For revision practice

SCHOOL OF SCIENCE AND TECHNOLOGY, SINGAPORE

SECONDARY 4
PRELIM EXAMINATION

COMPUTING
Paper 1 **7155/01**
Written

26 August 2022 (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	9	
5	9	
6	6	
7	6	
8	3	
9	8	
10	5	
11	6	
12	11	
Total		/80

1 Draw a line to match the types of computer security threats with their respective descriptions. **[4]**

Types of computer security threats
(a) Pharming
(b) Spyware
(c) Trojan horse
(d) Worm

Description
A computer program that runs automatically and attempts to spread by sending copies of itself to other computers without the need to attach itself to an existing program.
A hidden program that secretly collects personal information about its users and transmits this information to attackers without the users' knowledge.
The use of emails and fake websites that appear to be from reputable companies in order to steal personal information such as passwords and credit card numbers from users.
A computer program that pretends to be a harmless file or useful application. Once it is run, it does something harmful such as giving intruders unauthorised access to the computer instead.
The interception of requests sent from a computer to a legitimate website and redirection to a fake website to steal personal data or credit card details.
A computer program that attaches itself to a normally harmless program and modifies it.

2 In computer networks, MAC addresses are very important and used extensively. 20:17:0B:AD:C0:BE is an example of a MAC address in hexadecimal.

(a) What does the acronym MAC stand for?

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

(b) State what MAC addresses are used for.

.....

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

(c) Identify what the first six and last six hexadecimal digits of a MAC address represent.

First six digits: .....

Last six digits: ..... **[2]**

(d) Convert $(AD)_{16}$ to a binary number. Show your working.

Answer: …… **[2]**

(e) Convert $(BE)_{16}$ to a denary number. Show your working.

Answer: …… **[2]**

(f) Other than networks, describe one other area where hexadecimals is used.

…….....

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…….....

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

[Turn over

3 The rise of technology has transformed the entertainment sector greatly.

Describe **two** advantages and **two** disadvantages of the impact of technology on entertainment.

Advantage 1

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

Advantage 2

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

Disadvantage 1

.....

.....

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

Disadvantage 2

.....

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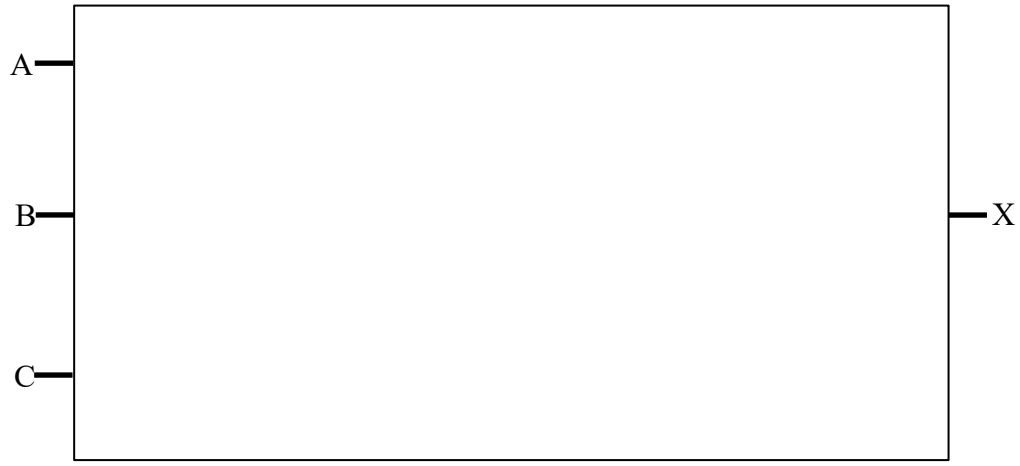
..... **[1]**

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

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



[4]

(b) Complete the truth table for the Boolean statement

X = (A NAND B) OR (NOT B NOR 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]

(c) Simplify X with just the use of three logic gates or less.

X =

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

[Turn over

5(a) Convert the following amounts of data into the unit indicated below.

(i) 100 TiB = …… GiB **[1]**

(ii) 65536 kB = …… KiB **[1]**

(b) The table below shows some computer hardware. Tick (✓) one or more boxes in each row to indicate if the hardware is an input, output, or storage device.

	Input device	**Output device**	**Storage device**
Touch screen monitor			
ROM			
Scanner			

[3]

(c) Describe the functions of the following parts of a computer:

(i) Control unit

.....

.....

.....

.....

.....

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

(ii) Address bus

.....

.....

.....

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

6 Mr Yeo, the CEO of SSTea Inc, is building a new office. He wants to build a client-server network to support his operations. Each employee will be equipped with a laptop and must be able to connect to the Internet easily.

(a) State **two** advantages of using the client-server network.

Advantage 1:..….....

.....

Advantage 2: .....

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

(b) State **one** disadvantage of using the client-server network.

.....

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

(c) After considering several factors, Mr Yeo chooses to install a wireless network for his company.

State **two** advantages of choosing wireless networks over wired networks.

