	ST. PATRICK'S SCHOOL PRELIMINARY EXAMINATIONS 2019 SECONDARY 4 EXPRESS		
NAME	SOLUTIONS		
CLASS		INDEX NUMBER	
COMPUTI	NG		7155/01

Paper 1 Written

7155/01 10 May 2019 2 h

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

READ THESE INSTRUCTIONS FIRST

Write your name, class, index number in the spaces at the top of this page. Write in dark blue or black pen. You may use an HB pencil for any diagrams or graphs. 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.

Parent's Signature : _____

Date: _____

Remarks (if any) :

For Exan	niner's Use
Marks	/80
Total	/00
	%

1 Draw a line to match the spreadsheet function to the correct description.



- [4]
- 2 A security system records video footage. One minute of video requires 180 MB of storage. The recording system can store several hours of video footage. (Computer Science P1, CIE 2015)
 - (a) Name and describe a suitable storage device for this recording system.

Memory card / Solid state drive / Hard disk drive. It is a non-volatile secondary storage

device *that is portable and uses flash memory / that uses flash memory / that uses

- magnetic storage. [2]
- (b) Calculate how much storage would be needed for 2 hours of video footage.

Show your working and give the answer in Gigabytes (GB).

 $180 * 10^9 * 2 * 60 / 10^{12} = 21.6 \text{ GB}$

[2]

3 A car's Engine Management System receives information from seven different sensors and stores the status of each sensor in an 8-bit register. A value of **1** indicates a fault condition.



For example, a register showing 10110100 indicates:

- Engine overheating
- Airbag malfunction
- Low fuel

(a) Identify the fault condition(s) that the following register indicates:

1 0 0 0 1 1 0 ·

There is low fuel, low voltage and the brake pads are too thin.

(b) The system uses even parity.

Write the correct parity bit in each of the following registers.

<mark>0</mark>	1	1	1	0	0	1	0
<mark>1</mark>	0	1	0	1	0	1	0

[2]

(c) State the hexadecimal value of the binary number shown in (a).

<u>(8C)₁₆</u>[1]

4 In 2018, many Apple users received the following email notification allegedly from Apple's billing department.

From: Apple Billing <<u>secured-uppds-auth-en-us-lang-appfgisdgisdgsgdjhjgdfg17@contoloyo.com</u>> Date: May 14, 2018 at 11:16:42 AM PDT To: undisclosed-recipients:; Subject: RE : [Alerts - Recent Activity] Your payment has been Scheduled [CONFIRMATION]



Dear Client,

This email confirms payment for the iCloud storage plan listed below. You will be billed each month unless you cancel. *To cancel, downgrade your storage plan from your iPhone, iPad, iPod touch, Mac, or PC.

Order ID : **TX226SDG594** Date of Purchase : Monday, May 14, 2018 Payment Method : iTunes

Item : 2 TB Storage

Subtotal : \$29.99 Tax : \$0 Total : **\$29.99**

You may cancel or downgrade from your device at any time. You may contact Apple for a full refund within 7 days of a monthly subscription upgrade or within 15 days after a yearly payment. Partial refunds are available where required by law.

Click For Cancel or Downgrade >

*Please feel free to use support. You can check the details of the product, download the latest software update, share hints and solutions with other users. Also, You can choose the method that is most suitable for you.

The hyperlink, titled "<u>Click For Cancel or Downgrade ></u>", leads to a fake website which looked like the company's real website. Several unsuspecting customers did not pay attention to the address of the hyperlink, and tried to login to their iTunes account as usual. As a result, their account was compromised, and personal information was stolen.

(a) Name and explain the type of cyberattack involved.

Phishing

It uses emails and fake websites that appear to be from reputable companies in order to

steal personal information from users. [3]

(b) Other than the address of the hyperlink, identify **two** tell-tale signs that should have alerted the user to conclude that the email is fraudulent, thus avoid becoming victims to this cyberattack.

Any two of the following:

- Email uses a generic greeting, "Dear Client", suggesting that it was sent automatically and not by a person
- Email has grammatical, spelling, spacing and punctuation errors, "Also,You can ...", "Click For Cancel or Downgrade", that suggest it is not from a legitimate source
- Tone of email is excessively urgent or threatening, "You will be billed each month unless you cancel." It also continuously emphasises and hints to the recipient to cancel, downgrade, ask for full refund or ask for partial refund of the purchase, baiting the recipient to click on the hyperlink.
- Email did not sign off, leaving no indication of the department or name of officer-incharge.
- The sender email address is questionable as it contains a long unintelligible string of characters and a dubious domain name, "contoloyo.com", whereas most reputable companies tend to use more relevant user ID and domain names in their email addresses.
- The recipient field displays "undisclosed-recipients:;", indicating that the email was sent in mass to many others, instead of it being a receipt that is generated specific to the dedicated user.
- The title of the email "Re: [Alerts Recent Activity] Your payment has been Scheduled [CONFIRMATION]" shows that it is a reply email rather than an automated or newly sent receipt of purchase.

6 A perfect number is an integer that is equal to the sum of its proper divisors. The following program will accept a sequence of integers and output the perfect numbers.

```
FOR counter = 1 to 3
 1
2
      total = 1
3
      INPUT number
      FOR divisor = 2 to INT(number**0.5):
4
5
          IF number % divisor == 0:
 6
             total = total + divisor + (number / divisor)
7
         ENDIF
8
      NEXT
9
       IF total == number:
10
          OUTPUT number
11
      ENDIF
12
   NEXT
```

Complete the trace table for the following set of data, entered in sequence.

number = 6, 10, 28, 30

Trace table

counter	total	number	divisor	OUTPUT
1	1	6		
			2	
	6			
				6
2	1	10		
			2	
	8			
			3	
3	1	28		
			2	
	17			
			3	
			4	
	28			
			5	
				28

- 7 In most cars, the car alarm system, **A**, would sound when
 - the user presses the alarm on the remote control (**R** = 1), or
 - the car is locked (L = 1) and the shock sensors detect a strong impact (S = 1), or
 - the car is locked (L = 1) and the voltage sensors detect a decrease in voltage (V = 0).
 - (a) Write down the Boolean statement for the car alarm system.

