THE HONG KONG ASSOCIATION FOR COMPUTER EDUCATION

INFORMATION AND COMMUNICATION TECHNOLOGY

MOCK EXAMINATION 2022

PAPER 1

SECTION B: Question-Answer Book B

Time Allowed: 8:30 am – 10:30 am

(2 hours for both Section A and B)

This paper must be answered in English.

	Marker's Use Only	
Question No.	Marks	
1		1
2		0
3		0
4		3
5		3
Total		7

INSTRUCTIONS

(1) After the announcement of the start of the examination, you should stick the label in the space provided on Page 1.

(2) **ANSWER ALL QUESTIONS**. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins.

(3) Supplementary answer sheets will be provided on request. Write your candidate number and question number on each sheet.

(4) No extra time will be given to candidates for filling candidate number and question number after the 'Time is up' announcement.

(5) The last page of the question-answer book contains a list of SQL commands and spreadsheet functions which you may find useful.

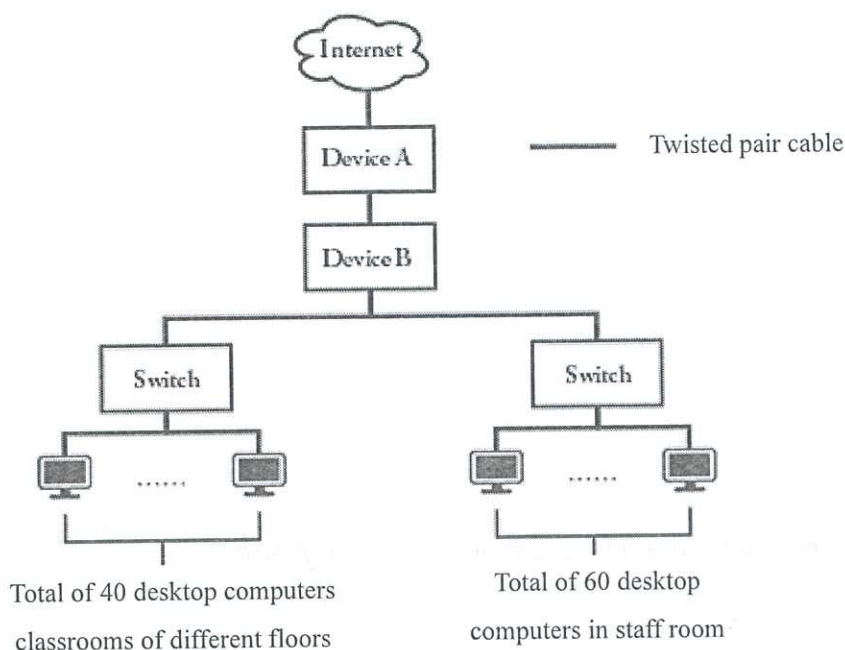**Answer all questions.**

1. During the outbreak of COVID-19, schools around the world began to use real-time online teaching.

    (a) Describe **one** advantage and **one** limitation of real-time online teaching for teachers and students.

	Advantage	Limitation
Students	Students can still learn something during COVID-19 ✗	A lot of excercise cannot do like speaking ✗
Teachers	Teachers can rather stay at home or back to school to teach ✗	Cannot use the online system well ✗

(4 marks)

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ACE secondary school purchased 60 tablet computers for teachers to conduct real-time online teaching during the epidemic. The network diagram of the school is shown below.

(b) Device A and device B are network devices. What are device A and device B respectively?

A: _____ mudem ✗ _____   B: _____ router ✗ _____

(2 marks)

(c) At most 40 teachers can conduct real-time online teaching in the staff room at the same time.

   (i) Give **one** network device that must be installed in the staff room.

   Wi-fi system ✗

(1 mark)

   (ii) Suggest **one** hardware that can be used with tablet computers to enhance teaching performance.

   Mone ✗

(1 mark)

   (iii) Give **two** potential problems that may happen when conducting real-time online teaching.

   ① May have lag while teaching ✗ ✓

   Cannot function the share & screen sy system ✗

(2 marks)

0

(d) •VA teacher finds the following setting option in the video conferencing software. He wants to demonstrate sketching skills during the real-time online teaching session. He sets the video as 720p.

Video setting
1080p
720p
480p
360p
240p
144p

(i) Give **one** reason why the teacher chooses 720p instead of 480p.

Students can look more clearly than before There are more pixels inside.

(1 mark)

(ii) Give **one** reason why the teacher chooses 720p instead of 1080p.

His CPU cannot handle it. It may lag during the demonstration.