Advantage 1:..….....

.....

Advantage 2: .....

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

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

.....

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

7 Data can become lost or corrupted during transmission. Computer network systems use error-checking methods to ensure that the data received at the destination is the same as that at the source. Two of the basic error-checking methods are parity checks and checksums.

(a) Determine whether the following 8-bit data packet has been corrupted, given the last bit is the parity bit and an odd parity system is used. Explain your answer.

1 0 1 0 1 1 0 0

.....

.....

.....

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

(b) State **one** limitation of the parity system.

.....

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

(c) Explain how a checksum is implemented for error-checking. Assume that the checksum has the length of one byte.

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..... **[3]**

8 Fill in the blanks using the words provided.

bridge	hub	interface card
modem	router	switch

A network …….. that connects exactly two networks together is also called a network ……... Most large networks use these two types of devices instead of a …….. as these devices are more "intelligent" and will send packets through a connection only if the network device determines that the intended recipient is on the other end, hence avoiding unnecessary bottlenecks. **[3]**

9 Students enrolled at the Super Secret Training School (SSTS) are assigned a personal identification number which acts as their username for school's server. The identification number begins with "S", followed by seven digits and a check digit, which is mathematically related to the previous seven digits.

(a) Explain the purpose of a check digit.

.....

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

(b) The check digit is calculated by:

- multiplying each digit by 3 or 7 alternately as shown in the table below
- adding together the result of each multiplication
- dividing the total by 11 which gives a remainder
- subtracting the remainder from 11 to give the check digit, unless the remainder is 0 or 1, which will result in the check digits 0 or the letter X respectively

The calculation of the check digit for the number S2238457 is:

Number	S	2	2	3	8	4	5	7
Multiply by		3	7	3	7	3	7	3
Result		6	14	9	56	12	35	21

Total = 6 + 14 + 9 + 56 + 12 + 35 + 21 = 150
150 / 11 = 13 remainder 7
Check digit = 11 – 7 = 4

The check digit calculator is shown in pseudo-code.

```
01  INPUT identification
02  total = 0
03  FOR x = 1 to 7
04      IF x modulo 2 == 1 THEN
05          total = total + identification[x] * 7
06      ELSE
07          total = total + identification[x] * 3
08      ENDIF
09  NEXT x
10  remainder = total modulo 11
11  check = 11 - remainder
12  IF check == 11 THEN
13      check = 0
14  ELSEIF remainder == "1" THEN
15      check = "X"
16  ENDIF
17  OUTPUT remainder
```

(i) There are three logic errors in the pseudo-code.
State the line number of each error **and** write the correct pseudo-code.

Error 1 .....

Correction .....

Error 2 .....

Correction .....

Error 3 .....

Correction ..... **[3]**

(ii) Name and describe the other two types of errors, other than logic errors.

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

(iii) These errors are likely to be detected and corrected in the fourth stage of developing a program. Identify and describe the final stage, which takes place after the code is tested and refined.

.....

.....

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

[Turn over

10 Bella uses a spreadsheet to record the orders for the made-to-order plush toys she sells. She records:

- the order identity number
- the date that the order was made
- the price that the customer paid
- whether the order has been fulfilled.

	A	B	C	D	E
1	**Order ID**	**Customer ID**	**Date**	**Total Price**	**Order Fulfilled**
2	06/3235/01	3235	05/06/2022	$30	Yes
3	06/0522/02	0522	30/06/2022	$120	Yes
4	07/1234/03	1234	19/07/2022	$50	Yes
5	07/3235/04	3235	22/07/2022	$30	Yes
6	08/5566/05	5566	06/08/2022	$200	No
7	08/1234/06	1234	21/08/2022	$280	No
8		**Number of Orders Unfulfilled**			

(a) Identify the **most appropriate** data type for the data in the following cell references:

Cell	Data type
A2	
C2	

[2]

(b) The order identity number (Order ID) is composed of the order month as a two-digit number, the customer identity number (Customer ID), a four-digit number, and the order number, a two-digit number. Each piece of information is separated with a slash.

The cells **B2:B7** extract the Customer ID from the Order ID.

Identify the formula that will need to be entered into **B2**.

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

(c) The cell **E8** will calculate the number of orders that have not been fulfilled yet.

Bella uses **one** function to calculate this value.

Describe the formula that will need to be entered in cell **E8**.

