

NGEE ANN SECONDARY SCHOOL



PRELIMINARY EXAMINATION

COMPUTING

7155/01

Paper 1 Written

20 September 2021

2 hours

Candidates answer on the Question Paper.

No Additional Materials are required.

Instructions to Candidates

Write your name, register number and class at the top of this page. Answer ALL questions. Write in dark blue or black pen. You may use pencil for any diagrams, graphs, tables or rough working. The use of an approved scientific calculator is expected, where appropriate.

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.

For Examiner's Use

Total	/80

Checked by student:	
,	

Date: _____

This document consists of 18 printed pages and 2 blank pages.

1 (a) Four terms of computer architecture and six descriptions are given.

Draw one line from each term to its appropriate description.

Term	Description
	Data that is stored is volatile and can be quickly accessed by the processor when needed.
Solid-state hard disk	
Option diag	Data is stored on a magnetic material that can be read or written by a magnetic "bead"
Read-only memory	Data is stored as very small pits or indentations that can be read or written by a laser
	Data is stored in electronic circuits called "flash memory" that have no moving parts.
Magnetic hard	
UISK	Data that is stored rarely has need for change or would be needed for a computer to start up.
	Data is stored in a square plastic enclosure composed of a thin and flexible disk of a magnetic storage medium with a fabric that removes dust particles from the spinning disk

[4]

1 (b) The central processing unit acts like the "brain" of a computer system. It contains the circuitry to interpret and execute program instructions.

Complete the following paragraphs by filling in the missing terms related to the central processing unit.

The does all mathematical operations and logical calculations. Some computers have two such units to process two calculations simultaneously. That is called dual core technology. These units are also accompanied by several small data storage units called

The receives orders from in the form of instruction and decode that instruction down into specific commands for other components inside computer system. It directs the data flow and how data should be stored, transmitted and received from different parts of the computer.

[4]

- **2** A game designing company plans to create a café simulation game, where the game character moves through different parts of the café and interacts with customers and equipment.
 - When the player chooses a new game, a character can be created along with its gender, name and appearance.
 - The appearance has an assortment of hair colours, eyes, nose, lips to be chosen from.
 - Each customer will order items form the café menu at random and will leave if not served within a time limit.
 - The game can also allow the player to shift furniture and equipment around the café.
 - (a) Before writing the program, the game designers need to use modular decomposition to create smaller, more manageable modules of the game. One of these modules is the **appearance**.

Identify **four** other modules that can be decomposed from the problem.

Module 1	 	
Module 2	 	
Module 3	 	
Module 4	 	
		[4]

(b) The game designers wish to add a feature which can show the total amount of earnings made after each in-game day. Each item has its individual price and if customers are served within 30 seconds, an additional 20% of the item price would be added to the earnings.

State the input(s), the output(s) and the process required to find the total earnings.

Input(s):
Output(s):
Processes required:
[4]

(c) The name of the character can only be made up of alphabets and be between 3 to 15 characters, inclusive.

The following pseudo-code algorithm validates the name of the character.

```
01 valid name = False
02 WHILE valid name = False
       OUTPUT "Enter character name: "
03
04
       INPUT char name
       name len = length(char name)
05
       IF name len >= 3 AND name len <= 15
06
           valid name = True
07
8 0
       ENDIF
09
       valid name = alpha(char name) // alpha()returns
                                         True if a string
                                         contains only
                                         alphabets, else
```

- 10 ENDWHILE
- (i) State whether valid_name is a variable of a constant. Give a reason for your choice.

.....[1]

(ii) Identify the data validation techniques used in the algorithm.

......[2]

(iii) Once completed, 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]

- 3 (a) Denary numbers are represented as binary numbers inside a computer.
 - (i) Convert the denary number **105** into 8-bit binary.

.....[1]

- (ii) Convert the positive whole binary number **1101 0011** into a denary number.
 -[1]
- (b) Hexadecimal RGB codes represent colours.
 - (i) The colour, baby-blue, has a hexadecimal code of **89CFF0**.

Complete the table to convert each hexadecimal digit to its 4-bit binary value.

RGB code	8	9	С	F	F	0
4-bit binary						
						[3]

(ii) RGB colours have Red, Green and Blue values. The green value of one colour is **254** in denary.

Convert 254 into hexadecimal.

......[1]

(iii) RGB colour codes are one example of where hexadecimal is used to represent binary.

State two other examples where hexadecimal is used to represent binary.

