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新加坡海星中学 MARIS STELLA HIGH SCHOOL

PRELIMINARY EXAMINATION

SECONDARY FOUR

COMPUTING

Paper 1 Written

7155 25 August 2021 2 hours

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

READ THESE INSTRUCTIONS FIRST

MARK SCHEME



This document consists of **10** printed pages.

1 Xavier is concerned about security threats that he may encounter when using the Internet.

Two of the threats that he is concerned about are phishing and pharming.

(a) Give **one** similarity and **two** differences between phishing and pharming.

One mark for similarity Similarity

- Both involve fake/fraudulent websites
- Both are designed to steal personal data

Two marks for difference Difference

- Difference
 - Pharming requires the installation of malicious code installed on computers
 - Phishing is initiated/started using form of an email
 - Phishing requires user to click on a link / open an attachment
- (b) State two other threats that Xavier could encounter when using the Internet.

Two marks

- Virus
- Worm
- Malware
- (c) Xavier uses a firewall to secure data on his computer.
 - (i) Xavier tells his classmate that a firewall can only be software-based.

Explain if you agree or disagree with him.

A firewall can be both a software and hardware. I disagree with Xavier.

[1]

(ii) Describe how the firewall helps to keep Xavier's data secured.

[4]

Any four from:

- Help prevent hacking / unauthorised access
- Monitor incoming and outgoing traffic
- Allows setting of criteria / rules for traffic
- Can check whether traffic meets / defies criteria rules
- Can reject any traffic that does not meet / defies criteria

[3]

[2]

2 A paragraph is given about MAC addresses and IP addresses.

Complete the paragraph using the list of terms given. Not all terms need to be used.

compiled	control	identify	principal	similar
computer	dynamic	packet	protocol	unique

One mark for each correct term in the correct place

- control
- unique
- identify
- protocol
- dynamic
- 3 (a) Five statements are given about storage devices.

Tick (\checkmark) to show if the statement applies to hard disk drive (HDD) storage or solid state drive (SSD) storage.

Some statements can apply to both.

[5]

[2]

[5]

Statement	HDD (√)	SSD (√)
It uses magnetic properties to store data	✓	
It is non-volatile storage	\checkmark	✓
It can be used as an external storage device to back up data	\checkmark	✓
It has moving parts	✓	
It uses flash memory to store data		✓

(b) Optical storage is another type of storage.

Any two from

- CD (drive)
- DVD (drive)
- Blu-ray (drive)

- 4. Joshua wants to create a simple game using the programming language he is learning.
 - (a) In the single-player computer game, the player has to shift brown blocks in order to create a clear path for the red block to reach the exit.

The blocks can only move in either up and down directions or left and right directions. When the player successfully drags the red block to the exit sign, a message "Level Cleared" is shown and the next puzzle is unlocked.

Players are given the choice to start from the last puzzle, choose a previously played puzzle or clear all current records and restart from the first puzzle.

Before the program is written, the problem is decomposed into smaller, more manageable parts.

[3]

[4]

Identify and describe three of these smaller parts.

Any three from

- Menu to select if the player wants to start a new record, load his last unlocked puzzle, or select puzzles previously unlocked
- Puzzles module to place (in a fixed sequence) **different puzzle configurations** for players to play
- Winning module to detect if the red block is place at the exit sign to trigger the "Level Clear" message and to unlock the next puzzle.
- (b) In the process of creating the game, Joshua makes several programming errors.

A logic error is one type of program error.

Identify and describe two other types of program error.

Syntax Error

Errors that causes the translation process from source code to machine code to fail

Run Time Error

- Errors that occur while a program is running, usually causing the program to crash or hang

5 (a) Name **and** draw the **single** logic gate that can replace the given logic circuits.



(b) Complete the truth table for the given logic statement:

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

			Working space			
А	В	С	A OR C	NOTA AND NOT C	NOT A AND NOT C NOR B	Х
0	0	0	0	1	0	0
0	0	1	1	0	1	1
0	1	0	0	1	0	0
0	1	1	1	0	0	0
1	0	0	1	0	1	1
1	0	1	1	0	1	1
1	1	0	1	0	0	0
1	1	1	1	0	0	0

6 (a) An algorithm has been written in pseudocode to input the names and marks of 35 students. The algorithm stores the names and marks in two arrays name[] and mark[]. The highest mark awarded is calculated and the number of students with that mark is counted. Both of these values are output.

- 01 highestmark = 100
- 02 highestmarkstudents = 0
- $03 \quad FOR \text{ count} = 0 \text{ to } 34$
- 04 OUTPUT "Please enter student name: "
- 05 INPUT name[count]
- 06 OUTPUT "Please enter student mark: "
- 07 INPUT mark[counter]
- 08 IF mark[count] == highestmark
- 09 highestmarkstudents = highestmarkstudents 1
- 10 ENDIF
- 11 IF mark[count] > highestmark
- 12 mark[count] = highestmark
- 13 highestmarkstudents = 1
- 14 ENDIF
- 15 NEXT
- 16 OUTPUT "There are ", highestmarkstudents, " with the highest mark of ", highestmark

[4]

State the line number in the algorithm where the four errors are found. Suggest a correction for each error.

