

NGEE ANN SECONDARY SCHOOL

PRELIMINARY EXAMINATION

COMPUTING

Paper 1 Written

20 August 2020

2 hours

7155/01

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. 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 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 question. You should show all your working. The total number of marks for this paper is 80.

For Examiner's Use

/80 Marks

Checked by student:	 Date:	

This document consists of <u>16</u> printed pages and 0 blank pages.

1 (a) Convert the following amounts of data in the table below:

Amount of data	Size in bytes	
2.4 MB		[1]
	5 × 1024 ³	[1]

(b) James is setting up his home computer for work. He is considering between buying a 900 MHz processor chip and a 3 GHz processor chip. Describe 2 differences between the processor chips that he will need to consider before deciding which processor chip to purchase.

[2]

- (c) Fill in the blanks below with an appropriate word/phrase.
 - The following data flow may occur when input or output devices are used.

Data is entered using an ______ device and converted into a form

that the computer can understand. This data may be temporarily stored in a

____.

Instructions from the running application are then interpreted. These instructions

involving logical operations may require the data to be processed by the

processor's ______.

The _____ may then redirect the processed data to an

output device for display in a form that users can understand.

[4]

2 (a) State the difference between a proprietary software and a free and opensource software (FOSS). (b) A secondary two student requires materials from the Internet for a project report. Suggest two guidelines he should take note of to avoid committing copyright infringement.[2] 3 The Covid-19 pandemic has impacted various aspects of people's lives greatly. Lockdowns and tightened measures around the world has caused restrictions (a) to people's social lives. Describe the positive and negative social impact brought about by advancements in technology during this period.

.....

.....

[2]

.....

.....

NAS/2020/Prelim/4E/7155/01

(b) Some essential services such as banking operations are temporarily disrupted as a result of a tightened measure to minimize crowding. This also give rise to scams known as "SMiShing".

SMiShing is a phishing attack through the use of text messages. An example is shown below:



Suggest two tell-tale signs that show that it could potentially be a SMiShing message.

 [2]

4 The following spreadsheet shows a customer's car loan details with ABC company. In this car loan scheme, the customer pays a down payment and takes a loan for the remaining amount. The customer takes a loan and pays monthly instalments over 1.5 years. The interest charged on the loan is compounded monthly.

AB		С
ABC Car Loan Schem		
Customer Name:	Aldrick Tan Kim Heng	
Down Payment:	\$56,000	
Total Loan:	\$60,000	
Loan Period (years):	1.5	
Interest (yearly):	2%	
Monthly Instalment:		
Month	Principal Payment	Interest Payment
1	(\$3,286.36)	(\$100.00)
2	(\$3,291.84)	(\$94.52)
3	(\$3,297.32)	(\$89.04)
4	(\$3,302.82)	(\$83.54)
5	(\$3,308.32)	(\$78.04)
6	(\$3,313.84)	(\$72.52)
7	(\$3,319.36)	(\$67.00)
8	(\$3,324.89)	(\$61.47)
9	(\$3,330.43)	(\$55.93)
10	(\$3,335.99)	(\$50.37)
11	(\$3,341.55)	(\$44.81)
12	(\$3,347.11)	(\$39.25)
13	(\$3,352.69)	(\$33.67)
14	(\$3,358.28)	(\$28.08)
15	(\$3,363.88)	(\$22.48)
16	(\$3,369.48)	(\$16.88)
17	(\$3,375.10)	(\$11.26)
18	(\$3,380.73)	(\$5.63)
	A ABC Car Loan Schem Customer Name: Down Payment: Total Loan: Loan Period (years): Interest (yearly): Monthly Instalment: Month 1 2 3 4 4 5 6 7 6 7 8 9 10 10 11 12 13 14 12 13 14 15 16 17 18	A B ABC Car Loan Scheme Customer Name: Aldrick Tan Kim Heng Down Payment: \$56,000 Total Loan: \$56,000 Loan Period (years): 1.5 Interest (yearly): 2% Monthly Instalment: 2% Monthly Instalment: 2% Monthly Instalment: 2% 1 (\$3,286.36) 2 (\$3,291.84) 3 (\$3,297.32) 4 (\$3,302.82) 5 (\$3,308.32) 6 (\$3,313.84) 7 (\$3,319.36) 8 (\$3,324.89) 9 (\$3,330.43) 10 (\$3,335.99) 11 (\$3,341.55) 12 (\$3,341.55) 12 (\$3,347.11) 13 (\$3,352.69) 14 (\$3,369.48) 15 (\$3,369.48) 16 (\$3,369.48) 17 (\$3,369.48) 16 (\$3,369.48) 17

(a) State the type of data that is held in each of the following cells.

B3: _____

B5: _____

[1] [1]

(b)	The cell B9 shows the monthly instalment amount in this loan scheme. Identify the most appropriate formula to use in cell B9.	
		[1]
(c)	The cell B29 shows the principal payment in the 18 th month of this scheme. Identify the most appropriate formula to use in cell B29.	
		[1]
(d)	The cell C12 shows the interest payment in the 1 st month of this scheme. Identify the most appropriate formula to use in cell C12.	
		[1]
(e)	The cells C12 – C29 show the interest payments over the 18 months of this scheme. Explain how the background of the cells containing less than \$50 can be highlighted in red.	
		[2]

5 (a) Identify the logic gate represented by the following truth table.

