

## ZHONGHUA SECONDARY SCHOOL PRELIMINARY EXAMINATION 2022 SECONDARY 4 EXPRESS

Candidate's Name	Class	Register Number

# COMPUTING

## 7155/01

Paper 1 Written

14 September 2022 2 hours

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

### READ THESE INSTRUCTIONS FIRST

Write your name, index number and class in the spaces at 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, correction fluid or correction tape.

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 total of the marks for this paper is **80**.

For Examiner's Use

TOTAL

Setter: Mr. Calvin Heng Vetted by: Mr. Low Kee Ley

This question paper consists of **16** printed pages including this cover page.

**1** The following shows a Computer Architecture diagram.



### **Computer Architecture Diagram**

(a) Complete the table below by filling in the missing words. Some of the labels have been done for you. Note: Acronyms are not allowed!

LABEL	NAME
Α	ARITHMETIC LOGIC UNIT
В	CONTROL UNIT
С	
D	RANDOM ACCESS MEMORY
Е	

LABEL	NAME
F	
G	
Н	
X	
Y	OUTPUT

[6]

[2]

(b) State two functions of the device labelled B.

 [2]

(c) Approximately how many times larger (in terms of physical address space) is a 64 bit processor compared against a 32 bit processor? (working must be clearly shown.)

•••••	 	

2 The Urban Redevelopment Authority (URA), Housing Development Board (HDB) and Government Technology Agency of Singapore (GovTech) collaborated to provide a public service using a mobile App for the purpose of administering vehicle parking. This App is used by motorists to pay for parking at paper coupon based public parking spaces.

After the vehicle is parked, the motorist starts the mobile App and selects the name of the road and enters the estimated parking duration (in units of 30 minutes), followed by pressing the **START** button (the App reads in the time from the mobile phone's clock).

Prior to leaving the parking space, the motorist ends the parking session by pressing the **END NOW** button (the App reads in the time from the mobile phone's clock). The App then calculates the monetary amount owed (based on the parking duration referenced against a parking rate table) and deducts the amount via a pre-arranged setting (i.e., from the motorist's credit card).

The amount will also be displayed on the screen.

State the inputs, output and processes involved with this mobile App:

Inputs:

i	
ii	
iii	
iv	[2]
Output:	
v	[1]
Process:	
vi	
	[2]



Study the following flowchart.



(a) Complete the trace table with the following inputs:

$$x = 3, y = 7; x = 12, y = 15;$$

x	у	t	x odd?	<i>x</i> = 0?	OUTPUT
3	7				
10	15				
12	15				
) Wha	t does the flo	wchart do?			
			•••••		
) Writ	e down two o	bservations	about this alg	gorithm.	
			-		
				•••••	
•••••	• • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • •	•••••	•••••	

There are many data types supported in the Python Programming Language.	
Define the String (str) data type:	
i	[1]
William wishes to create a string variable called 'name' initialized with the content 'Alison'. Demonstrate how this would be done in Python.	
ii	[1]
What is Type casting?	
iii	[1]
What is a List?	
iv	[1]
A special situation arises when a List can be called an Array. Describe this special situation.	
v	
	[1]

- **5** Programming Languages can be classified as either compiler or interpreter types.
  - (a) What is a compiler?

.....

.....[1]

(b) What is an interpreter?

.....[1]

Complete the table below concerning compiled vs interpreted programming languages.

	Compilers	Interpreters
Describe two		
Advantages		
_		
Describe two		
Disadvantages		

[8]

6 The following python function accepts as input a numerical grade and returns the corresponding letter grade.

You are required to complete the table about Test Condition information.

```
def numtolet(n):
    if type(n) != int: return 'INVALID NUMERICAL
GRADE '
    if n > 0 and n < 10:
        if n == 1 or n == 2: return 'A'
        elif n == 3 or n == 4: return 'B'
        elif n == 5 or n == 6: return 'C'
        elif n == 7: return 'D'
        elif n == 8: return 'E'
        elif n == 9: return 'F'
    else:
        return 'INVALID NUMERICAL GRADE'
```

#### **Test Condition Information Table**

Type of <b>Test Condition</b>	<b>Two</b> examples of input test data

[6]

7 Data corruption and loss may be caused by a variety of factors. In all cases, making regular backups of data will help to prevent the loss of data in the event of data corruption. Complete the table below about causes of data loss or corruption. Describe one scenario leading to the cause of data loss or corruption and describe a **relevant** preventive measure that **addresses** the scenario you described. (note: Do not discuss making regular backups of data)

Cause	Scenario	Preventive measure
Human error		
Power failure		

Complete the following passage using the helping words provided.

offline	divulge	online	weaker
report	stronger	intersected	intercepted

[4]

**8** Convert the Binary number 10010011 into a Hexadecimal number. Please show your working.

.....

