Please stick the barcode label here.

Candidate Number

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2025

INFORMATION AND COMMUNICATION TECHNOLOGY
PAPER 1

SECTION B: Question-Answer Book

This paper must be answered in English

INSTRUCTIONS FOR SECTION B

(1) After the announcement of the start of the examination, you should first write your Candidate Number in the space provided on Page 1 and stick barcode labels in the spaces provided on Pages 1, 3 and 5.

(2) Refer to the general instructions on the cover of the Question Paper for Section A.

(3) This section consists of **TWO** parts, Parts I and II.

(4) Answer **ALL** questions in both Parts I and II. Write your answers in the spaces provided in this Question-Answer book. Do not write in the margins. Answers written in the margins will not be marked.

(5) Supplementary answer sheets will be supplied on request. Write your Candidate Number, mark the question number box and stick a barcode label on each sheet, and fasten them with string **INSIDE** this book.

(6) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

(7) The last page of this Question-Answer book contains SQL commands and spreadsheet functions which you may find useful.

Answer ALL questions.

1. Ms Ng uses a spreadsheet to store the student marks in three tests, as shown below:

	A	B	C	D	E	F	G	H
1	Class number	Name	Test 1 mark	Test 2 mark	Test 3 mark	Average mark	Average mark less than or equal to	Number of students
2	1	Au Chi Man	65	88	45	66.0	30	1
3	2	Chan Ka Ka	37	20	29	28.7	50	4
4	3	Chan Wing Hong	88	60	90	79.3	75	22
5	4	Chan Yi Ling	70	45	97	70.7	90	30
6	5	Cheng Wai	61	66	56	61.0	100	35
7	6	Chow Pui Pui	53	80	87	73.3		
8	7	Ho Ting Ka	85	99	98	94.0		
⋮	⋮							
35	34	Yip Fung	36	98	45	59.7		
36	35	Yip Ka Fai	55	80	30	55.0		

(a) To calculate the average mark of students in the three tests, a formula is entered into $F2$ and then copied to $F3:F36$. Write the formula in $F2$. (1 mark)

(b) To store the numbers of students who scored less than or equal to 30, 50, 75, 90 and 100 marks in $H2:H6$, a formula is entered into $H2$ and then copied to $H3:H6$. Write the formula in $H2$. (3 marks)

2. (a) When Eva logs on to a computer system, she will receive a one-time password for authentication. Give two characteristics of a one-time password. (2 marks)

(b) Eva sends a document file to Paul. Describe how they use Public Key Infrastructure (PKI) to ensure that only Paul can open and read the file. (2 marks)

3. Amy uses her mobile phone to take photos during a study tour. She uploads the photos to the Internet to share them with her classmates.

(a) Suppose that the size of each photo is 5 MB and the bandwidth for the upload is 100 Mbps. Estimate the shortest time required to upload 200 photos. Show your calculation. (2 marks)

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(b) Amy sends her classmates the following email for them to download a zip file.

> Hi Classmates,
>
> Please click the following link to download the photos:
>
> *http://www.hkedcity.net/ihouse/Amy2504/photos.zip*
>
> Amy

(i) Amy finds that entering the following URL in a browser also results in downloading the same file. Why? (1 mark)

http://202.8.88.24/ihouse/Amy2504/photos.zip

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(ii) Give an advantage of using an attachment over a hyperlink to send the file. (1 mark)

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4.   (a) Mary's company web site shows a photo with its original resolution of 800 × 600. She changes the HTML code to make the displayed size of the photo become 400 × 200.

After the change of HTML code,

        (i) Will the download time of the photo be shorter? Why?   (1 mark)

        (ii) Will the photo displayed be distorted? Why?   (1 mark)

    (b) Mary installs an artificial intelligence (AI) system with cameras in a country park to detect fires. She needs to choose photo samples to train the AI system. Give **two** considerations that Mary should take into account for this.   (2 marks)

5.   (a) Complete the following table with improvements in the hardware specifications of a desktop computer.   (3 marks)

Hardware component	Improvements	
RAM	1. Larger storage capacity	2.
Display unit	1. Larger screen	2.
CPU	1. More cores	2.

