福建中學

FUKIEN SECONDARY SCHOOL

S6 Mock Examination (2021-2022)

Information and Communication Technology

Paper 1 (Section B)

(2 hours)

Date: 27th January 2022 Name:_____

Time: 8:30a.m. - 10:30a.m. Class: _____ No.: _____

INSTRUCTIONS

1. When told to write your name, class and class number, write them on Section A, Section B as well as the multiple-choice answer sheet.
2. **ANSWER ALL QUESTIONS.** Write your answers in the spaces provided in this Question-Answer book.

1. A secondary school uses the following spreadsheet to keep the data of students in a particular school year. There are totally 900 records.

	A	B	C	D	E	F	G	H
1	**sid**	**year**	**dob**	**ename**	**gender**	**class**	**house**	**height**
2	201949805		10/12/2007	Pak Sze	M	2B	Y	182.5
3	201734701		4/10//2005	Wong Wai	M	4C	P	181.1
4	201815238		28/1/2006	Wong Lai	F	3C	P	155.7
5	201716992		21/10/2005	Young	M	4B	G	174
6	201713710		10/4/2005	Ng Yu Han	F	4C	P	181.2
7	202035001		28/1/2008	Chan Ching	M	1D	B	158.5
…	…		…	…	…	…	…	…

The descriptions of each field is as follows:

Field	**Description**
`sid`	Student number
`year`	The year the student was admitted to the
`dob`	Date of birth of the student
`ename`	English name of the student
`gender`	Gender of the student
`class`	Class of the student
`house`	House of the student (four houses: Y, P, G, B)
`height`	Height of the student

Mr. Leung is a member of the school admission group.

(a) The first four digit of the field `sid` indicates the year that the student was admitted by school.

(i) Write down the formula in `B2` to extract the year of admission. The formula will be copied to cells `B3:B901`.

_____

(2 marks)

(ii) Mr Leung wants to get the total number of students who were admitted in 2020. Write down the formula below.

_____

(2 marks)

(b) Miss Chan is a physical education teacher. She is going to analyze the data through the pivot table in the spreadsheet.

(i) The configuration interface of the pivot table is as follows. If Miss Chan wants to get the average, maximum and minimum height of each class, and the analysis table should include a filter for the field `year`, please fill in appropriate content in the following regions.

Filters	Columns Values
Rows	Σ Values Average of height Max of height

(3 marks)

(ii) State one advantage of using pivot table for data analysis.

_____

_____

(1 mark)

(c) Miss Chan has imported 8 records in the spreadsheet into a table in a database, as shown below.

student

sid	dob	ename	gender	class	house	height
201722461	17/8/2006	Chu Melissa	M	3C	Y	172.6
202034983	23/9/2008	Lee Pui Ling	M	1A	P	157.7
201835930	19/4/2006	Fu Chun Yat	M	3C	G	166.6
201910321	20/2/2007	Chan Rachel	F	2D	Y	186.4
201647128	25/9/2004	Tang Shuk Fong	F	5C	B	180.5
201835217	4/8/2006	Ng Yiu Yu	F	3B	G	178
201515362	7/6/2004	Cheung Nga Hang	M	5A	B	171
201837879	23/10/2006	Choi David	F	3B	G	171.3

(i) Suggest data types for the following fields.

height: _____

class: _____

(2 marks)

(ii) What is the execution result of the following SQL command?

```
SELECT class, sid, ename
FROM student
WHERE house = "G"
ORDER BY class, dob DESC
```

(2 marks)

2. A lift system which is used to control 6 lifts installed in a building. The system assigns passengers on the same destination floor to the same lift. In this system, the passenger enters the destination floor on the input panel. The system will check the destination floors one by one in each lift, and then assign the passengers to different lifts.

   Assume the maximum number of destination floors for a lift is 10. An array `lift_A` is used to store the destination floors where one of the lifts will arrive. For example, if the floors reached by this elevator are 4th floor, 3rd floor, basement level 2, 8th floor and the ground floor, the contents of the array will be as follows:

I	1	2	3	4	5	6	7	8	9	10
Lift_A[I]	4	3	-2	8	0					

   The following is the algorithm **ALG1** to check whether the destination floor will be assigned into a certain lift (`lift_A`). The variable `N` stores the current number of destination floors in the array. If the target floor `X` of the passenger can be assigned to this lift, the variable `ASSIGN` will be assigned `TRUE`.