(1 mark)

4

2. A technology and innovation venture company is developing a smart cane. The smart cane can be connected to a mobile phone via Bluetooth and operated by a mobile app. As the cane has its own operating system, it can also operate independently.

(a) Suggest **one** type of operating system to be installed in the smart cane, and describe the advantage of using this type of operating system.
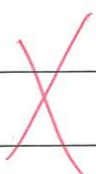
_____

_____

_____

_____

(2 marks)

(b) The smart cane can calculate the distance between the cane and the user's mobile phone through Global Positioning System (GPS). In case the user forgets to bring the cane, if the distance is more than 10 m, the user will be notified. Otherwise, the cane will enter a 'standby state'. With such application, what will be stored in the RAM and ROM of the smart cane respectively?

RAM: the distance is more than 10m.

ROM: the cane will enter a 'standby state'.

_____

_____

(2 marks)

(c) In order to strengthen the security of the smart cane so that it will not be stolen easily, suggest **two** biometric technologies and their corresponding input devices to achieve the above goals.

Passwords and security code.

_____

_____

_____

(2 marks)

Peter uses a database table `client` to store the user information of the smart cane.

client

CID	firstName	lastName	gender	age	contactNo	home
E003	Chris	Wong	M	30	21711123	NT
E005	Mary	Chan	F	35	50508982	KLN
E008	Peter	Lee	M	40	93333547	HK
E012	John	Cheung	M	34	25328795	KLN
E117	Joyce	Ho	F	36	34986585	NT

(d) S1 and S2 below are SQL statements:

S1 : SELECT CID FROM client WHERE age > 35 ORDER BY CID DESC;

S2 : SELECT gender, COUNT(*) FROM client GROUP BY gender;

Write down the output after executing the SQL statements S1 and S2.

S1:

E 117   Joyce   Ho   F   36   34986585   NT
E 008   Peter   Lee   M   40   9333 3547   HK   ✗

S2:

M   3
F   2   ✓   0

(2 marks)

(e) (i) In the database table `client`, which field can best be used as the primary key? Explain briefly.

character, because you can ~~both~~ enter numbers and ~~words~~. ✗

(2 marks)

(ii) Peter finds that the design of one of the fields in the database table is not ideal. State the field that has the problem and suggest one corresponding improvement.

Lastname. It can be put into Firstname ✗

(2 marks)

7

3. Susan writes an algorithm involving array A.

Line Number	Code
10	Input N
20	Input A[1], A[2], …, A[N]
30	M ← 0
40	i ← 1
50	While i <= N
60	If A[i] > M
70	M ← A[i]
80	i ← i + 1
90	Output M

(a) Suppose N = 8 and the content of A is as follows:

A[1]	A[2]	A[3]	A[4]	A[5]	A[6]	A[7]	A[8]
5	3	9	0	4	12	5	7

(i) Write down the contents of M and i after executing line 80 in the 2nd and 5th iteration.

Iteration	M	i
2nd	2	3
5th	4	6

(2 marks)

(ii) Write down the final output of the above algorithm. _____1_____ (1 mark)

(iii) After the execution of the algorithm above,
how many times does Line 70 get executed? _____8_____ (1 mark)

(b) What is the purpose of the program?

To output M.

(2 marks)

8

(c) Emma debugs the algorithm.

(i) Suggest a set of values for A with N >= 1 that the algorithm does not produce the correct result.

0

(1 mark)

(ii) Change up to two lines of code to correct the problem.

Line Number	Code

(2 marks)

(d) Susan sends Peter the program using public key infrastructure (PKI).

(i) What is the benefit of using PKI?

You can transfer the file easily.

(1 mark)

(ii) Describe a way that PKI is used to complete the file transfer.

If there is puple key infrastructure inside, everyone can download it or transfer it to other

people. People can receive it also.

(2 marks)

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4. Mr. Chan is an IT administrator of ACE restaurant. He plans to develop an electronic ordering platform for the restaurant.

(a) He is considering two different options: a website version or a mobile app version.

   (i) State **two** advantages of using a website version over mobile app version.

