Class	Index Number	Name

Mark Scheme



新加坡海星中学 MARIS STELLA HIGH SCHOOL PRELIMINARY EXAMINATIONS SECONDARY FOUR

COMPUTING

Paper 1 Written

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

7155/01 24 Aug 2018 2 hours



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

1 (a) Convert the denary number 4351 into a hexadecimal number. Show your working.

Denary	Quotient	Remainder
4351	271	15
271	16	15
16	1	0
1	0	1

The hexadecimal equivalent of 4351 is 10FF.

[2]

(b) Convert the binary number 11010101 into a denary number. Show your working.

128	64	32	16	8	4	2	1
2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
1	1	0	1	0	1	0	1

128+64+16+4+1 = 213

The denary equivalent of 11010101 is 213.

[2]

(c) Describe **two** common uses of the hexadecimal number system.

RGB colour codes – hexadecimal number is used to express the intensities of red, green and blue light in the form of #RRGGBB this allows HTML and CSS users to change site colours to required colours based on the number keyed in.

Memory Dump – hexadecimal number system is deal for displaying every byte in memory used by the program in a compact manner. Allowing experience programmers to interpret and work out the cause of program failure.

Network Addresses – hexadecimal numbers are used to express the unique internet protocol address in a more compact way. It is also used to express computer Media Access Control (MAC) address which identify each hardware device uniquely.

ASCII and Unicode – Hexadecimal number is used to express different characters in languages other than English as a standard that can be used all over the world.

URL Encoding – Hexadecimal number is used in Uniform Resource Locator (URL) to represent reserved characters that is part of a web address.

[4]

2. Insert **six** of the following words about types of software licences in the correct places in the text below.

Most <u>commercial</u> software are under legal protection and copyright, and they are also known as <u>proprietary software</u>. Unauthorised copying is <u>illegal</u> and majority of the source code is kept secret. Only after these legal protection have expired, been surrendered or are simply inapplicable would these programs become <u>public domain</u> software.

A type of software known as <u>freeware</u> is similar to proprietary software except that it is available for use at no cost. It usually allows users to try a limited version of the software. While <u>shareware</u> is usually the demonstration software that is distributed for free for a specific evaluation period.

[6]

3 Computer networks are common nowadays. Most homes are equipped with a simple modem and a router to link the mobile devices at home to the same network. Identify **two** other network devices. In each case, explain the function of the device.

NetworkInterfaceCard(NIC)Provides the hardware interface to enable the transfer of data between a device and anetwork. Usually built-in in most devices, the NIC has a unique 48-bit MAC addressthat can be used to identify the computer or device its connected to.

Network Hub

Connects multiple devices to the same network. It transfers received packets to all devices connected to the hub, like a broadcast. However, it does not store any information about the connect devices.

Network Bridge

Connects two similar networks together to form a single network. Used to connect 2 LANs using the same protocol. The bridge uses MAC addresses to keep track of all devices connect to it and is able to decide if it requires to forward or drop packets when it receives data packets.

4 Your Co-Curricular Activities (CCA) club wants to organise an enrichment activity for its members. Each student is given 3 enrichment activities to choose from. Your club wants to use a computer program to find out which students are interested in which enrichment activity and which is the most popular choice. There are 60 students in the club.

State the inputs, the outputs and the processes required to find the most popular enrichment activity and the names of the students who chose that enrichment activity.

Inputs

- 60 students' names
- 60 students' choices (1 of 3 possible enrichment programs)

Output

- Enrichment with most names
- List of names who chose enrichment

Process

- Store names and choices into list
- Split names into 3 different list based on name of enrichment
- Count number of names in each list

[6]

- 5 There are three main types of program errors that can occur in programming.
 - (a) A student was asked to write a program that asks for integer and returns the value of that integer multiplied by 5. The program would be required to check that only numbers are accepted. The student wrote the following code.
 - 1 number = input("Please enter a number. ")
 - 2 while not number.isdigit:
 - 3 number = input("Please enter numbers only. ")
 - 4 answer = number * 5
 - 5 print(answer)

The student made 2 mistakes in the programming code above. That caused his output to be undesirable.

You are required to do the following:

- locate which lines the errors are in
- for each error, identify what type of error it is
- explain why it is an error
- what should be done to correct the error

Line 2 Syntax Error The use of function isdigit, requires the "()" to be completed. The correction should be number.isdigit()

Line 4

Logic Error

Since the program is required to output the value of the input number multiply by 5, the answer = number * 5 requires "number" to be integer. However, at that step, number stores the value in a string. So, the output will be 5 of that number string together.

The correction should be answer = int(number)*5

(b) (i) State the third type of error that is not found in part (a).

(ii) Describe with an example why such an error occurs and what will it cause.

- i) The last error is Run-time errors.
- ii) This error occurs by incorrect use of commands, input data that has not been properly validated or running out of memory. This will result in the program crashing or hanging. An example would be a program that is required to add 2 to the number that is input. num1 = 2 num2 = input("Enter integer") print (num1+num2) and the inputs given is seven. A run time error will occur here.

[4]

[5]

6 Five statements about compilers and interpreters are shown.

Tick ($\sqrt{}$) to show whether the statement refers to a compiler or to an interpreter.

Statement	Interpreter	Compiler
Takes one statement at a time and executes it		
Syntax errors are detected before the program		
runs		
Translates the whole program in one go		
Easier to debug		
Resulting program runs at a faster speed		

7 Pharming is a type of cyber-attack; describe two safety measures that businesses could use to prevent pharming.

Two from:

- Use regularly updated anti- virus program to protect against unauthorized alteration of the Host file.
- Regularly patch your operating system and installed software.
- Check the 'HTTP' address for 'HTTPS' which shows that the protocol used is secured
- Check for the Padlock symbol that indicates a secure, encrypted connection.
- Double check the spelling of the website.