Line 1 highestmark = 0 Line 7 INPUT mark[count] Line 9 highestmarkstudents=highestmarkstudents+1

Line 12 highestmark = mark[count]

(b) Explain how you could extend the algorithm to also find the lowest mark awarded, count the number of students with that mark, and output both these values.

[6]

[4]

Any Six from

- Add variable lowestmark ...
- ... Set this to a high value for example 100
- Add variable lowestmarkstudents
- ... Set this to zero
- Add check IF mark[count] == lowestmark ...
- If check is true, add1 to lowestmarkstudents
- Add check IF mark[count] < lowestmark
- If check is true, set lowestmark to mark[count] and lowestmarkstudents to 1
- Add extra output statements

7 This pseudocode represents an algorithm.

```
flag = -1
WHILE flag != 0
      flag = 0
      FOR count = 0 to 3
              IF num[count] < num[count + 1]
                      store = num[count]
                      num[count] = num[count+1]
                      num[count+1] = store
                      flag = 1
              ENDIF
      NEXT
```

ENDWHILE

(a) The contents of the array at the start of the algorithm are:

num[0]	num[1]	num[2]	num[3]	num[4]
45	56	30	12	15

Complete the trace table for the algorithm using the data given in the array.

flag	count	num[0]	num[1]	num[2]	num[3]	num[4]	store
-1		45	56	30	12	15	
0							
	0						
							45
		56					
			45				
1							
	1						
	2						
	3						
							12
					15		
						12	
0							
	0						
	1						
	2						
	3						
1m	1m	1	m		1m		1m

[5]

Describe the purpose of the algorithm. (b)

Any two from

- The algorithm sorts/orders numbers -
- _ ... into descending order / from largest to smallest

- 8 Range check is an example of how programs can perform validation checks on data entered.
 - (a) Give the names of **two** other different validation checks and state the purpose of each.

One mark for correct validation and one mark for correct related purpose (max 2 each)

- Length
 - To make sure data enter is not too short or too long
- Presence
 - o To make sure all required inputs are provided
- Format
 - o To make sure the data entered follows a required pattern
- (b) You are tasked to create a program to calculate the class's average score in a Computing examination.
 - Prompt the user to enter the name of the class
 - Prompt the user to enter the number of students in the class
 - Prompt the user to key in the score of each student one at a time
 - Ensure the score entered is between 0 to 80 inclusive
 - If the entry is not valid, prompt the user to re-enter the score
 - When all student scores have been entered, the program will calculate the class's average score
 - Output the class name and the average score with appropriate message

Write an algorithm, using pseudo-code, program code or a flowchart, for the program described.

```
total = 0

OUTPUT "Enter name of class: "

INPUT class

OUTPUT "Enter number of students in ", class, " : "

INPUT num

FOR student = 1 to num

OUTPUT "Enter Computing score of student ", student, " : "

INPUT score

WHILE score < 0 OR score >80

OUTPUT "Please enter a number between 0 and 80 inclusive: "

INPUT score

ENDWHILE

total = total + score

NEXT

average = total / num
```

- OUTPUT class, " has the class average of ",average, "."
- (c) Suggest **three** different test data that can be used to test if your program in (b) works for the input of score.

Test case condition	Test data(single data input)		
Normal Condition	42		
Boundary Condition	0 / 80		
Error Condition	-1 / 100		

[4]

[6]

9 (a) Name **three** of the stages involved in the development of a program.

Any three from:

- Gather requirements
- Plan Solutions
- Write code
- Test and refine code
- Implement code
- (b) Most programs are created using compilers, suggest **two** advantages of compilers over interpreters.

[2]

[3]

Any two from:

- Resulting program from a compiler usually runs at a faster speed as the translation is done beforehand
- The compiler program is not needed to run the program once compilation is complete
- Syntax errors are detected before the program is even run.
- 10 James works in a company as the IT support staff. The company has a total of 50 employees and each is supplied with a company laptop. The company has recently moved to a new building and James has been tasked to set up the company's computer network in the new building.
 - (a) James' first task is to obtain suitable network devices.

James intends to purchase the Network Interface Card, Router and Modem. Explain the functions of these devices.

Network Interface Card

 Provides hardware interface to enable transfer of data between a device and a network

Router

- Forwards packets between separate networks

Modem

- Require to convert incoming analog data into digital data and outgoing digital data into analog data for transmission
- (b) Within the company, data files are to be accessed by the employees to do their work. Privacy of client data is also of great importance.

Suggest if James should set up a peer to peer network or a client server network in the new building and give two reasons to justify your choice.

[3]

Type of logical topology

- Client Server topology

Two Reasons

- Centralised server allows employees to easily access the shared files required
- Centralised server allows for tighter security measures to ensure integrity of data

[3]

Give two benefits students would receive from the increased access to technology in education.

[2]

Any **two** from

- Students can access shared learning materials at their own time
- Students can re watch recorded lessons or videos at their own pace
- With the use of learning devices, teachers can use more videos and collaboration tools to make lessons more engaging and relevant to students.

-End of Paper-