   No need to install. ✓
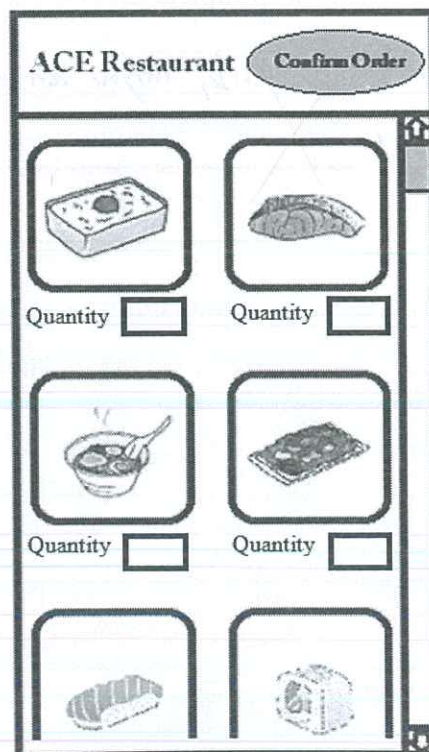
   Easy to process. ✗

   (2 marks)

   (ii) State **two** advantages of using a mobile app version over a website version.

   Hard to lose the data ✗

   Have a more completed system than website. ✗

   (2 marks)

(b) Mr. Chan has created the first design of the ordering platform, as shown below:

10

(i) Under each food item, he adds a field 'Quantity' to facilitate user's input. State one validation check for this field.

number check ✗

(1 mark)

(ii) Redesign the electronic ordering platform in order to get three improvements in interface design.

Rice

Rice
Noodles
Sushi
Drinks

Fried rice
Rice
Rice
Lice

⊖ ∪ ⊕
⊖ ∪ ⊕
⊖ ∪ ⊕
⊖ ∪ ⊕

2

$XXX [Confirm] [Paid]

(3 marks)

11

2

Some customers find that all the Chinese words become garbled when they access the online ordering platform through mobile devices.

(c) Give **one** reason that cause the garbled codes.

They are using ASCII. ✗

(1 mark)

(d) Mr. Chan believes that the electronic ordering platform should be barrier-free. Suggest **two** features that can help the visually-impaired people access the platform.
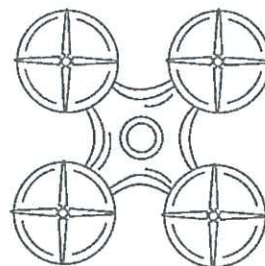
✗

(2 marks)

(e) Mr. Chan downloads different food photos on the internet and uses them on the electronic ordering platform of the restaurant. Do you agree with this? Explain your answer briefly.

No. There is copyright inside. It is illegal if you do not have the permission. ✓

(1 mark)

5. Hi-tech company has developed a drone to let students learn how to operate drones. Students can send commands to the drones via Bluetooth connection with their smartphones. The drone is equipped with a camera, and an 8-bit dual core central processing unit for computation. When user issues a command from a smartphone, a group of 8-bit pattern will be sent to the drone. The first 3 bits represent the command, and the following 4 bits represent the parameters, the last 1 bit represent the parity check digit. The example below shows the program code and the corresponding bit pattern to control the drone to move 10 cm upward.

	Command (3 bits)	Parameters (4 bits)
Program code:	UP	10
Bit pattern:	011	1010

(a) (i) How many commands can be given to the drone?

3 ✗

(1 mark)

(ii) Give **one** limitation of using 4 bits to represent parameter for the drone.

✗

(1 mark)

(b) Give **one** advantage and **one** disadvantage of using Bluetooth instead of Wi-Fi to connect to the drone.

It has a longer distance. ✗

It can transfer data immediately.

(2 marks)

(c) Explain why the drone needs dual core central processing unit.

There is a camera. ✗

(1 mark)

Hi-tech company only offers few commands at the research stage. They promise users that it will offer more control commands in the future to make it more enjoyable.

(d) How can High-tech company offers more control commands to users?

Install more programmes inside. ✗

(1 mark)

The drones can take uncompressed photos with resolution of 1600 x 1200 pixels and colour depth of 24 bits. It can also send photos to smartphones via Bluetooth.

(e) (i) Give **one** uncompressed image file format.

1920 x 1080 ✗

(1 mark)

(ii) Estimate the file size of the photos taken by the drone in MB.

$\dfrac{1600 \times 1200 \times 24}{8 \times 1024 \times 1024}$ = 5.49 MB. ✓ 1

(1 mark)

(iii) Assume that the data transmission speed of Bluetooth is 24 Mb/s. Estimate the time required to send a photo.

2

$\dfrac{5.49 \times 8}{24}$ ✓

≈ 1.83 s ✓

(2 marks)

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③

To avoid errors in the transmission process, the drone use even parity check to validate the data received. If the data is invalid, the drone will request the user to resend the data.

(f) (i) Estimate the parity bit of the command 'UP 10'.

16 bit

(1 mark)

(ii) Explain the situation where errors cannot be detected in the parity check.

_____

_____

(1 mark)

END OF PAPER