

Name: _____

Class: _____

Index Number: _____



Anglo-Chinese School
(Barker Road)

PRELIMINARY EXAMINATION 2022

**SECONDARY FOUR
EXPRESS**

**COMPUTING
PAPER 1**

7155/01

2 HOURS

INSTRUCTIONS TO CANDIDATES:

Do not open this booklet until you are told to do so.

Write your name and index number clearly in the spaces at the top of this page.

Write in dark blue or black pen. You may use soft pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, highlighters, 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 of question.

You should show all your working.

The total mark for this paper is 80.

TOTAL	80
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This paper has 15 pages, inclusive of the cover page.

1 The diagram show four types of computer network identifiers on the left and eight examples of representation on the right.

Draw one line between each identifier to its correct representation.

Identifiers

IPv4	•
MAC	•
Port number	•
IPv6	•

Example of Representation

• 2001:db8::20:17:bad:c0de
• 55
• H4-7G-09-E0-D2-5Z
• 129.126.67.97
• 3A
• 108.F5.153.AF
• F4-7B-09-E0-D3-54
• 2010:db8::20::b2d:134

[4]

2 (a) Convert the binary number **101 1011** into a denary and hexadecimal number.

Denary:

Hexadecimal:[2]

(b) Convert the denary number **1698** into hexadecimal number. Show your working.

.....[2]

(c) Explain why hexadecimal numbers are commonly used to represent binary numbers.

.....

.....[1]

3 Computer memory is measured in terms of the number of bytes.

(a) (i) Explain the term "byte".

.....
[1]

(ii) State the number of bytes in 5 mebibytes (MiB).

.....
[1]

(b) (i) Optical and solid-state are two common types of storage media. Give **two** differences between these two types of storage media.

1

 2
[2]

(ii) State another type of storage media.

.....[1]

4 Data collection is the first of four stages in the data life cycle.

(a) Describe any **two** data collection activities.

1
 2[2]

(b) List any **two** other stages in the data life cycle.

1
 2[2]

5 Intellectual property are creations that have value. They can exist physically but also purely as data with no physical form.

(a) The table shows three scenarios of Intellectual Property offences. Tick (✓) **one or more** boxes in each row to indicate if the offence is copyright infringement, plagiarism or both.

Scenario	Copyright Infringement	Plagiarism
Taking a friend's source code and submitting it for a coding competition without seeking his permission.		
Downloading and installing a "cracked" version of a game without paying for it.		
Downloading research information from the internet and submitting it without any modification as your own for a homework assignment.		

[3]

(b) Draw **one or more** lines from each description on the left to the type of software it applies to on the right.

Illegal to copy, modify and distribute	•	
Protected under copyright	•	• Public Domain
Do not have to pay for use	•	• Free and Open Source
Not protected under copyright	•	• Proprietary
Can legally copy, modify and distribute	•	

[3]

(c) Describe **one** way to avoid plagiarism when using public domain information in your research.

.....

.....[1]

- 6 An alarm, Y, sends a signal ($Y = 1$) when certain fault conditions in a chemical process are detected. The inputs are:

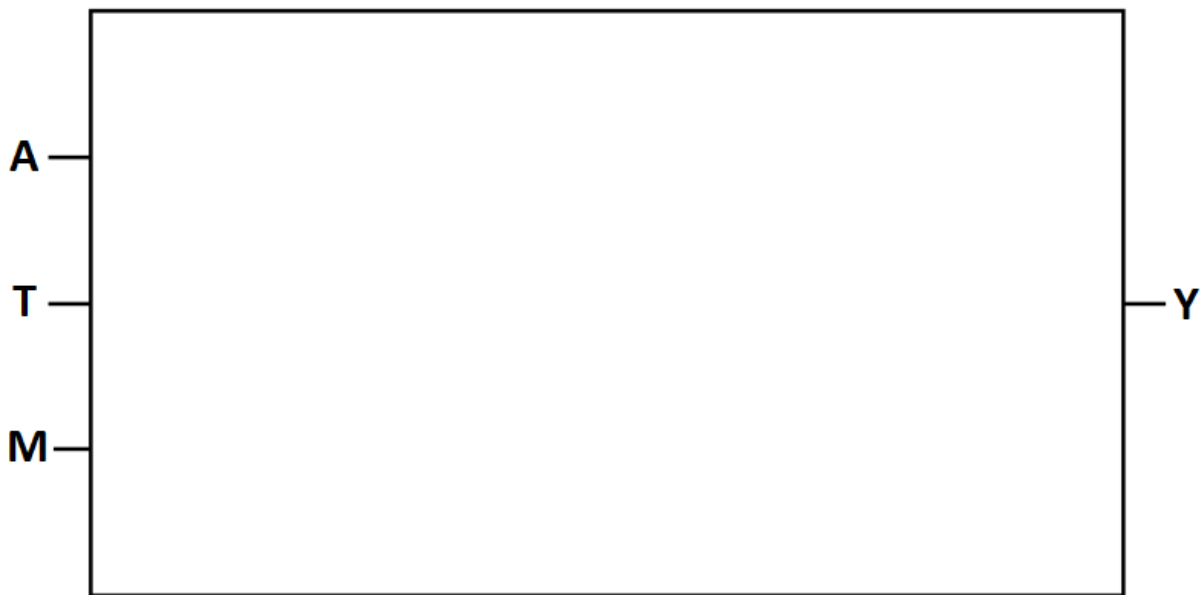
Input	Binary	Condition
A	0	Acidity ≤ 5
	1	Acidity > 5
T	0	Temperature $< 150^\circ\text{C}$
	1	Temperature $\geq 150^\circ\text{C}$
M	0	Mixer is off
	1	Mixer is on

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

either temperature $\geq 150^\circ\text{C}$ and mixer is OFF

or acidity > 5 and temperature $< 150^\circ\text{C}$

- (a) Draw a logic circuit for the system.



