COMMONWEALTH SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2021

COMPUTING
Paper 1 (Theory)

Name: _____ ( ) Class: _____

SECONDARY FOUR EXPRESS /
SECONDARY FIVE NORMAL (ACADEMIC)

Monday 17 September 2021

0800 – 1000

2 hours

7155/01

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.

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.

Candidates will answer on the question paper.

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.

Name of setter: Mr Christopher Sim

Parent's Signature: _____

For Examiner's Use	
Total	**80**

This paper consists of **15** printed pages including the cover page.

[Turn over

1 **(a)** Convert the denary number **110** into binary number.
Show your working.

.....

.....

.....[2]

(b) Convert the hexadecimal number **19C** into denary number.
Show your working.

.....

.....

.....[2]

2 Lawrence has a computer that has a central processing unit (CPU) based on the Von Neumann model for a computer system.

(a) Identify the component within the CPU that controls the flow of data.

.....[1]

(b) Identify the component within the CPU where calculations are carried out.

.....[1]

(c) Identify the set of wires responsible for the transport of data between components of computer.

.....[1]

3 Instructions executed by the computer can either be processed by a programming language or a machine code.

(a) Give **two** reasons why a programmer would choose to write a program in using programming language instead of writing a machine code.

1 .....

.....

2 .....

.....

[2]

(b) A compiler can used to translate from a program written in programming language to a machine code.

State **two** advantages of using a compiler.

1 .....

.....

2 .....

.....

[2]

(c) A programmer makes several errors when writing a computer program.

A runtime error is one type of program error.

Identify **and** describe **two** other types of program error.

Error Type 1 .....

Description .....

.....

Error Type 2 .....

Description .....

.....

[4]

4 Charlie has a web server that stores his online media repository.

Customers can access the website using a browser and make purchases for the published stock photographs.

(a) State **two** reasons why Charlie still uses a HDD instead of upgrading to a SDD for his web server.

1 .....

.....

2 .....

.....
[2]

(b) The browser uses a small file to store the details of the products that his customers view. This allows the website to display advertisements for other products they may like.

The small file also stores his log-in details.
Give the name of this type of file.

.....[1]

(c) State **three** online threats to Charlie's web server.

1 .....

2 .....

3 .....
[3]

(d) Charlie makes sure data transmission for his website is secure.

State how his customers can check that the personal details they enter into the website will be transmitted securely.

.....

.....[1]

5 The use of tele-medicine using video conferencing platforms to provide remote diagnosis and consultations has become popular nowadays.

(a) Explain **one** positive and **one** negative social impact of the use of tele-medicine.

Positive impact .....

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Negative impact .....

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.....
[4]

(b) State **one** ethical issue with the automation of medical procedures with the use of robots.

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.....[1]

6 The use of the Internet to transmit information is prevalent nowadays.

(a) Transmission of data can be done wired or wirelessly.

Explain **two** reasons why wired is a preferred option.

1 .....

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.....

2 .....

.....

.....

[4]

(b) The MAC address is used to identify a particular network device on the network.

(i) State the name of the network device.

.....[1]

(ii) Describe the structure of a MAC address.

.....

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.....

.....[3]

(c) Computing devices can be connected by devices such as a network hub.

(i) Describe the function of a network hub.

