ST. PATRICK'S SCHOOL
PRELIMINARY EXAMINATIONS 2020
SECONDARY 4 EXPRESS

NAME

CLASS

INDEX NUMBER

COMPUTING
Paper 1 Written

7155/01
20 August 2020
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 Examiner's Use	
Marks	/80
Total	%

This document consists of **11** printed pages including this page.

1 **(a)** Convert the binary number **0101 1111** into its hexadecimal value.

....

.... [1]

(b) Convert the positive whole denary number **462** into a 12-bit binary number.

Answer: .... [2]

(c) Describe how the hexadecimal number **8A** is converted into its denary value. Give the denary value in your answer.

Description: ....

....

....

....

....

....

....

Denary value: .... [4]

2 The following diagram shows five network terms and six descriptions.

Draw a line from each network device to its best description.

Network Devices	Description

Network Devices
Bridge
Router
Network Interface Card (NIC)
Modem
Hub

Description
A device that constructs a single network by connecting two similar networks together
A device responsible for modulation and demodulation
A device that provides the hardware interface to enable the transfer of data between a device and a network.
A device that extends the distance a signal can travel
A device that forwards packets between separate networks
A device that transmits received packets to all connected devices

[5]

3 The following pseudo-code algorithm validates the age of a user.

```
 1  is_valid = False
 2  no_of_users = 0
 3  CURRENT_YEAR = 2020
 4  WHILE is_valid = False
 5      OUTPUT "Enter your birth year: "
 6      INPUT birth_year
 7      IF CURRENT_YEAR – birth_year >= 18 THEN
 8          is_valid = True
 9          no_of_users = no_of_users + 1
10      ENDIF
11  ENDWHILE
```

(a) The algorithm is tested using the following three numbers as input: 2006, 2000.

Complete the trace table for the algorithm.

birth_year	is_valid	no_of_users

[3]

(b) State whether **is_valid** is a variable or a constant. Give a reason for your choice.

....

....

.... [2]

(c) Identify the data validation technique used in the algorithm.

....

.... [1]

(d) Identify two other data validation checks.

1: ....

2: .... [2]

(e) The algorithm is tested with data for normal conditions.

Identify **two other** test case conditions that could be used to test the algorithm.

For **each** condition, give an example of test data for this algorithm.

Test case condition 1:

Test data 1:

Test case condition 2:

Test data 2: [4]

4 A government agency has asked your company to create an app for citizens to access all government services.

- The app will display a menu that lets the user login or register for an account.
- If the user registers for an account, the user must fill up a particulars form.
- If the user logs in, he/she will have to pass a few authentication measures before he/she can be granted access.
- Once access is given, the user will be able to select a list of government services.
- The user can also access his/her email inbox to view/send messages from/to various government services.
- The user can log out from the app at any time.

(a) Identify **five** modules that can be decomposed from the problem.

Module 1:

Module 2:

Module 3:

Module 4:

Module 5:

[5]

(b) For the login module, state the input, output and process that are required.
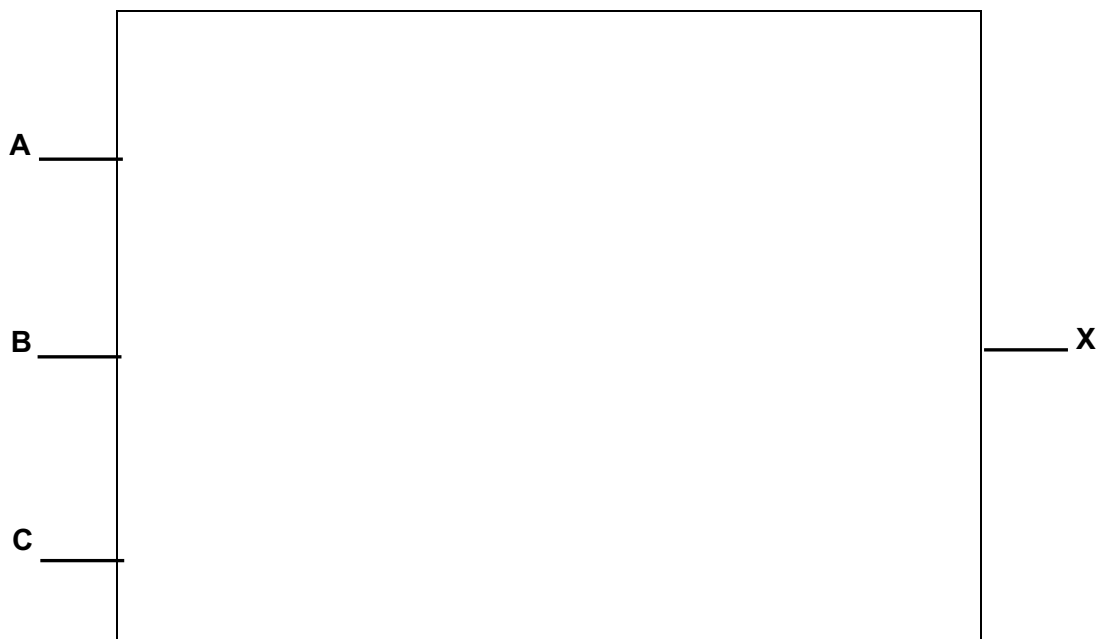
Input: ....

