SCHOOL OF SCIENCE AND TECHNOLOGY, SINGAPORE

SECONDARY 4
PRELIM EXAMINATION

COMPUTING
Paper 1 Written

7155/01

28 August 2020 (Friday) **2 hours**

CANDIDATE NAME			
CLASS		INDEX NUMBER	

READ THESE INSTRUCTIONS FIRST
Do not turn over the page until you are told to do so.
Write your name, class, and index number in the spaces provided above.
Write in dark blue or black pen.

You may use a pencil for any diagrams.

Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

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.

For Examiner's Use		
1	4	
2	9	
3	4	
4	5	
5	4	
6	5	
7	7	
8	4	
9	8	
10	10	
11	6	
12	9	
13	5	
Total		/80

1 Draw a line to match the computer parts to their correct description. **[4]**

Computer Parts		Description
arithmetic logic unit	•	• Data storage space that is extremely fast but small. It is physically located inside the processor and cannot be changed without changing the processor.
address bus	•	• Transports required memory location from processor to memory; uni-directional.
control unit	•	• Where data and instructions are stored temporarily so that they can be quickly accessed by the processor when needed.
data bus	•	• Part of the processor that follows instructions and decides when data should be stored, received or transmitted by different parts of the computer.
process register	•	
RAM	•	
ROM	•	

2 The hexadecimal numbering system is widely used in computing. Some examples of usage include representing common characters in the ASCII code format, as well network addresses such as the Internet Protocol (IP) addresses.

(a) State what the acronym "ASCII" stands for.

…… **[1]**

(b) The character "|" is represented by the hexadecimal number 7C in ASCII. Convert 7C into a binary number. Show your working.

Answer: …… **[2]**

(c) The backslash character "\" is represented by the binary number 1011100 in ASCII. Convert 1011100 into a denary number. Show your working.

Answer: …… **[2]**

(d) The character "m" is represented by the denary number 109 in ASCII. Convert 109 into a hexadecimal number. Show your working.

Answer: …… **[2]**

(e) Two well-used IP addresses systems are IPv4 and IPv6 addresses. State the number of bytes an IPv4 address and an IPv6 address use respectively.

Answer: IPv4 uses …..……. bytes

IPv6 uses …….……. bytes **[2]**

[Turn over

3 The rise of technology and the internet has transformed the education landscape in Singapore. The Ministry of Education reports that more schools have experimented with technology for learning and teaching. More research is also being done to develop ICT innovations that can be adopted by schools.[1] However, the use of technology in education also comes with its own threats.

(a) State one positive and one negative **social impact** of technology on education.

(i) Positive impact

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..... **[1]**

(ii) Negative impact

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..... **[1]**

(b) Viruses and worms are two examples of cyberattacks. State a similarity and a difference between viruses and worms.

(i) Similarity

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..... **[1]**

(ii) Difference

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..... **[1]**

[1] https://www.straitstimes.com/singapore/education/more-schools-tap-tech-tools-for-learning (Accessed in August 2020)

4 Data can be lost or stolen due to unauthorised access by individuals or groups.

(a) The table below shows some measures to prevent unauthorised access to data. Classify these measures by putting a tick (✓) in the most appropriate category for each row.

Measures	**Access Control / Authorisation**	**Authentication**	**Understanding of Private Policies**
Biometrics			
Cloud Services			
Encryption			
Firewalls			
Passwords			
Social Networking sites			

[3]

(b) State what 2FA stands for, and explain how it works to prevent theft of data.

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..... **[2]**

5 Boon Lay East Secondary School (BLESS) is organising a cross-country event for its 1000 students. It plans to use a computerised system to find the fastest runners for girls and for boys. State the inputs and processes required to find the name and the timing of fastest runner in each category.

Inputs:……

.....

.....

.....

Processes: .....

.....

.....

..... **[4]**

6 A company is building a new office. They need to build a wireless computer network from scratch. Each employee will be equipped with a desktop and must be able to connect to the internet easily.

(a) Give **two** reasons why the company is building a computer network as opposed to setting up stand-alone desktops.

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[2]

(b) State **two** advantages of choosing wireless networks over wired networks.

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..... **[2]**

(c) Suggest **one** reason why some companies prefer wired networks over wireless networks.