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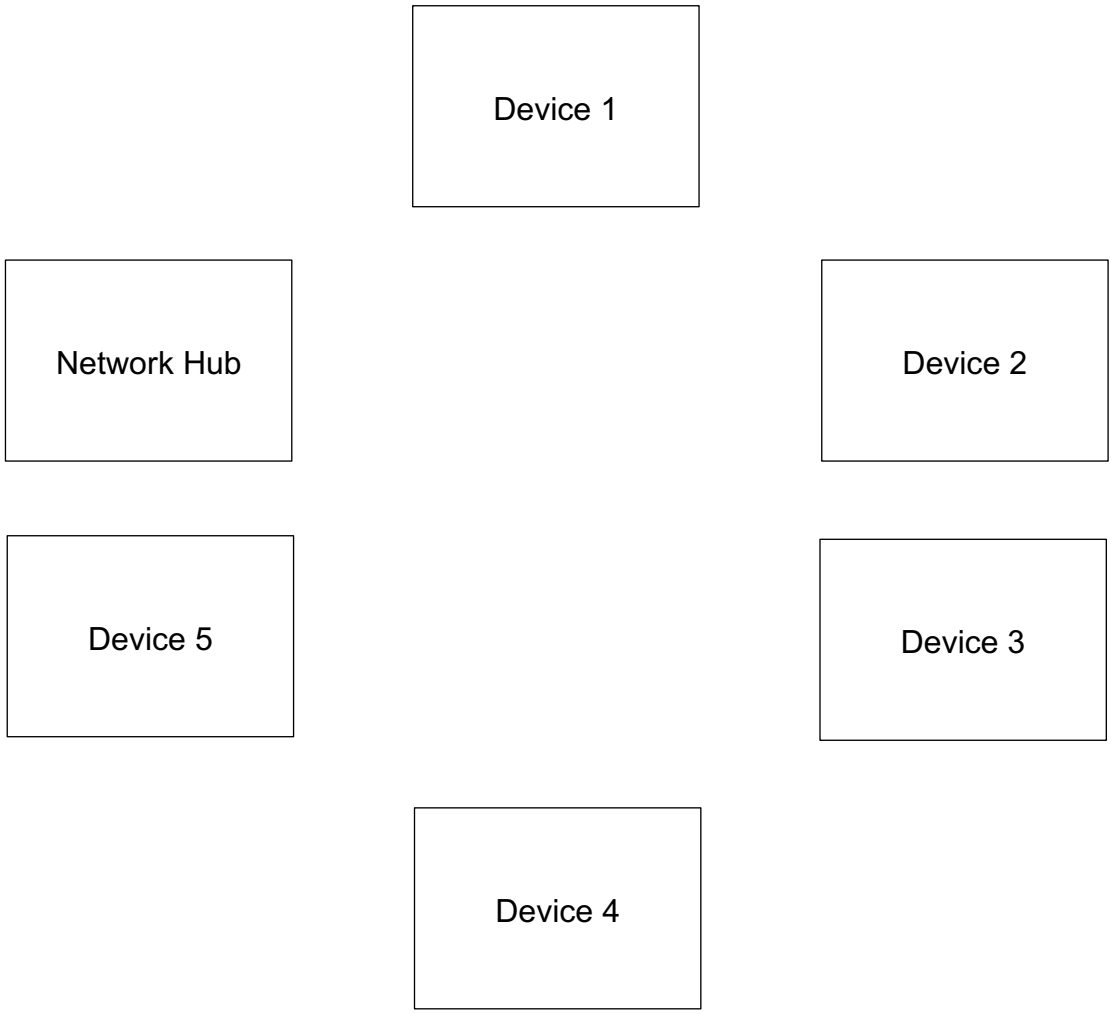
.....[2]

(ii) State the most suitable type of topology that connects computing devices by a network hub. Complete the diagram to show the connections.

Suitable Type of Topology .....



[4]

(d) To check whether the data have been transmitted from one computer to another correctly, parity bits and checksum are used.

(i) **Three** 7-bit binary values are transmitted. A parity bit was **prepended** to each binary value creating 8-bit binary values. All the binary values have been transmitted correctly.

Tick (√) to show whether an **Even** or an **Odd** parity check has been used for each binary value.

8-bit binary value	Even (√)	Odd (√)
11001011		
10001000		
10010101		

[3]

(ii) A parity check may not always detect errors that have occurred in data transmission.
State why a parity check may not detect data transmission errors.

.....

.....[1]

(iii) The data will also be checked using a checksum.

Describe how a checksum can be used to check that the data has been transmitted correctly.

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.....[3]

7 A spreadsheet is used frequently to manage data.

(a) Identify **two** of the stages in the management of data.

1 .....

2 .....

[2]

(b) The following spreadsheet is used to calculate the instalment amount needed for a loan payment.

