

NGEE ANN SECONDARY SCHOOL

PRELIMINARY EXAMINATION

COMPUTING

7155/01

Paper 1 Written

25 August 2022

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 16 printed pages and 2 blank pages.

1 (a) The bus topology and the star topology are two possible physical layouts of a network. Give **one** feature that is the same for both a bus topology and a star topology, and **one** difference between the two.

Feature that is the same:

..... Difference: [2] (b) A home network typically requires a network interface controller and a router. Identify and describe the function of one other network device that could be part of the home network. Device: Function:[2]

- **2** Ms Anna attempts to use a spreadsheet to record the gender ratio of each class. She records:
 - the number of girls and boys in each class
 - the ratio of girls to boys in each class
 - the classes

	А	В	С	D	E
1	Girls	Boys	Ratio	% Girls	Class
2	14	25	14:25		А
3	4	9	4:09		В
4	24	8	0:08		С
5					
6					
7					

Upon keying the ratio from cells **C2 to C4**, the spreadsheet detects the input and automatically changes the data type into something other than the expected ratio.

(a) Identify the data type which cells C2 to C4 are changed into.

Describe how Ms Anna can make the spreadsheet display the expected

(b) Describe how Ms Anna can make the spreadsheet display the expected ratio.

[2]

- (c) Cell D2 needs to show the percentage of girls in each class.
 Identify the most appropriate function that will need to be entered into D2 and copied to cells D3 and D4.
-[1]
- (d) Cell E6 needs to show a boolean value which indicates if the number of boys in class A is more than the number of girls in class A and more than the combined total number of boys from the other two classes.
 Identify the most appropriate function that will need to be entered into E6.

......[2]

(e) Cell E7 needs to show the class with most number of girls. Identify the most appropriate function that will need to be entered into E7.

3 Devon is developing a single-player computer game. The objective of the game is to harvest as many crops as possible within a time limit in order to score the most number of points possible. The player is able to customise the look of the sprite, and buy any tools that can help to speed up the process of harvesting before the start of the game using the points the player has accumulated. The game will save the points achieved by the player after every round.

Before the program is written, Devon decomposes the problem using a modular approach.

(a) Describe what is meant by a modular approach.

(b) One of the modules is to save the points achieved by the player after each round.

Identify three other modules that can be decomposed from the problem.

Module 1:

.....

.....

Module 2:

.....

.....

Module 3:

[3]

(c) Devon eventually completes writing the code as well as testing and refining the code. Describe the remaining stage of program development that is necessary for him to complete the program development.

[2]

- 4 A local bank has recently developed a mobile application that allows its users to make digital payments by scanning a QR code when shopping overseas. The user can review the price in either currency before confirming payment.
 - (a) State and explain one positive impact that this mobile application may have on businesses.

......[1]

(b) Transaction data from payment applications could be analysed further with Artificial Intelligence (AI) to benefit the user. Describe how transaction data from such a mobile application can be analysed further with AI.

.....

-[2]
- (c) Payment using mobile application is often accompanied with biometric authentication.
 Explain the benefit of using biometric authentication when making payment.

[2]

- **5** A ransomware attack typically works by tricking a target into clicking a malicious link by using a fake email that appears to be from reputable companies.
 - (a) State another form of cyberattack which works in a similar way.

(b) Once the attackers have access to critical files on the computer, they will encrypt the files and render the files inaccessible to the owners, unless a ransom is paid. Define the term encryption.

(c) Suggest **one** method to prevent the occurrence of ransomware attacks.

......[1]

6 Match each of the following types of hardware to its purpose.

<u>Hardware</u>		Purpose
Address bus	•	 to send address information is sent from memory to processor.
		 to send address information from processor to memory.
Data bus	•	 to send data between processor and memory
		 allows users to enter data and instructions into a computer
Input device	•	 to display, project or print processes data from a computer
		 follows instructions and decides when data should be stored, received or transmitted
Control unit	•	• part of the computer that processes data and follows instructions [4

- 7 Whenever a computer needs to store data, it uses memory. The type of memory used depends on how the data stored inside is meant to be used.
 - (a) Describe how the Random Access Memory (RAM) is used.

[3]

(b) State **one** advantage and **one** disadvantage that the Solid-state storage media has, when compared to the magnetic storage media.

Advantage: Disadvantage: [2]

8 Study the following flowchart.



(a) The algorithm needs to be tested. Complete the trace table for the following set of input data.