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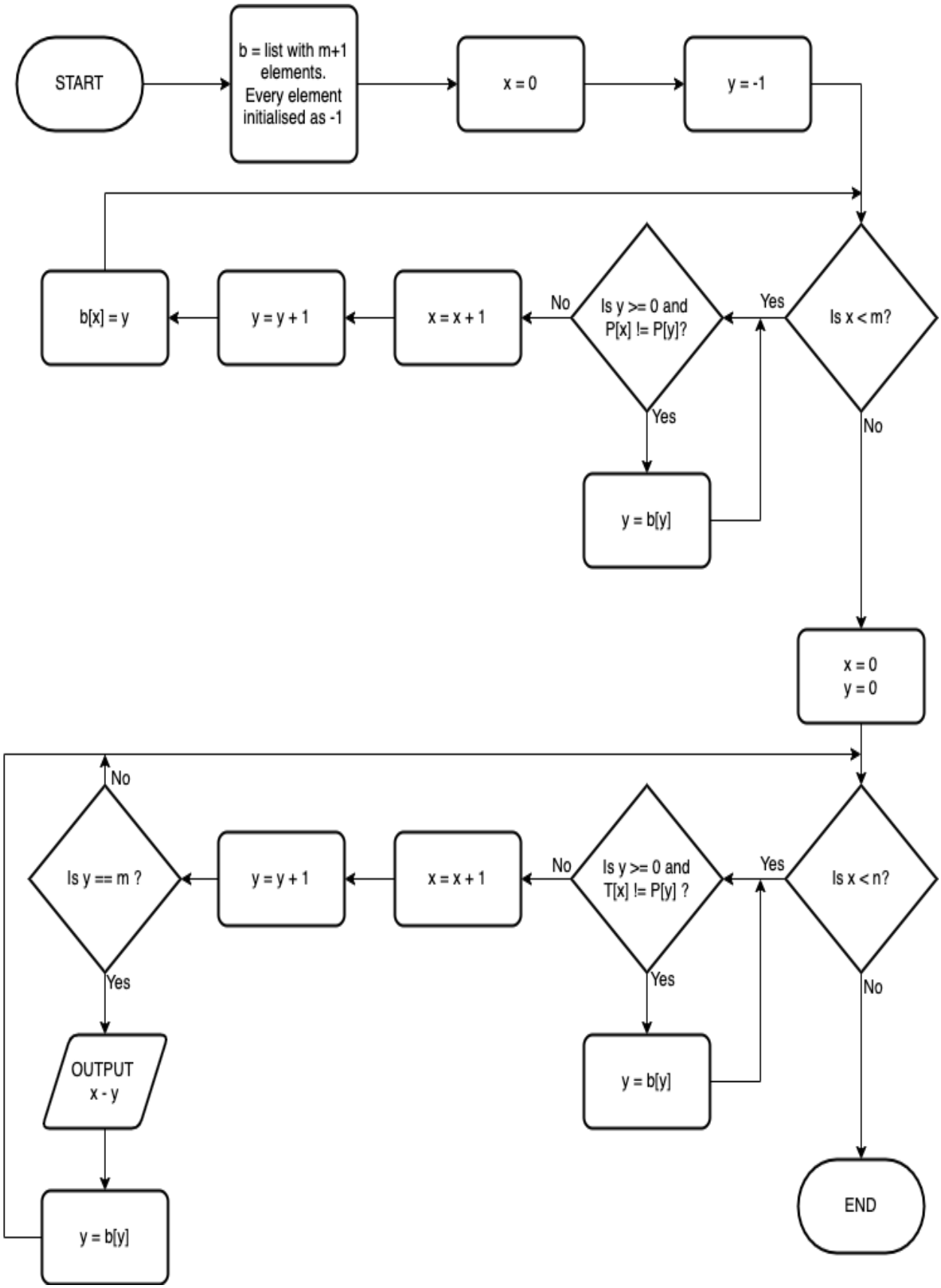
[2]

[Turn over

11 Study the following flowchart.



(a) The algorithm in the flowchart needs to be tested.

Using the input stated below, complete the following data trace table.

```
T = "susushi",   n = 7 (which is the length of T),
P = "sus",       m = 3 (which length of P)
```

b	x	y	OUTPUT

[4]

[Turn over

(b) State the purpose of the algorithm above.

.....

.....

.....

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

12 Ethan is developing a program for a new web-based game.

(a) The game is a single-player guessing game, where players must guess a four-digit number. The answer to the game is determined by the website hosting the game.

Name a suitable data validation check for the player's input. Provide a description for the check in the context of the scenario above.

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.....

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

(b) The input is tested with normal and error test case conditions.

Based on the data validation check you have named in part (a), suggest one example of test data for each test case condition.

Test case condition	Test data
Normal	
Error	

[2]

(c) In addition to the rules described in part (a), the game does not allow duplicate digits in the answer or the guesses.

The program for the game can be decomposed to include an answer-checking code as one of its modules. The answer-checking code needs to:

- take the guess, a four-digit number, as input
- check if the guess contains duplicate digits
- if the guess contains duplicate digits, inform the player of the indices of the duplicated digits
- if the guess does not contain duplicate digits, compare the guess with `answer`, the answer to the game, and output the number of correct digits and the number of digits in the wrong position:
  - a digit is correct if it is in the same position in `answer`
  - a digit is in the wrong position if it appears in `answer`, but in a different position

Write an algorithm, using pseudo-code or a flowchart, to input the four-digit number and output the list of four digits. In your algorithm, you should use the variable `answer` to denote the answer to the game, which has already been encoded into the program. You do **not** need to validate the input.

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[Turn over

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.... **[7]**

END OF PAPER