....

Output: ....

....

Process: ....

.... [3]

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

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

A ____

B ____   ____ **X**

C ____

[5]

(b) Complete the following truth table for the Boolean statement:

$$X = (NOT\ A\ OR\ (B\ NOR\ C))\ AND\ (A\ NAND\ C)$$

A	B	C	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 e-commerce company uses technology to train its staff.

(a) Give **three** social benefits to the staff of using technology to upgrade their skills.

1: ....

....

2: ....

....

3: ....

.... [3]

(b) One negative impact of using technology in a company is that its sensitive data can be compromised by cyber-attackers. State **two** types of cyberattacks.

1: ....

2: .... [2]

(c) Describe **two ways** in which the company can adopt to ensure the security and integrity of its customers' data.

1: ....

....

....

2: ....

....

.... [4]

7 Alice has a $65 000 loan to buy a car. The loan is repaid over 3 years. The interest rate is 10% per year. She has a spreadsheet to keep track of the repayments and the amount she owes.

	A	B	C	D	E
1	**Initial Loan**	$65,000.00		**Total Paid to Date**	$4,194.74
2	**Interest Rate**	10%		**Amount Owed**	$71,310.00
3	**Loan Length (months)**	36		**Number of Payments Made**	2
4	**Monthly Payment**	-$2,097.37			
5	**Total to Pay**	$75,505.22			
6					
7	**Date**	**Amount Paid**			
8	01/01/2020	$2,097.37			
9	01/02/2020	$2,097.37			
10					

(a) Identify the most appropriate data type for the following cell references.

A1: ....

A8: ....

B1: .... [3]

(b) The cell B4 shows the monthly payment amount.

Identify the most appropriate function to use in cell B4, if the interest rate and monthly payment amount remain the same.

.... [1]

(c) The cell E1 shows the total amount that Alice has paid to date. The payments are entered in cells B8 to B43.

Identify the most efficient function to use in cell E1.

.... [1]

(d) The formula in cell E3 calculates the number of payments made.

Identify the most appropriate function to use in cell E3.

.... [1]

8 This section of program pseudo-code asks user for 100 Body Mass Index (BMI) numbers between 18.5 and 40. It checks that the numbers are in the correct range, and stores them in an array. It counts how many of the numbers are larger than or equal to 27.5 and then outputs the result.

```
1  count = 0
2  array = []
3  FOR num = 1 TO 100
4      INPUT 'Enter the BMI: ', BMI
5      WHILE BMI = 18.5 AND BMI = 40
6          INPUT 'Out of range BMI. Enter value between 18.5 and 40', BMI
7      ENDWHILE
8      array[100] = BMI
9      IF BMI >= 27.5 THEN count = count + 1
10 NEXT
11 PRINT num, ' BMIs were larger than or equal to 27.5.'
```

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

Error 1: ....

Correction: ....

....

Error 2: ....

Correction: ....

....

Error 3: ....

Correction: ....

....

[6]

9 Complete the following sentences by filling in the missing words.

(a) ………………………………….. is a network device that provides a connection between wireless devices up to 100 metres away and can connect to wired networks.

(b) ………………………………….. stores large amounts of data that will not be lost when power supply is interrupted.

(c) ………………………………….. is a device or computer program that prevents unauthorised access to or from a private network.

(d) ………………………………….. is a network of computing devices connected within a small geographical area, typically within the same building.

[4]

10 A tuition centre needs a computer program to read in the test scores for 40 students and then outputs the average test score, the lowest score and the highest score. Each test score is a whole number between 0 and 100 inclusive.

Write an algorithm, using a flowchart, to take the 40 scores as input and then outputs the average score, lowest score and highest score. You do **not** need to validate any data entered.

[6]

11 Write an algorithm, using pseudocode, to encrypt the letters of a string based on the position of the letter in the English alphabet. For example, if "a" is present, change it to "1"; if "b" is present, change it to "2". The program should then print the result. You may assume that the input string only contains lower case English alphabet characters.

You **must** validate all inputs.

[8]

End of Paper