1 2 [2] 4 Charles was working on his laptop when he saw the following message:



The above message was received by many computers that experienced the WannaCry attack in May 2017. This cyberattack was known to be caused by a ransomware worm.

(a) Describe what a worm is and explain how the cyberattack was carried out.

(b) Describe the impact of a ransomware attack on the user. [2]

(c) Give two preventive measures to avoid such an attack.

	Preventive measure 1:
	Preventive measure 2:
	[2]
(d)	When the WannaCry ransomware attack first happened, some people thought that it was spreaded through a phishing campaign. It was later discovered that the attack took advantage of a weakness in the Microsoft Windows operating system.
	Explain the term "phishing".

.....[1]

(e) Suggest two ways to identify a phishing email.



Integers are input into the flowchart below.

(a) State the purpose of the algorithm show in the flowchart.

......[1]

(b) Complete the trace table for the following set of data. 1, 2, 3, 6, 7, 0, 14

Trace table

Х	prime	not	check	OUTPUT
	1		1	[5 ⁻

6 (a) Identify the logic gate that the following truth table represents.

Α	В	Х
0	0	1
0	1	0
1	0	0
1	1	0

......[1]

(b) Identify the logic gate that the following truth table represents.

Α	В	Х
0	0	0
0	1	0
1	0	0
1	1	1

.....[1]

(c) Complete the truth table for the following Boolean statement.

Α	в	с	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		
	1	1		

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

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



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

- 7 A home office has a Local Area Network (LAN).
 - (a) The LAN has both wired and wireless connections.
 - (i) Describe **two** factors which may affect the home office's choice between a wired and wireless connection.

.....

-[2]
- (ii) Identify and describe the function of two network devices that could be used in the LAN.

Component 1	•••
Description	
Jomponent 2	•••
Description	•••
	[4]

(b) The LAN is made up of several topologies. One topology used is a ring.

Draw and label a ring topology.

(c) A checksum is a type of error-checking method for files sent over a network.

Explain what a checksum is and how it detects errors.

	Α	В	С	D	E	F
1	BEST Car Mart Lucky Draw Customers 2020					
2						
		Customer's				
		last 4 NRIC	Month of	Spent	Membership	Qualify for
3	No.	characters	Purchase	Amount (\$)	Status (Y/N)	Special Draw (Y/N)
4	1	841A	Jul	120000		
5	2	234F	Jul	92000		
6	3	435G	Aug	78890		
7	4	102Y	Aug	118000		
8	5	255C	Aug	153980		
9	6	294B	Sep	98780		
10	7	485E	Sep	87990		
11	8	445M	Sep	100200		
12	9	652P	Sep	99500		
13	10	828A	Oct	82550		
14	11	495B	Oct	100250		
15	12	248J	Oct	210000		
16	13	249F	Nov	97500		
17	14	493L	Dec	78300		
18	15	643H	Dec	98200		
19						
20				l	Lucky Number:	
21	Customer's last 4 NRIC characters of Special Draw Winner:					

8 The sales records of a car company are as shown below:

(a) Identify the most appropriate data type for the following cell references.

A4	
F21	

[2]

(b) Customers who spent more than \$100 000 will be entitled to the membership of the company.

Cell E4 needs to display the membership status of the customer.

Identify the most appropriate function that will need to be entered into cell E4.

......[1]

(c) Customers who spent more than \$80 000 and made the purchase between the period from October to December (inclusive) are entitled to a special lucky draw.

Cell **F4** needs to display the eligibility status of the customer for the special lucky draw.

Identify the most appropriate function that will need to be entered into cell F4.

.....[2]

(d) Cell F20 needs to display a random number from column A.

Identify the most appropriate function that will need to be entered into cell F20.

......[1]

(e) Based on the lucky number generated in cell F20, cell F21 needs to display the last 4 characters of the customer's NRIC number if he qualifies for the special lucky draw. If the selected customer does not qualify, the cell should display "No winner".

Identify the most appropriate function that will need to be entered into cell F21.

......[2]

9 A PE teacher needs a computer program to read the weight and height for 40 students and then output the average Body Mass Index (BMI), lowest BMI and highest BMI. The weight should be between 30 kg to 120 kg inclusive. The height should be between 1 m to 3 m exclusive. Both height and weight are to be recorded to 1 decimal place.

The formula to calculate BMI is given as follows:

$$BMI = \frac{weight}{height^2}$$

Write an algorithm, using pseudo-code, to take the 40 sets of weight and height as input and then output the average BMI, lowest BMI and highest BMI. You must validate all inputs.

..... [8]

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