    (b) A driver program is needed to use a printer.

        (i) What is the major function of the driver program?   (1 mark)

        (ii) What is the benefit of using the latest version of the driver program?   (1 mark)

6. s1 and s2 are two arrays. The content of s1 is

```
    i      0   1   2   3   4
    s1[i]  S   T   E   A   M
```

(a) What is the content of s2 after executing the following program segment?   (2 marks)

[Python version]
```
for i in range(0, 5):
        s2[4-i] = s1[i]
```

[C++ version]
```
for (i = 0; i <= 4; i++)
        s2[4-i] = s1[i];
```

[Pascal version]
```
for i := 0 to 4 do
        s2[4-i] := s1[i];
```

```
    i      0   1   2   3   4
    s2[i]
```

(b) What is the content of s2 after executing the following program segment?   (2 marks)

[Python version]
```
ch = s1[0]
for i in range(0, 4):
        s2[i] = s1[i+1]
s2[4] = ch
```

[C++ version]
```
ch = s1[0]
for (i = 0; i <= 3; i++)
        s2[i] = s1[i+1];
s2[4] = ch;
```

[Pascal version]
```
ch := s1[0];
for i := 0 to 3 do
        s2[i] := s1[i+1];
s2[4] := ch;
```
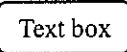
```
    i      0   1   2   3   4
    s2[i]
```

Answer ALL questions.

7.   Mr Li creates the following online form for students to enter the relevant data on the services they complete.

(a) (i) Suggest a better form element than 'text box' for entering data in 'Class'. Explain briefly.

(2 marks)

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(ii) A student may enter multiple services. Mr Li finds that it is unnecessary to repeatedly enter some fields. What are these fields? Suggest a way to improve the form design.   (2 marks)

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(b) Mr Li decides to provide tablet computers instead of notebook computers for students to enter data.

(i) Give **two** reasons to support his decision.   (2 marks)

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(ii) Mr Li develops a program to run on a tablet computer, but the program cannot be installed on a notebook computer. Why? (1 mark)

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Mr Li uses the database table SS to store information on students.

SS

Field name	Type	Description
CL	Character	Class of student
CNO	Integer	Class number of student
SER	Character	Title of service
HR	Integer	Number of service hours

(c) Suggest a validation check for CL that is more effective than a format check. (1 mark)

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(d) Suppose that there are five records in SS, as follows:

CL	CNO	SER	HR
2A	22	Flag selling	15
3D	3	Flag selling	15
2C	2	Library assistant	40
2C	5	IT prefect	35
3D	10	Flag selling	15

What are the outputs after executing the following SQL statements?

(i) SELECT CL, CNO FROM SS
    WHERE SER='Flag selling' AND CL LIKE '2_'   (1 mark)

(ii) SELECT CL, SUM(HR) FROM SS GROUP BY CL   (2 marks)

8. In a skateboarding competition, each of five judges will give a score from 0 to 100 to each skateboarder after a run. The highest and lowest scores are dropped, and the average of the remaining three scores becomes the final score for a run, as shown in the following example:

Judge	1	2	3	4	5	Final score
Skateboarder A	98	94	95	96	90	95.00
Skateboarder B	95	88	90	90	91	90.33

The competition uses a program with the following variables to calculate the final scores.