[4]

- (b) Complete the truth table for this alarm system.

A	T	M	Working Space	Y
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]

7 A programmer is creating a new computer game.

In the game, the user's avatar (a game character) moves through the virtual world trying to catch and rear cute monsters.

- The game will display a menu that will let the user create a new player or login as a returning player.
- If the user chooses a new player, an avatar is created with name, gender and costume.
- If the user chooses returning player, the game accesses the saved file and starts from where it was last saved.
- The user makes the avatar move within a virtual world.
- The game is auto-saved.
- The user can click on cute monsters roaming in the virtual world and encounter them to catch them
- The user can also access his/her collection of cute monsters and interacts with individual monsters via hugging, playing and/or feeding candies.

- (a) The decomposition technique can be used to create smaller, more manageable modules of the program. One of these modules is the **menu**.

Identify and describe **five** other modules that can be decomposed from the problem.

Module 1

.....

Module 2

.....

Module 3

.....

Module 4

.....

Module 5

.....[5]

- (b) State **two** other problem-solving techniques.

1

2[2]

8 Technology has enabled rapid healthcare changes all around the world.

(a) Describe **two** economic benefits to healthcare using technology.

- 1
-
- 2
-[2]

(b) Describe **one** ethical issue of using technology in healthcare.

-
-
-[1]

(c) Public and private medical institutions need to implement proper controls in handling online medical records to prevent unauthorised access.

(i) State and describe **one** authentication method to prevent unauthorised access.

-
-
-
-[2]

(ii) State and describe **one** access control method to prevent unauthorised access.

-
-
-
-[2]

- 9 A healthcare organisation has one hospital, two specialist centres and three clinics at various locations within a city. A computer network is implemented to enable communication between the six entities to share medical information of patients.

(a) State the most appropriate network based on geographical size.

.....[1]

(b) The network is primarily connected via wires.

(i) State the most commonly used wired protocol.

.....[1]

(ii) Explain why it is more advantageous to use a wired network.

.....

.....[1]

(c) State the network model (client-server or peer-to-peer) that is most appropriate for the network used by the organisation. Explain why.

.....

.....

.....[2]

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

Device 1

Function

.....

Device 2

Function

.....[4]

- 10** The following pseudo-code represents an algorithm that allows the user to generate usernames for a nation-wide learning portal. The username is created via the `generate` function.

```

user = []
repeat = TRUE
WHILE repeat == TRUE
    OUTPUT "Enter a student's name: "
    INPUT name
    OUTPUT "Enter the school: "
    INPUT school
    username = generate(name, school)
    user = user + [username]
    OUTPUT username
    OUTPUT "Next student? (Y/N): "
    INPUT option
    IF option == "N" THEN
        repeat = FALSE
    ENDIF
ENDWHILE
OUTPUT user

```

Note: the function `generate(name, school)` returns a username in capital letters by prepending the `school` input, followed by a "-" character and then appending the first 5 alphabets of `name`.

Example:

`generate("John Tan", "acsbr")` would return the string "ACSB-ROHNT".

- (a)** State the output of `generate(generate("Muhd Nazir", "moe"), "moe")`

.....[1]

- (b)** The algorithm needs to validate the `school`, immediately after it is input.

- (i)** The `school` input must be more than 2 letters, but less than 6 letters. Identify an appropriate data validation technique that can be used to validate this input.

.....
[1]

- (ii) Write pseudo-code for the algorithm to restrict the input of `school` to more than 2 letters, but less than 6 letters. The algorithm should continually ask for a new input until a valid one is entered.

You only need to write the pseudo-code to validate the input. You may use the `length()` function that accepts one argument of type string and returns its length as an integer.

.....

.....

.....

.....

.....

.....[3]

- (iii) For each test case condition in the following table, give an example of test data for `school`.

Test case condition	Test data
Normal	
Error	
Boundary	

[3]

- (c) The table below shows some of the variables in the algorithm.

State the data type for each variable.

Variable	Data Type
<code>repeat</code>	
<code>user</code>	
<code>username</code>	

[3]

11 Consider the following pseudocode algorithm.

```

Flag = 1
WHILE Flag == 1
    Flag = 0
    FOR Count = 0 TO 3
        IF Num[Count] < Num[Count + 1] THEN
            Store = Num[Count]
            Num[Count] = Num[Count + 1]
            Num[Count + 1] = Store
            Flag = 1
        ENDIF
    NEXT Count
ENDWHILE

```

The contents of the Num[Count] array at the start of the algorithm are:

Num[0]	Num[1]	Num[2]	Num[3]	Num[4]
26	38	32	15	27

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

[illegible]

[5]

(b) Describe the purpose for the algorithm.

.....

.....

[2]

12 Write an alternating case text algorithm, using pseudo-code that does the following:

- reads a word
- generates a new word that alternates the case of the word. The case of the first character in the word would be fixed as the initial starting case, with subsequent characters alternating between uppercase or lowercase. Example: Input of "acSbr" should generate "aCsBr" while input of "ACsBr" would generate "AcSbR".
- outputs the new word

You can assume that the text string is entirely comprising of alphabets. There is no need to validate the text string. You can also make use of the following methods:

Method	Function
<code>text.islower()</code>	returns TRUE if text is lowercase; FALSE if otherwise
<code>text.isupper()</code>	returns TRUE if text is uppercase; FALSE if otherwise
<code>text.lower()</code>	converts text to lowercase
<code>text.upper()</code>	converts text to uppercase

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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.....[6]

End of Paper