^{(2', (37', (3', (7', (75', (6', (63', (9', (90')}

count	combine	num	player	guess	OUTPUT

[5]

(b) Describe the purpose of the algorithm. Assume *player* is always a string containing a single digit and *guess* is always a string of two digits.

[3]

9 Wordilo is a single-player word game where a player attempts to correctly guess a five-letter word within five attempts.

In every attempt that the player makes, the algorithm is supposed to give feedback on the player's guess.

- 1) If a correct letter in the guess is found in the correct position as well, the response string will show a "O"
- 2) If a letter in the guess can be found in the correct answer but is situated at the wrong position, the response string will show a "-"
- 3) If a letter in the guess cannot be found in the correct answer at all, the response string will show a "X"

A player that manages to guess the correct word within five attempts will see a congratulatory message.

The algorithm ends when a player has used up his attempts without getting the correct answer.

There are four logic errors in the psedo-code.

State the line number of each error and write the correct pseudo-code.

```
01
    answer = "SWING"
02
03 \quad \text{count} = 0
04 response = ""
05
06
   WHILE count <= 5
07
80
    INPUT word
09
    count = count + 1
10
11
      IF word == answer
          count = 5
12
13
14
    ELSE
15
          FOR x = 1 to length (word) - 1
16
17
              IF word[x] == answer[x]
18
                  response = response + "0''
19
              ELSEIF word[x] is found in answer
20
                  response = response + "-"
21
              ELSE
                  response = "X''
22
23
              ENDIF
24
         NEXT
25
26
      ENDIF
27
28
   ENDWHILE
```

29		
30	IF count == 5 and word == answer	
31	OUTPUT "You have used up all tries!"	
32	ELSEIF word == answer	
33	OUTPUT "Correct! Well done!"	
34	ENDIF	
Error	1	
Corre	ection	
Error	2	
Corre	ection	
Error	3	
Corre	ection	
Frror	4	
Corre	ection	
		[8]
		_

10 (a) Draw the logic gates that the following truth tables represent.

(i)	Α	В	Χ	Logic Gate
	0	0	1	
	0	1	0	
	1	0	0	
	1	1	0	
(ii)	Α	В	Χ	Logic Gate
	0	0	0	
	0	1	0	
	1	0	0	
	1	1	1	

[2]

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





- 13
- (c) Complete the truth table for the 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		

X = (A NOR B) NAND (NOT B AND C)

11 (a) An RGB colour code is represented in the form #RRGGBB, where RR, GG and BB are the two-digit hexadecimal numbers that represent the red (R), green (G) and blue (B) components of the colour.

The RGB code of a certain paint colour is defined as #A5D700.

Convert each digit from the hexadecimal number A5D7 as a 4-bit binary.

Hexadecimal	Α	5	D	7
Binary				

[2]

[4]

(b) State one other application of hexadecimals.

 [1]

(c) Convert the denary number 41 into an 8-bit binary number.

(d) Describe how the binary number 1110 0011 is converted to hexadecimal. Give the hexadecimal value in your answer. Description
[4] Hexadecimal value:

12 A ticketing company uses a computer program to check on the validity of ticket serial numbers.

The correct format of a serial number is such that it:

- starts with "PER", followed by a hyphen (-)
- contains a 6-digit number in between two hyphens
- ends with a valid check character that is a letter between A to C in alphabetical order.

To verify if the check character is correct,

- refer to the 6-digit number in between the input string
- find the absolute difference between the first 2 digits and the last 2 digits
- find the remainder when the absolute difference is divided by 3
- convert the remainder to a check character using the table below.

Remainder	0	1	2
Check character	А	В	С

If the check character corresponds to the last letter in the serial number, the serial number is a valid number.

Example, given that the serial number is PER-152234-B,

6-digit number in the string: 152234

Absolute value of (15 - 34) = 19

Remainder when 19 is divided by 3 = 1

Since 1 corresponds to the letter "B", the check character is "B" \rightarrow The serial number is valid

The program needs to:

- take a serial number as input
- check if the format of the serial number is correct
- output a suitable error message if the format of the serial number is wrong
- output if the serial number is valid or not, if the input format is correct

Write an algorithm, using pseudo-code or flowchart, to request input on the serial number, check the format and validity of the serial number and output the required results.

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End of Paper

.....

.....

[9]

.....

. . .

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