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

NAME	Marking Scheme	

CLASS		INDEX NUMBER	

COMPUTING   **7155/01**

Paper 1 Written   **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) :

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

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

5F with correct working

[1]

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

Correct working (place value method or divide-by-2 method)

Answer: 0001 1100 1110 [2]

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

Description:

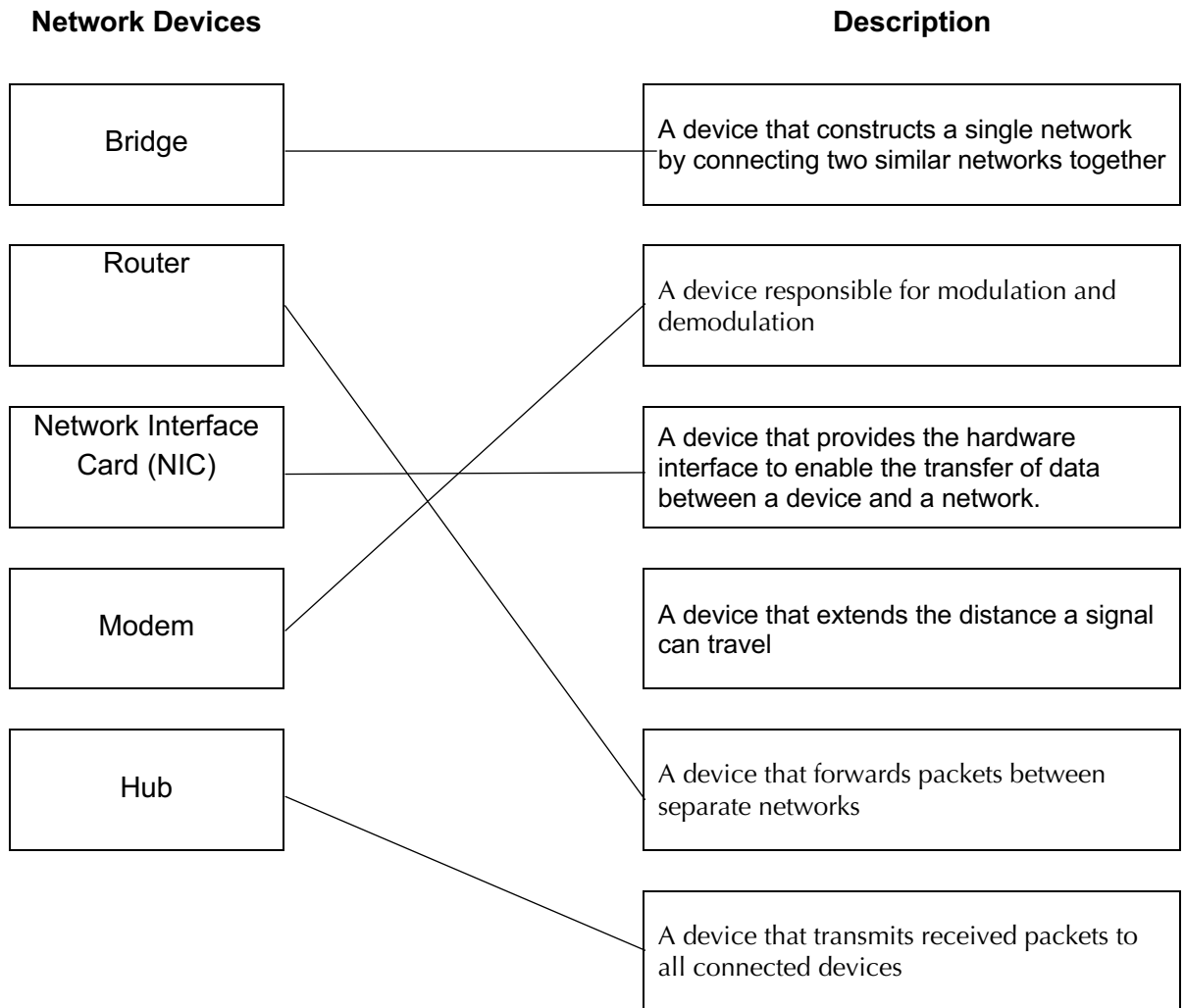To convert a hexadecimal number to its denary equivalent:
1. Convert each hexadecimal digit to its equivalent denary number.
2. Multiply each denary number by its place value.
3. Sum the product of each denary number and its place value.

Denaryl value: 138 [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**

Bridge

Router

Network Interface Card (NIC)

Modem

Hub

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
	False	0
2006		
	False	
		0
2000		
	True	
		1

[3]

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

It is a variable
A constant is a name with an associated value that usually cannot be changed while the program is running

[2]

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

Try again

[1]

(d)   Identify two other data validation checks.

1: Length check

2: Presence check, Format check   [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: Error

Test data 1: Any input that is not a positive integer.

Test case condition 2: Boundary

Test data 2: 2002, 2001, 2003 [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: Login and Register module.