[2]

[3]

8 Study the following flowchart of a program very carefully.



(a) Complete the trace table for the following two sets of data:

(ii) a = 5, b = 9, c = 4, d = 1

а	b	С	d	X	У	OUTPUT
					1	
18	34	5	55			
				0		
	5				34	
		34		1		
				0		
5					18	
	18			1		
				0		
						5,18,34,55
					1	
5	9	4	1			
				0		
	4				9	
		9		1		
		1			9	
			9	1		
				0		
4					5	
	5			1		
	1				5	
		5		1		
				0		
1					4	
	4			1		
				0		
						1,4,5,9
						[4]

(b) (i) Explain the purpose of this program.

(ii) Explain the purpose of the following two variables within this program.

Purpose of the program is to sort the 4 numbers that have been input in ascending order.

Variable x is used as a check to see if any numbers have been swapped.

Variable y is used as a third variable to temporarily store the value of one of the two numbers that is being swapped.

9 Spreadsheets are used to process and analyse data. Explain the purposes of conditional formatting, goal seek and scenario manager features in spreadsheets.

Conditional formatting – allows users to highlight important details to make them more noticeable. It allows a cell to automatically vary its appearance based on the rules set.

Goal seek – Allows users to specify a specific value or requirement and get the program to make changes to one particular cell in order for the specific value to be achieved.

Scenario manager – allows the user to create set of values that a spreadsheet can save and substitute automatically into a range of cells. It also allows the user to print the summary of all scenarios to view the changes in a single spreadsheet.

10 Rick gave the following three computer definitions.

Give the name of the term being described in each case.

(i) "a temporary memory to store data waiting to be sent to a device"

buffer

(ii) "a signal from a device sent to a computer causing the CPU to stop its current operation temporarily"

interrupt

(iii) "a permanent storage device type that has faster access speed and is not susceptible to mechanical shocks"

solid state

[3]

11 Networks are made up of physical topology and logical topology, such as bus topology and peer to peer networking.

You are tasked to design the information kiosk for the upcoming Changi Airport Terminal 5. The information kiosk would allow users to check their current location and how to get to a particular destination within the terminal. Your design should ensure that updating the main computer will update all the other kiosk as well.

Suggest a possible physical and logical topology for your design. Explain your decision.

Physical topology – Star topology Since the updating will be done on the main computer terminal, and all such information will have to be transferred to all other kiosk, star topology makes its ideal to do its centralise control. furthermore with the server to store the data, having terminal break down will not affect all other terminals.

Logical topology – Client server network will be ideal in this situation. Firstly the need for a main computer for updating will make peer to peer fail the requirement of centralize server. (1m) Having client server network would also allow the kiosk to require lower technical specification compared to the main computer. Since it does not require so much processing capabilities.

8

12 A gas heater has a safety circuit made up of logic gates. It generates an alarm sound in response to certain conditions.

The output, X, of the logic circuit that drives the alarm must have a value of 1 only if: either gas pressure is normal and carbon monoxide level is too high or gas leak is detected and carbon monoxide level is normal

The inputs to the system are:

Input	Description	Binary	Conditions
		Value	
	gas leak	0	no gas leak is detected
L	detection	1	gas leak is detected
<u> </u>	carbon	0	carbon monoxide level is normal
C	monoxide level	1	carbon monoxide level is too high
6		0	gas pressure is normal
G	gas pressure	1	gas pressure is too high

(a) Draw a logic circuit for this safety system.



[5]

(b) Complete the truth table for the monitoring system.

L	C	G	R	S	Т	U	X
0	0	0	1	0	1	0	0
0	0	1	0	0	1	0	0
0	1	0	1	1	0	0	1
0	1	1	0	0	0	0	0
1	0	0	1	0	1	1	1
1	0	1	0	0	1	1	1
1	1	0	1	1	0	0	1
1	1	1	0	0	0	0	0

- 13 Write an algorithm, using pseudocode only, which:
 - inputs 1000 numbers
 - ensures that the number entered is between (1 to 10000) (You may assume that only numbers will be input)
 - processes each number to identify if it's a perfect square
 - outputs only the perfect square
 - outputs the total number of perfect squares
 - outputs the total percentage of inputs are perfect squares
 - outputs the total number of even perfect squares
 - outputs the total number of odd perfect squares

(You may use INT(X) in your answer e.g. Y = INT (3.8) gives the value Y = 3 and SQRT(X) in your answer e.g. Z = SQRT(81) gives the value Z = 9.0)

Your output statement should look as follows:

The total number of perfect squares: 143 The total percentage of inputs that are perfect squares: 14.3% The total number of even perfect squares: 101 The total number of odd perfect squares: 42

```
total = 0
number =0
is_even = 0
difference = 0
even_square = 0
odd_square = 0
percentage = 0
```

```
FOR x = 1 to 1000
     INPUT number
     REPEAT
              INPUT number
     UNTIL (number > 1 AND number < 10000)
     difference = SQRT(number) – INT(SQRT(number))
     IF difference = 0
             total = total + 1
             is even = number/2 - INT(number/2)
             IF is even = 0
                    even_square = even_square + 1
              ELSE
                    odd square = odd square + 1
             ENDIF
NEXT
percentage = total/1000*100
OUTPUT "The total number of prefect squares: " + total
OUTPUT "The total percentage of inputs that are prefect squares: " + percentage +"%"
OUTPUT "The total number of even prefect squares: " + even square
OUTPUT "The total number of odd prefect squares: " + odd square
```