	A	B	C	D	E
1					
2	Principal Amount	$500000			
3					
4	**Interest Rate Per Annum**	**Repayment Time Period (Years)**			
5		**5**	**7**	**10**	**12**
6	2.5%				
7	5.0%				
8	7.5%				

The formula to calculate each instalment in **B6** is given by:

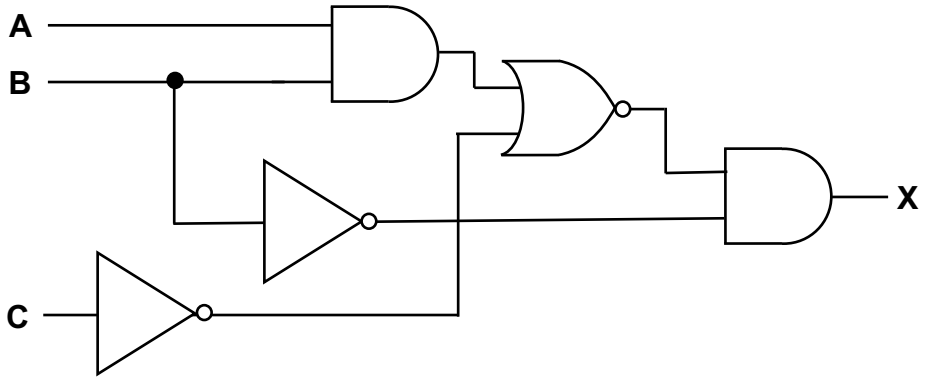
=PMT(A6,B5,B2)

The use of absolute cell references is to not let the cell references change when it is copied to other cells.

Amend the formula in **B6** to include absolute cell references such that the formula can be copied to cells **B6:E8** such that it will make use of the cell references **A6:A8** and **B5:E5** to calculate the instalment based on the different interest rate per annum and repayment time period.

=PMT(..... , ... , ...) [2]

8 **(a)** Complete the truth table for the following logic circuit.



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]

(b) Use the truth values in **(a)** to write down the logic statement for the logic circuit.

X = ...

.....[2]

9 Computer systems are used in the medial industry to improve on their efficiency.

In a particular hospital, a program was developed to monitor its patient's health.

- On admitting to the hospital, the registrar will register the identity number of the patient.
- Based on the identity number, the past records of the patient will be retrieved.
- The nurses will key in the essential information that was measured to monitor the patient's health, such as temperature, blood test results, etc.
- Some of the medical devices will also store various data obtained from its sensors such as heart rate, oxygen level, etc.
- Based on the data entered and match with patient's past records, the system will trigger patients who require immediate attention.

(a) The developers of the program used modular decomposition to break down the system into smaller, more manageable modules to develop.

One of such modules is the **registration of a patient**.

Name **three** other possible modules that can be decomposed from the problem.

Module 1 .....

.....

Module 2 .....

.....

Module 3 .....

.....

[3]

(b) The following algorithm validates the identity number of the patient.

```
01   valid = False
02   WHILE not valid
03        valid = True
04        PRINT "Enter identity number"
05        INPUT identity_num
06        IF LENGTH(identity_num) != 9
07             valid = False
08        ENDIF
09        IF identity_num not in "STFG"
10             valid = False
11        ENDIF
12   ENDWHILE
```

The function `LENGTH()` takes in one string argument and gives an output of the number of characters in the string.

(i) The variables valid and identity_num were used in the algorithm. State the data type for each of the variables.

Variable	Data Type
valid	
identity_num	

[2]

(ii) Give the line number(s) from the algorithm of:

an assignment statement .....

a loop .....

a selection statement .....

[3]

(iii) Identify **two** data validation techniques used in the algorithm.

Validation Technique 1 .....

Validation Technique 2 .....

[2]

10 Write an algorithm, using flowchart to:

- takes in 20 integers
- output the product of the even numbers from the input.

You do **not** need to validate any data entered.

[4]

11 You are to create a program for the Point of Sales (POS) system for a retail store.

Write an algorithm, using pseudo-code, to:

- input the number of unique items for each transaction
- input the quantity and price of each unique item sold
- output the total amount collected for each transaction
- input the string `"X"` to end all transactions
- output the total amount of money collected for all the transactions.

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END OF PAPER