Variable	Description
JS	An array for storing scores given by the five judges, with indexes from 1 to 5
Smax	An integer variable, where JS[Smax] stores the highest score
Smin	An integer variable, where JS[Smin] stores the lowest score
FS	A variable for storing the final score for a run

(a) (i) According to the scores of skateboarder C below, write down the values of the variables after executing the program. (2 marks)

Judge	1	2	3	4	5
Skateboarder C	68	84	82	80	92

Variable	Value
Smax	
Smin	
FS	

(ii) What data type should FS be? Why? (1 mark)

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(b) The pseudocode for computing the highest score is

```
N ← 5
Smax ← 1
for i from 2 to N
        if JS[i] > JS[Smax]
            Smax ← i
```

(i) How many times will 'if JS[i] > JS[Smax]' be executed? (1 mark)

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(ii) What is the benefit of using 'N' instead of '5' in the loop? (1 mark)

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(c) Please tick the appropriate box to indicate the programming language used.

Python ☐   C++ ☐   Pascal ☐

(i) Assume that all five scores for a run given by the judges are stored in JS[1], JS[2], JS[3], JS[4] and JS[5]. By making use of the given variables, write a program segment in Python, C++ or Pascal to compute Smax, Smin and FS. (5 marks)

(ii) Complete the following program segment to ensure that the scores (sc) entered by the judges are valid, i.e. $0 \leq sc \leq 100$. (2 marks)

[Python version]
```
    sc = int(input())
    while (                                    ):
        print('Invalid input. Please input again.')
        sc = int(input())
```

[C++ version]
```
    cin >> sc;
    while (                                    ) {
        cout << "Invalid input. Please input again.";
        cin >> sc;      }
```

[Pascal version]
```
    readln(sc);
    while (                                    ) do begin
        writeln('Invalid input. Please input again.');
        readln(sc);
    end;
```

9. Mr Cheung designs an information system for students in a school. The usernames of students consist of four parts: form, class, class number and check digit, represented by F, C, N, and D respectively, as shown below.

Example:

1	A	24	5
Form	Class	Class number	Check digit
F	C	N	D

Mr Cheung creates the following flowchart to illustrate the process of validating a username within the system.
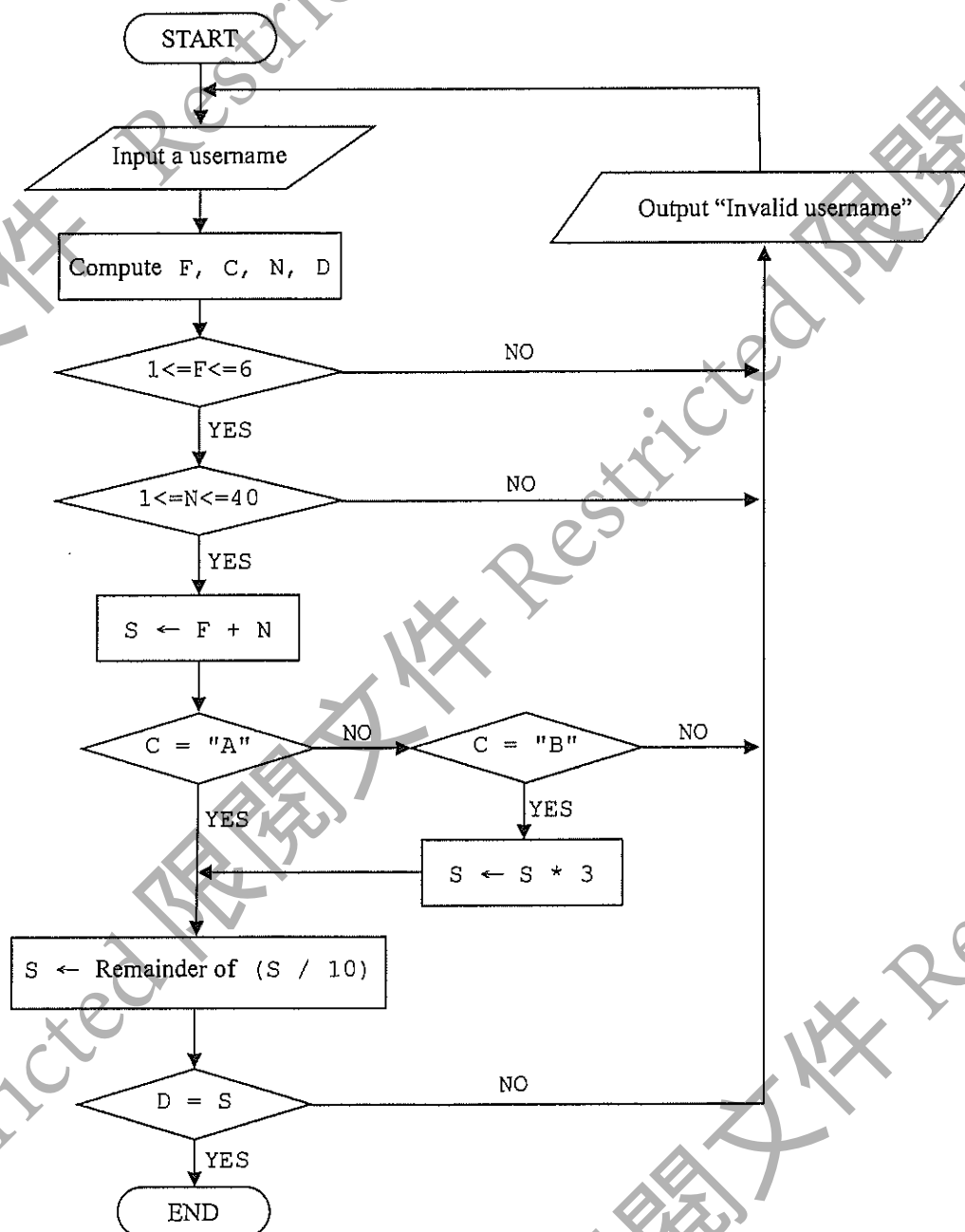
(a) What is the maximum number of students that can be supported by the system? (2 marks)