Α	В	Χ
0	0	1
0	1	1
1	0	1
1	1	0

-[1]
- (b) Draw the logic circuit to represent the following Boolean statement. Do not simplify the statement.

 $X = \mathbf{A} \text{ NAND } ((\mathbf{A} \text{ NOR } \mathbf{B}) \text{ OR } (\mathbf{B} \text{ AND } (\text{NOT } \mathbf{C})))$



(c) Complete the truth table for the Boolean statement:

 $X = \mathbf{A} \text{ NAND} ((\mathbf{A} \text{ NOR } \mathbf{B}) \text{ OR } (\mathbf{B} \text{ AND} (\text{NOT } \mathbf{C})))$

A	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		

[4]

- 6 An electronic guessing game compares denary integer values input by a user with pre-stored values. The pre-stored values are held in 10-bit binary format.
 - (a) Convert the binary values in the table to denary.

Binary	Denary
0001001110	
0110110111	
100000001	

(b) Describe how the binary value 0110110111 is converted into hexadecimal. Give the hexadecimal value in your answer.

	Description	
	Hexadecimal value	[4]
(c)	When planning the game, the designer decided to use hexadecimal number system to represent the binary values.	
	Explain why the designer used the hexadecimal number system.	
		[2]
(d)	Besides game design, state another example where hexadecimal is used to represent binary.	

7 The following diagram shows four network terms and six descriptions.

Draw a line between the term and the correct description.



- 8 Jane is creating a program to help her coach (the user) keep a record of the total number of shots, assists and goals achieved by her squad of 30 players in all 12 matches during a competition season. She wants to be able to use this to monitor the progress of the players.
 - The program will display an option that lets the user create a squad or load a saved squad.
 - If the user chooses to load a saved squad, the saved squad file is accessed and displays another page with all the players' names, along with their respective players' scores for shots, assists and goals during the competition season.
 - The user can select a player and input the player's scores for shots, assists and goals achieved after each match, all scores input must be validated. The user can save all these records into the saved squad file.
 - The user can add or remove players and edit their names, she is also able to upload photos of the players.
 - If the user chooses create a new squad, a new squad file is created and she will be required to input names of 30 players, along with their age, gender and height.
 - (a) Before writing the program, Jane needs to use modular decomposition to create smaller, more manageable modules of the program. One of these modules is **manage squad**.
 - (i) Fig. 1.1 shows a diagram of the structure of manage squad module.

Complete Fig. 1.1 to show the sub-modules that belong to the manage squad module. The first sub-module has already been added for you.



(ii) Identify four other modules other than **manage squad** that can be decomposed from the problem.



(b) When the user creates a new squad, she sets the name, age in years, gender and height in metres for each player, she does this continuously for 30 players.

The table shows some of the variables used in creating a squad.

Tick (\checkmark) one box to identify the most appropriate data type for each variable.

Variable	String	Integer	Float	List
players				
player_name				
player_age				
player_height				

[4]

(c) A goal is a successful score on the target, the maximum goals in a season is 40.

The following pseudo-code validates the goals scored by the player.



(ii) The algorithm is tested using the following 3 numbers as input: -3, 54, 20

valid_goals	goals	OUTPUT

Complete the trace table for the algorithm.

(iii) For each test case condition in the following table, give an example of test data for the goals scored by the player.

Test case condition	Test data
Normal	
Error	
Boundary	

[3]

[3]

(d) A shot is an attempt to score on the target, but was blocked. The maximum shots possible in a season is 100.

Write an algorithm, using a flowchart, to validate user input for the shots attempted by the player, and re-enter if input is invalid.

Use the same validation techniques identified in **(c)(i)**, you do **not** need to perform other validation techniques. [4]

9 The Luhn algorithm is a checksum formula that calculates a check digit used to validate credit card numbers.

A check digit for a 15-digit number is calculated by the following steps:

- from the rightmost digit and moving left, double the value of every second digit
- if the result of this doubling operation is greater than 9, subtract 9 from the result
- add together all the digits of the result
- multiply the sum of all digits by 9
- divide the total by 10 which gives a remainder.

If the remainder is zero (0), the check digit is 0. The calculation of the check digit for the number 4532942229010972 is:

Number	4	5	3	2	9	4	2	2	2	9	0	1	0	9	7
Double alternate digit	8	5	6	2	18	4	4	2	4	9	0	1	0	9	14
Result	8	5	6	2	9	4	4	2	4	9	0	1	0	9	5

Total = 5 + 9 + 0 + 1 + 0 + 9 + 4 + 2 + 4 + 4 + 9 + 2 + 6 + 5 + 8 = 68

69 x 9 = 612

612 / 10 = 61 remainder 2

Check digit = 2

(a) Calculate the check digit for the number 558618701744079

Show all your working.

[3]

(b) Write an algorithm, using pseudo-code, to generate a check digit using the method given in the question.

 [7]

*** End of Paper ***