ALG1

Line	Code
1	`input X`
2	`if N >= 10`
3	`    output "The lift is full"`
4	`else`
5	`    for I from 1 to N do`
6	`        if X = lift_A[I]`
7	`            ASSIGN ← TRUE`
8	`            I ← N`

(a) Modify **ALG1** so that when a passenger needs to reach a floor that is within the range from 5 floors lower than the existing destination floors to 5 floors higher than the existing destination floors, the system will treat it as a nearby floor and `ASSIGN` will be assigned `TRUE`, and add the target floor into the array.

ALG1

Line	Code
1	`input X`
2	`if N >= 10`
3	`    output "The lift is full"`
4	`else`
5	`    for I from 1 to N do`
6	`        if X = lift_A[I]`
7	`            ASSIGN ← TRUE`
8	`            I ← N`
9	`        else`
10	`            if _____`
11	`                ASSIGN ← TRUE`
12	`                _____`
13	`                _____`
14	`                I ← N`

(5 marks)

Fanny is the programmer of the lift system. She has written the algorithm **ALG2** to process the array `lift_A` as follows:

ALG2

```
for I from 2 to N do
    if lift_A[I] < lift_A[I-1]
       temp ← lift_A[I]
       lift_A[I] ← lift_A[I-1]
       lift_A[I-1] ← temp
```

(b) Assume `N = 5`. The initial content of array `lift_A` is as follows:

I	1	2	3	4	5
Lift_A[I]	4	3	-2	8	0

(i) What is the content of `lift_A` after the first and second iterations of the loop?

After the first iteration

I	1	2	3	4	5
Lift_A[I]					

After the second iteration

I	1	2	3	4	5
Lift_A[I]					

(2 marks)

(ii) Fill in the final content of `lift_A`.

I	1	2	3	4	5
Lift_A[I]					

(1 mark)

(iii) What is the use of the variable `temp`?

_____

_____

(1 mark)

(c) Both **ALG1** and **ALG2** are modules of another algorithm. Describe one reason for modularizing an algorithm.

_____

_____

(1 mark)

(d) Fanny uploaded the above algorithms and other modules to the server of the lift system. What are the main tasks of the following components of the server when the system is in operation?

(i) Central processing unit

_____

(1 mark)

(ii) Random access memory

_____

_____

(1 mark)

3. Guangzhou-Shenzhen-Hong Kong High Speed Rail Hong Kong Section opened in Sep 23, 2018. A citizen can buy ticket by inserting coins to the ticket selling machine, making a phone call to the buying ticket hotline, buying through website or using mainland ticket selling system.

Source: http://www.expressraillink.hk/en/database/what-is-high-speed-rail.html

(a) Each ticketing method needs the registration number of the Mainland Travel Permit for Hong Kong and Macau Residents (港澳居民來往內地通行證).

(i) What is the characteristic of the registration number of the Mainland Travel Permit to identify different users?

_____

_____

(1 mark)

(ii) The data in the ticket selling machine are stored in Electrically Erasable Programmable Read Only memory (EEPROM), which is a form of flash memory.

(1) Give one difference between EEPROM and RAM.

_____

_____

(2) Give one difference between EEPROM and ROM.

_____

_____

(2 marks)

(b) A staff of MTR has prepared two video clips, both are 10 minutes but in different format. One in MP4 format, another one in AVI format.

(i) Give **two** major differences between the two video formats. Which one of them is more suitable to be uploaded to MTR website? Explain briefly.

_____

_____

_____

_____

(4 marks)

(ii) The staff estimates that 1-minute video requires 750 MB of free storage space. He uses a 1TB portable hard disk with 931GB free storage space to store one video file. How long can the hard disk store the video? Show your calculation and express your answer in minutes.

_____

_____

_____

(2 marks)

(c) The staff has uploaded the video to MTR web site. Users can play the video from the web site by choosing different video settings.

(i) The web site uses the streaming method to deliver the video. What is the major benefit of this method? Explain briefly.

_____

_____

_____

(2 marks)

(ii) Why does the web site provide different options of video settings, namely 1280 × 720 and 240 × 135?

_____

_____

(1 mark)

4. Amy runs an online shop.

(a) The online shop provides order forms for customers to fill. The customers will then send the form back through email.

(i) The shop adopts PDF format for the order forms. Write down one advantage and one disadvantage of this.