_____

(b) (i) Are '4B115' and '2C180' valid usernames? Explain briefly. For the valid username(s), show the calculation of the check digit. (3 marks)

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(ii) What is the limitation of using this check digit? Explain your answer with an example. (2 marks)

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(c) Mr Cheung converts the algorithm in the flowchart to the pseudocode below.

```
Line    Content
100     FLAG ← true
110     while FLAG
120         input a username
130         compute F, C, N, D
140         if  1<=F<=6  or  1<=N<=40
150             S ← F
160             if  C = "A"
170                 if  C = "B"
180                     S ← S * 3
190                 S ← remainder of (S / 10)
200                 if  D = S
210                     FLAG ← false
220         if  not FLAG
230             Output "Invalid username"
```

However, there are four mistakes after line 130 in the pseudocode. Fill in the following table to show the location of each mistake and its correction. One of the corrections is given. (3 marks)

Line	Corrected statement
150	S ← F + N

(d) Mr Cheung plans to download and install free word processing software in the school. After reading the terms of use, he decides to give up on the installation. Give **two** reasons to support his decision. (2 marks)

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END OF SECTION B
END OF PAPER

Database (SQL commands)

Constants	TRUE, FALSE
Operators	+, −, *, /, >, <, =, >=, <=, <>, %, _ , ' , AND, NOT, OR
SQL	AVG, MAX, MIN, SUM, AS, BETWEEN, BY, ASC, DESC, DISTINCT, FROM, GROUP, HAVING, LIKE, NULL, ORDER, SELECT, WHERE

Spreadsheet

Constants	TRUE, FALSE
Operators	+, −, *, /, <, >, =, <>, <=, >=, &
Functions	INT, RAND, SQRT, ROUND, AND, NOT, OR, LEFT, LEN, MID, RIGHT, AVERAGE, COUNT, COUNTIF, MAX, MIN, RANK, SUM, SUMIF, FIND, XLOOKUP, IF