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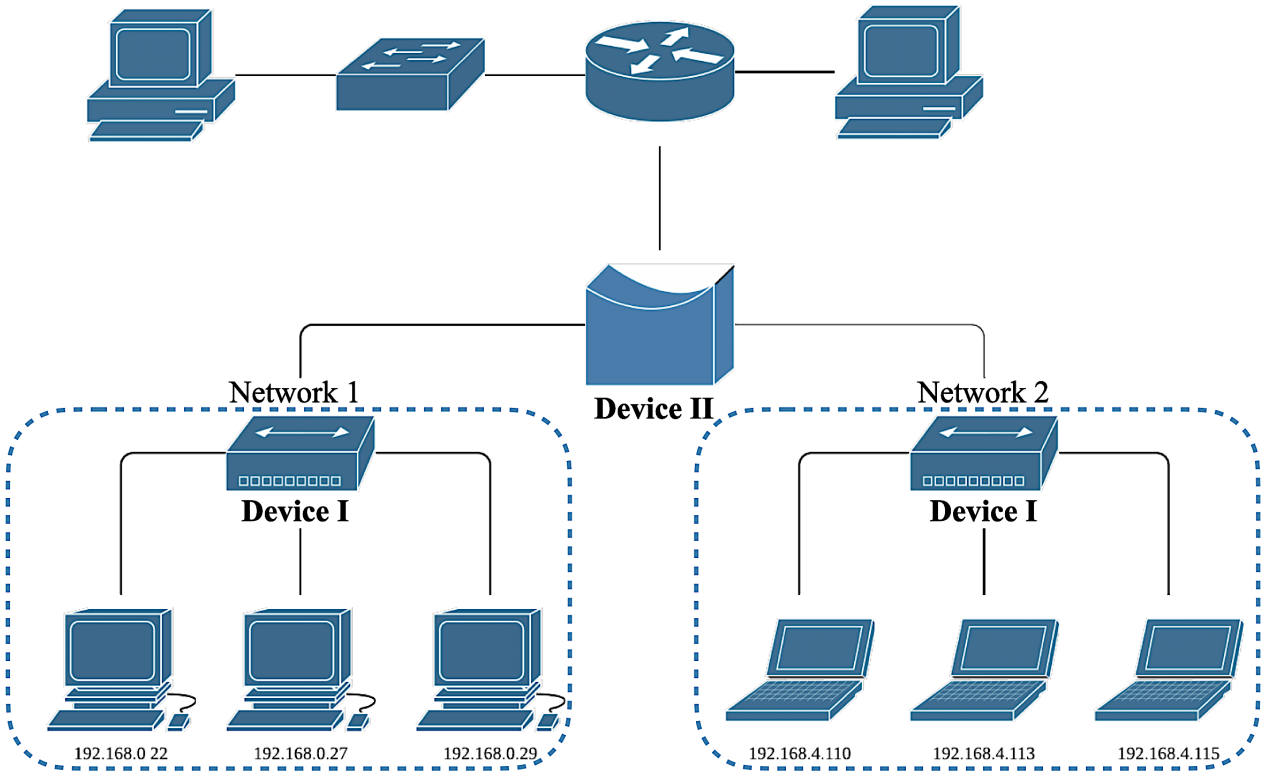
..... **[1]**

.....

7 The diagram below shows how some LAN networks are connected together.



(a) Fill in the name of the appropriate networking devices labelled Device I and Device II.

Networking devices: **Modem, Hub, Bridge, Router**

Device I: ……..

Device II: …… **[2]**

(b) Explain the following terms in a computer network:

(i) Network Interface Card

……

……

……

…… **[2]**

[Turn over

(ii) Service set identifier (SSID)

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..... **[1]**

(iii) Packet

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..... **[2]**

8 Spreadsheet software is used by many companies to keep track of accounts.
State the spreadsheet function from the following list which fits the description.

```
CEILING, COUNT, COUNTA, COUNTBLANK, COUNTIF, FLOOR, FV,
HLOOKUP, IPMT, LEFT, LEN, MAX, MID, MIN, MOD, PMT,
PPMT, PV, RAND, RANDBETWEEN,  RATE, ROUND, VLOOKUP
```

(a) Returns the number of non-empty cells in a given `range`. Empty cells are not counted while cells with any other type are counted.

[1]

Answer: .....

(b) Calculates the principal payment (or instalment) for a loan of present value with interest rate over the number of periods.

[1]

Answer: .....

(c) Returns `number` rounded up to an exact multiple of `significance`.

Answer: ..... **[1]**

(d) Looks for `lookup_value` in the first row of `table_range` and returns the value in `row_index_num` of the matching column.

[1]

Answer: .....

