i>.</i>				L
۱ f	What would flowchart?	happen if tr	ie value of A	(wasn't set	to 0 in the re	eturn loop of	t the	

[1]

9 A spreadsheet was set up to calculate values of v based on the formula:

v = u + a * t

	А	В	С	D
1	value of u	value of a	value of t	result v
2	20	9.81	10	
3	30	9.81	30	
4	10	9.81	40	
5	40	9.81	20	
6	50	9.81	50	
7	20	9.81	20	
8				

(a) A student typed in =(D2 + B2 * C2) into cell D2.

Why would this formula produce an error message?

..... [1] What is the correct formula that should be in cell D2? (b) = [1] (c) If this formula was replicated down to cell **D7**, what formula would be in **D7**? = [1] (d) Cell D8 needs to display the highest value of v. Identify the most appropriate function that will need to be entered in cell D8. = [1] Column B has the same value throughout. (e) If column B was removed, explain the changes in cell D2? = [1]

- 10 State the security issue as described by each of the descriptions below.
 - (a) Using a software that gathers information by monitoring key presses on a user's computer and relays the information back to the person who sent the software.

.....

(b) Using a malicious code installed on the hard drive of a user's computer or on the web server; this code will re-direct user to a fake web site without their consent.

.....

(c) Using a normally harmless program that has a program or code that is attached to itself and is designed to amend, delete or copy data and files on a user's computer without their consent.

.....

(d) The act of gaining illegal access to a computer system without the owner's consent.

.....

(e) The creator of code sends out a legitimate-looking email in the hope of gathering personal and financial data; it requires the recipient to follow a link in the email or open an attachment.

[5]

- 11 An office building has many companies. Each company has its own computer network that connects to the main building's LAN.
 - (a) Give one reason why the office building's network is a LAN.

[1]

(b) Some companies use wired networks while others use wireless networks. Describe the difference between a wired and wireless network.

[2]

(c) One company uses a ring topology. The company consists of a small setup of three computers. The diagram shows the layout in the office.
Complete the diagram by drawing the ring topology that connects the three computers shown.



(f) The office building uses a range of network devices.

Complete the table by writing the missing function or name of each network device.

Device	Function
	It connects multiple devices of the same network together. It broadcasts data to all its connected devices.
Router	
	It forwards packets between two of more networks. The connected networks are of similar network protocol. The device is able to store the MAC address of the connected devices.

[4]

12 A greenhouse is being monitored by a computer using two sensors. SENSOR1 measures the temperature and SENSOR2 measures the humidity levels.

If the temperature exceeds 32°C or the humidity levels fall below 0.55%, then an error message is output by the computer.

Write an algorithm, using pseudocode only, which

- inputs both sensor readings
- checks the sensor input values and outputs a warning message if either input values is out of range
- continues monitoring until the <ESCAPE> key is pressed

(You may assume that INPUT SENSORn will take a reading from SENSORn for example INPUT SENSOR1 means that readings will be taken from SENSOR1. You may also assume INPUT KEY inputs a key press from the keyboard for example when the <ESCAPE> key is pressed, "ESCAPE" is stored into KEY).

 [5]