 $\mathbf{A} = \mathbf{R} \text{ OR } (\mathbf{L} \text{ AND } \mathbf{S}) \text{ OR } (\mathbf{L} \text{ AND } \text{ NOT } \mathbf{V}) / \mathbf{A} = \mathbf{R} \text{ OR } (\mathbf{L} \text{ AND } (\mathbf{S} \text{ OR } \text{ NOT } \mathbf{V}))$ [1]

(b) Draw the logic circuit diagram for the car alarm system.



8 The following logic circuit diagram is only made up of NAND gates.



(a) Complete the following truth table for the above logic circuit diagram.

Α	В	Q
0	0	<mark>0</mark>
0	1	<mark>1</mark>
1	0	<mark>1</mark>
1	1	<mark>1</mark>

[4]

(b) Name a single logic gate that has the same function as the above logic circuit.

OR gate [1]

9 The following program calculates the lowest common multiple between 2 integers.

One way of calculating the lowest common multiple between 2 integers is to divide the product of the 2 integers by their highest common factor.

```
hcf = 0
 1
 2
   Lcm = None
 3
   INPUT integer_1, integer_2
 4
   FOR count = 2 to MIN(integer 1, integer 2)
5
       IF (integer 1 % count) == 0 or (integer 2 % count) == 0:
6
           hcf = count
7
       ENDIF
8
   NEXT
   Lcm = integer 1 * integer 2 % hcf
9
10
   OUTPUT Lcm
```

(a) There are three errors in this code. Locate the errors and suggest a correction.

Error 1	Line 1	
Correction	hcf = <mark>1</mark>	
Error 2	Line 5	
Correction	IF (integer_1 % count) == 0 <mark>and</mark> (integer_2 % count) == 0:	
Error 3	Line 9	
Correction	Lcm = integer_1 * integer_2 <mark>/</mark> hcf	
		[6]

- **9** A processor or central processing unit (CPU) executes instructions.
 - (a) Describe what is meant by a 1 MHz (megahertz) processor.

a 1 MHz (megahertz) processor can perform one million instructions per second

[2] (b) Describe what is meant by multi-core processors. "multi-core" processors that contain multiple processing units inside a single package. These "multi-core" processors can perform more than one instruction at the same time [2] 10 Computers in a network are generally classified as either clients or servers. These devices can be organized in either a client-server or peer-to-peer (P2P) network. Describe two differences between a client-server network and P2P network in terms of (a) their functions In client-server network, data and resources are shared using one or more dedicated servers; each computer has a distinct role – client or server However, in P2P network, data and resources are shared directly between computers; each computer acts as both a client and server[4] What kind of network would you suggest for businesses with a large number of users? (b) Explain your answer. Client-server network. Because security is high as access rights can be controlled centrally at a server and not by each computer. Bandwidth is usually high due to the presence of a dedicated server. [2] 11 Your friend has 2 laptops, 2 desktops, 1 wireless printer and 1 tablet computer at home. He wishes to connect these devices as a single home network. Draw for him a possible network diagram for his home in the space provided. You should label your network devices clearly.

Drawing must be clearly drawn and labelled; and must include: 1) wireless router 2) modem

12 Perform the following number system conversions. Show your working clearly.

(a)	Hexadecimal 7A to Denary	
	122. Correct working shown clearly.	
		[2]
(b)	Denary 765 to Hexadecimal	
	2FD. Correct working shown clearly.	
		[2]
(c)	Binary 10101111 to Hexadecimal	
	AF. Correct working shown clearly.	
		[2]

- **13** Data stored on a computer needs to be kept safe and secure. Malicious software or viruses can cause data corruption and loss.
 - (a) State two other ways data can become corrupted.

(b) Explain one difference between viruses and worms. When the modified program is run by a user, the virus attaches copies of itself to any other programs it can find, thus "infecting" them. Unlike a virus, a worm does not need to attach itself to an existing program	[2]
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A computer program that runs automatically and attempts to spread by sending copies of itself to other computers	- · · -
A computer program that attaches itself to a normally harmless program and modifies it	[1]
(c) Apart from data corruption, data must be kept safe from unauthorized access. State three reasons how unauthorized access can occur.	
1 Poor authentication	
2 Poor access control or authorisation	
3 Poor understanding of privacy policies	[3]
14 A client wants you to write a program to calculate the cash income of a mini store over a day. Upon running the program, it should ask the user for the amount of cash received from each transaction. Then, the program outputs the total amount of cash income over the day, and the average amount of cash income per transaction.	
Input Amount of cash received from each transaction.	
Output Total amount of cash income over the day, Average amount of cash income per transaction	

Process Store the amount of cash received from each transaction in a variable. Add to the total variable and track the number of transaction. From this total variable, calculate the average.

[6]

15 Write a pseudocode or flowchart to inverse the letters of a string. Inverse means to swap the letter to the opposite letter in the English alphabet. For example, if "a" is present, change it to "z"; if "b" is present, change it to "y". The program should then print the result. You may assume that the input string only contains lower case alphabet characters. So the inverse of input string "abefg" is "zyvut".

Initialisation [2]	
Input [1] Loops construct and conditional constructs[4]	
Output [1]	
	[8]