9 The following is an algorithm written in pseudo-code to input twenty positive numbers and then output the total number of even and odd numbers.

```
1    Counter = 0
2    Even = 0
3    Odd = 1
4    REPEAT
5        INPUT Num
6        IF Num MODULO 2 = 1
7            Even = Even + 1
8        ELSE
9            Odd = Odd + 1
10           Counter = Counter + 1
11   UNTIL Counter > 20
12   PRINT Even, Odd
```

There are exactly four errors found in this pseudo-code. Locate which line the errors are in and state the correct pseudo-code.

Error 1: .....

Correction: .....

.....

Error 2: .....

Correction: .....

.....

Error 3: .....

Correction: .....

.....

Error 4: .....

Correction: .....

..... **[8]**

[Turn over

10 An alarm sounds when certain conditions occur in a large sea aquarium. There are three input parameters involved in the alarm system: amount of oxygen (A), whether it is day or night (D) and temperature (T). Each parameter has a binary value of 0 or 1 depending on the process conditions.

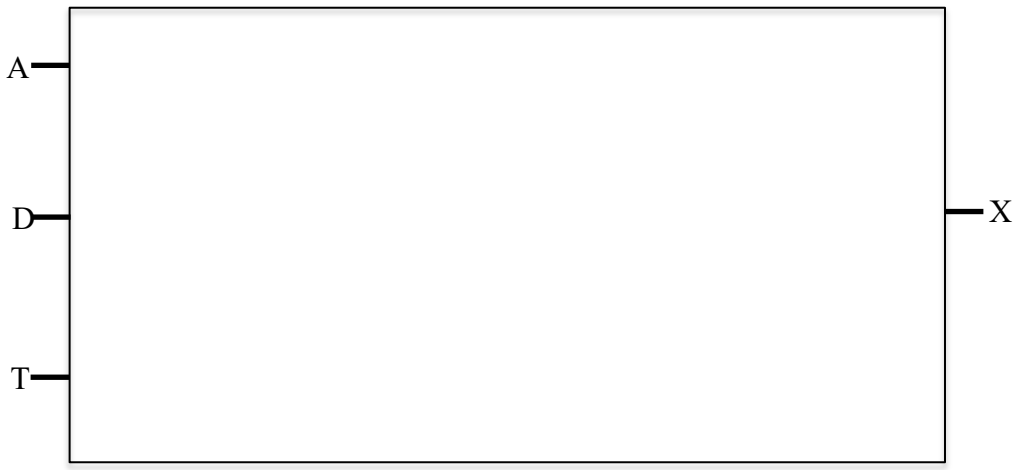
The inputs to the system are:

Input	**Description**	**Binary Value**	**Conditions**
A	Amount of Oxygen	1	Amount of oxygen is normal.
		0	Amount of oxygen is too little.
D	Day or night	1	Day
		0	Night
T	Temperature	1	Temperature is > 25 °C
		0	Temperature is ≤ 25 °C

The alarm system is made up of logic gates. The system is designed such that its logical output, X, will have a value of 1 and the alarm will activate when:

either it is day and the temperature is > 25 °C.
or it is night and the amount of oxygen is too little.

(a) Draw a logic circuit for this safety system using only the AND, NOT and OR gates.



[3]

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

A	D	T		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		

[5]

(c) Write a logic statement for X.

X =

..... **[2]**

[Turn over

11 Computing worksheets, with a total score of 30 are collected in the order that the students complete it. Thus, the worksheets are compiled in the following order:

- The worksheet that was completed fastest is placed on top.
- The next fastest worksheet is then placed below.
- The slowest completion will be at the bottom.

Ms Tang is marking the worksheets starting from the top to bottom. After marking the worksheets, she decides to compliment students that are both fast and accurate.

She will give a star to worksheets that

1. score higher than all other worksheets that are below itself (i.e. all other worksheet that were handed in later than itself), and
2. obtain at least 75% of the total score.

Given a list of N integers [M_1, M_2, M_3, …, M_N], where M_1 is the worksheet on top, and M_N is the worksheet on bottom, write an algorithm, <u>using a pseudo-code,</u> that will display all M_i that satisfy the following condition:

$$M_i > \text{All of } M_{i+1} \text{ to } M_N$$

For example, consider the list [9, 30, 12, 24, 7, 23, 19].

One of the M to be displayed will be 30, because M_2 is greater than all other values from M_3 to M_7. In the same way, 24 and 23 will also be displayed.