[1]

In the 1950's, when programmable computers first appeared, a typical computer program looked like this: [Sample 1]

However, programs could also appear like this: [Sample 2]

55 31 D2 89 E5 8B 45 08 56 8B 75 0C 53 8D 58 FF 0F B6 0C 16 88 4C 13 01 83 C2 01 84 C9 75 F1 5B 5E 5D C3 55 31 D2 89 E5 8B 45 08 56 8B 75 0C 53

In the context of that era, State three reasons programmers chose to use the format shown in Sample 2.

.....

[2]

In our current day context, computer programmers typically use languages such as python to code computer programs: [Sample 3]

def triangle\_area(b, h):
 return (b \* h) / 2
print('Triangle Area = '+str(triangle\_are(1, 2)))

Explain, in the context of current day software development, three reasons computer programmers choose to code in a high-level language vs machine language.

	[3]
Describe a situation where coding in machine language is preferable.	
	[1]

**9** A factory manufactures soap and has a system that monitors the manufacturing process. The system has three conditions to monitor: the acidity (A), the temperature (T) and the pressure (P).

The conditions for the system are:

Input	Binary value	Condition
А	1	pH <= 7
	0	pH > 7
Т	1	Temperature $< 50^{\circ}$ C
	0	Temperature $>= 50^{\circ}C$
Р	1	Pressure $>= 75\%$
	0	Pressure < 75%

The system will sound an alarm (X) when certain conditions are detected. The alarm will sound when:

The pressure >= 75% and the temperature >=  $50^{\circ}C$ or The temperature <  $50^{\circ}C$  and the pH > 7

(a) Write down the Boolean statement for this problem:

#### (b) Complete the Truth Table for this problem:

Α	Т	Р	X

[2]

(c) Draw the logic circuit for the Soap Factory Problem Statement: Additional condition: OR gate must be expressed in terms of NAND gates!

[4]

10 The following spreadsheet table shows some sales data for raw ingredients. Notes:

(a) Income = Sale Price \* Units Sold
(b) COGS (Cost of Goods Sold) = Cost Price \* Units Sold
(c) Profit = Income - COGS
Answer the following questions based on this table.

	А	В	С	D	E	F	G	Н
1	S/No	Item	<b>Cost Price</b>	Sale Price	<b>Units Sold</b>	Income	COGS	Profit
2	01	Brimstone	\$2.20	\$2.85	4	\$11.40	\$8.80	\$2.60
3	02	Charcoal	\$1.80	\$2.20	25	\$55.00	\$45.00	\$10.00
4	03	Detergent	\$15.50	\$17.50	5	\$87.50	\$77.50	\$10.00
5	04	Petrol	\$3.40	\$4.50	8	\$36.00	\$27.20	\$8.80
6	05	Saltpetre	\$4.30	\$6.30	12	\$75.60	\$51.60	\$24.00
7								
8		Highes	t Sale Price	\$17.50			Total Profit	\$55.40
9								
125 0								

(a) The most likely function used in cell D8 is:

		[1]
<b>(b)</b>	The most likely function used in cell H8 is:	
		[1]
(c)	Write down the formula in cell H4:	
		[1]
( <b>d</b> )	Write down the range of cells formatted with Currency, 2 Decimal Places.	
		[1]

11 A Computer Network can be organized as a Client-Server Network or as a Peerto-Peer Network. **(a)** What is a client computer? -----..... [1] **(b)** What is a server computer? ..... [1] ..... Why is there a difference between the client and server computers in **(c)** terms of capacity and processing power? ..... [1] ..... **(d)** What are three typical resources/services managed by a server? ..... [3] ..... **(e)** Complete the following table comparing client-server vs peer-to-peer networks.

Feature	<b>Client-server</b>	Peer-to-Peer
Security		
-		
Application		
(where can		
it be found)		
,		

[4]

~ End of Paper ~