Advantage: _____

_____

Disadvantage: _____

_____

(2 marks)

(b) Peter makes an order at the online shop. He thinks that the order form contains private information, so he encrypts his form with a password before sending. Then he sends another email containing the password.

(i) Write down a privacy threat that can be prevented by using password encryption.

_____

(1 mark)

(ii) Can the method Peter use effectively prevent the privacy threat stated in (b)(i)? Explain briefly.

_____

_____

_____

(2 marks)

(c) Amy improves the security of the online shop using the Public Key Infrastructure (PKI) technology.

(i) Briefly describe a way how PKI is used to complete the data transfer so that customers' information can be secured.

_____

_____

_____

(2 marks)

(ii) Apart from securing senders' information, write down one application of using PKI.

_____

(1 mark)

(d) Amy sends a group email to all customers about a promotion of the shop with a video attachment.

From: To: Cc:	promotion@amyshop.com.hk
Subject:	Promotion of Amyshop

(i) In this group email, customers cannot see the email addresses of other recipients.

(1) Suggest how Amy can send the email so that the customers cannot see the email addresses of one another.

_____

(2) Write down a reason why Amy hides the customers' email addresses.

_____

(2 marks)

(ii) The file size of the video exceeds the attachment limit. Suggest **two** methods that Amy can use to send the video.

_____

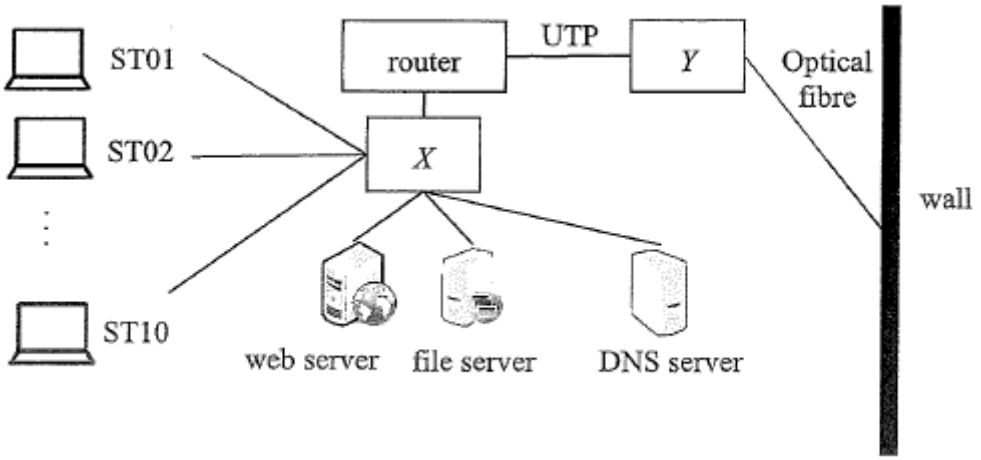
_____

_____

_____

(2 marks)

5. Gary is assisting a physical shop "Samazon" to establish an online sales system. The following figure shows the company's network structure. ST01 to ST10 are computers used by employees.



(a) What are the devices *X* and *Y* in the figure?

X: _____ *Y*: _____

(2 marks)

(b) Gary has installed anti-virus software on the computers of the online sales system.

(i) State **two** reasons why the anti-virus software needs to be updated frequently.

_____

_____

_____

_____

(2 marks)

(ii) In addition to anti-virus software, suggest one more security measure for the online sales system and explain how this measure can reduce security threats from the Internet.

_____

_____

_____

_____

(2 marks)

(c) The devices in the network use the TCP/IP communication protocol. The IP protocol requires that all communication devices must use IP addresses as their identity. When an employee connects to ST01, they use the computer's name instead of IP address. Explain how it can be done.

_____

_____

_____

(2 marks)

(d) The online sales system is restricted to registered members only. Customers must use a browser to log in to the system to purchase goods and use electronic payment to make immediate payments. The goods will be delivered to the designated delivery addresses according to the instructions of customers.

(i) State one encryption technology that the online sales system can use in order to reduce the risk during transmission of customer information to ensure that only the "Samazon" shop can interpret the information. Briefly describe how this technology works in the system.

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_____

_____

(2 marks)

(ii) When a customer pays in the online sales system, the system will ask the customer to enter the login password again before proceeding. Give one reason for this measure and suggest one other alternative.

_____

_____

_____

_____

(2 marks)

END OF PAPER