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[6]

12 A Pythagorean Triplet consists of three positive integers a, b and c, such that

$$a^2 + b^2 = c^2, \text{ where } a \leq b \leq c.$$

For example {3, 4, 5} is a Pythagorean Triplet because $3^2 + 4^2 = 5^2$.

Given an integer input N, write an algorithm, using a flowchart, that would find and display all Pythagorean Triplets such that a, b, c < N.

Data validation is not required.

[9]

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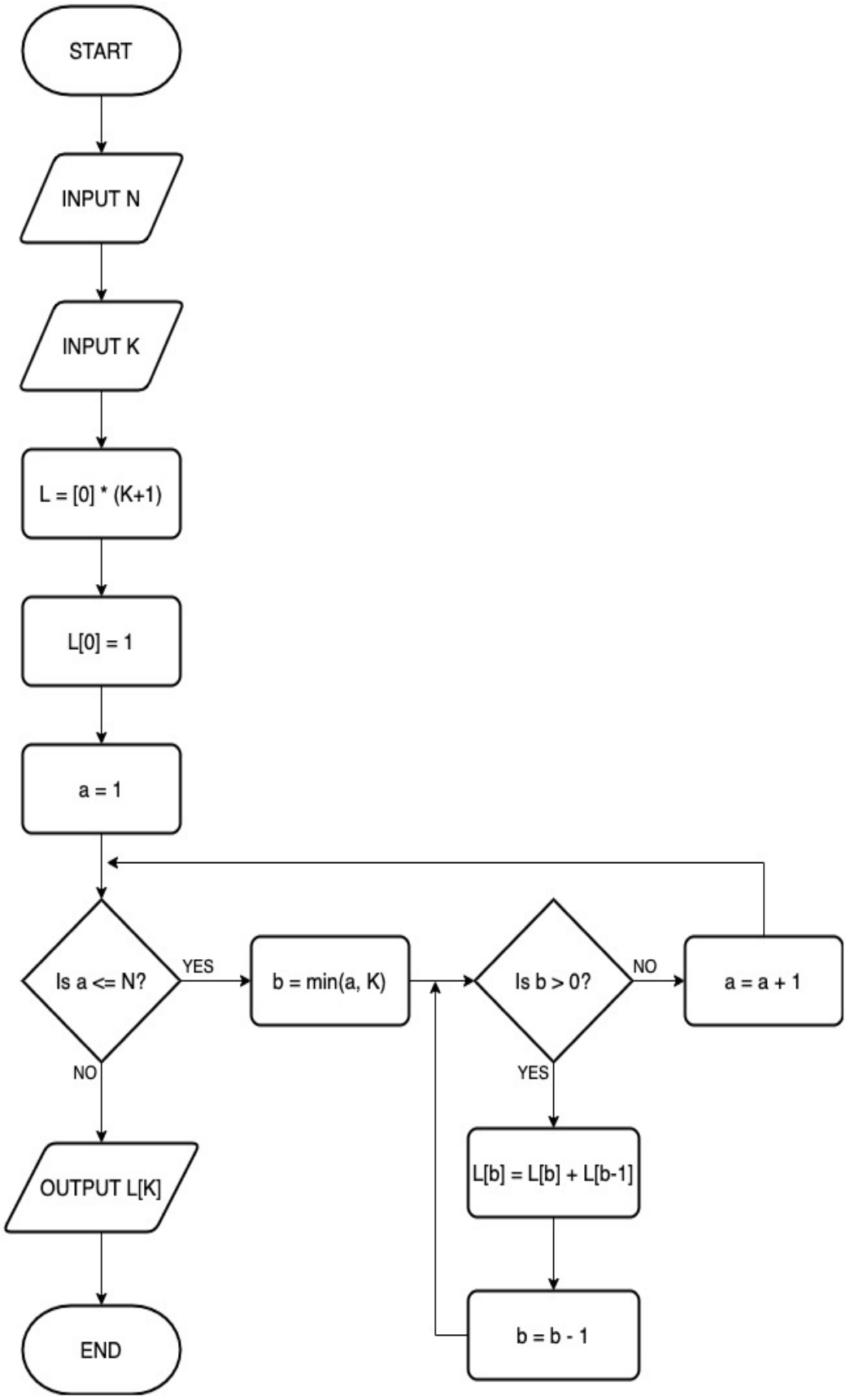
[Turn over

13 Consider the following flowchart.



(a) Given the input of N = 5, K = 3, completed the following trace table.

L	a	b	OUTPUT

[4]

(b) What is the purpose of the algorithm?

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..... **[1]**

END OF PAPER