Describe the features

Module 2: Particulars form

Describe the features

Module 3: Authentication form

Describe the features

Module 4: Menu of government services

Describe the features

Module 5: Email inbox/log off

Describe the features [5]

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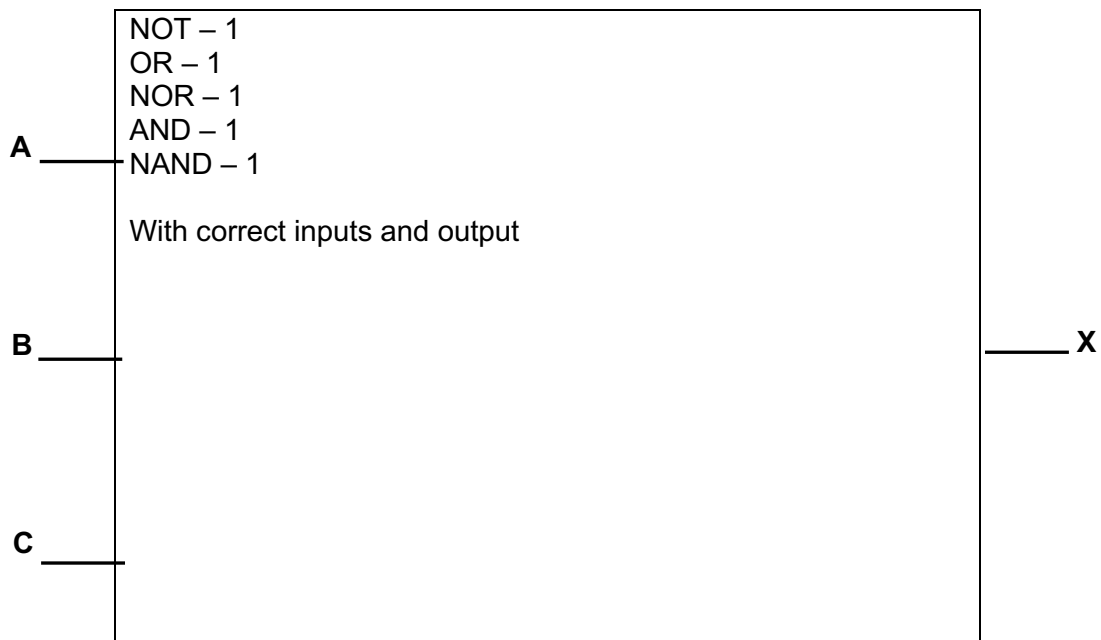
Input: username, password

Output: Authentication page

Process: store username and password in an array. Search the registered users list for a

match. If matches, allow user to go to next page. If not, send error message   [3]

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

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

NOT – 1
OR – 1
NOR – 1
AND – 1
NAND – 1

With correct inputs and output

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		1
0	0	1		1
0	1	0		1
0	1	1		1
1	0	0		1
1	0	1		0
1	1	0		0
1	1	1		0

[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: On the positive side, technology has provided better videos, simulations and collaboration tools for lessons to be more engaging and relevant to staff. The open sharing of information on the Internet has made education accessible to all, giving a wider perspective.

[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: Trojan horse, virus, worm,

2: phishing, pharming, spyware

[2]

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

1: Viruses, worms, spyware and Trojan horses are all examples of malware that need to run on a user's computer in order to perform their respective attacks. Anti-virus and anti-spyware programs can be used to:
• detect when malware is about to be run and stop it from running;
• detect malware that is already running and try to stop it; or
• scan the user's storage and email to detect and remove malware; if a program has been infected by a virus, it may also try to restore the original program.

2: **Update software regularly** so that bugs that were discovered since the last update can be fixed. This is especially important for software that is used to interact with public networks such as the Internet, as data from public networks is more likely to be malicious and designed to take advantage of known bugs.

Identify phishing, pharming, with correct explanation

[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: text

A8: date

B1: currency   [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.

=PMT(10%/12,36,65000,0)   [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.

=SUM(B8:B43)   [1]

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

Identify the most appropriate function to use in cell E3.

=COUNTA(A8:A43)   [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:   Line 5

Correction: WHILE BMI < 18.5 OR BMI > 40

Error 2:   Line 8

Correction: Append BMI to array; array.append(BMI)

Error 3:   Line 11

Correction: PRINT count, ' BMIs were larger than or equal to 27.5.'

[6]

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

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

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

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

(d)   ....**LAN**............................ 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.

Initialisation of lowest, highest, average [1]
Loop management
..for lowest [1]
..for highest [1]
Average formula [1]
Output lowest [1]
Output highest [1]
Output average [1]

[Any 6]

[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.

Initialisation input and list of letters-numbers and output [3]
Lowercase Validation + error message [2]
Loop management
…search for letters.[2]
…append to output string[2]
Output string encryption[1]

Any 8

[8]

End of Paper