HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2022

INFORMATION AND COMMUNICATION TECHNOLOGY
PAPER 1

8:30 am – 10:30 am (2 hours)

This paper must be answered in English

GENERAL INSTRUCTIONS

1. There are two sections, A and B, in this Paper.

2. Section A consists of multiple-choice questions in this question paper. Section B contains conventional questions printed separately in the Question-Answer Book.

3. Answers to Section A should be marked on the Multiple-choice Answer Sheet. Answers to Section B should be written in the spaces provided in the Question-Answer Book. **The Answer Sheet for Section A and the Question-Answer Book for Section B must be handed in separately at the end of the examination.**

INSTRUCTIONS FOR SECTION A (MULTIPLE-CHOICE QUESTIONS)

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should first stick a barcode label and insert the information required in the spaces provided. No extra time will be given for sticking on the barcode label after the 'Time is up' announcement.

2. When told to open this book, you should check that all the questions are there. Look for the words **'END OF SECTION A'** after the last question.

3. All questions carry equal marks.

4. **ANSWER ALL QUESTIONS**. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured.

5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.

6. No marks will be deducted for wrong answers.

Not to be taken away before the end of the examination session

Section A
There are 40 questions in this section. Choose the most suitable answers.

1. A computer receives the three data sequences, shown below. Each sequence includes a parity bit. Two of the sequences are found to be corrupted during transmission.

```
First:  0101 0111
Second: 1101 0101
Third:  1110 1011
```

Which of the following best describes the situation?

	Corrupted data sequence	Parity check
A.	The first and second	Even
B.	The second and third	Even
C.	The first and second	Odd
D.	The second and third	Odd

2. A supermarket uses a database table `FRUIT`, which stores fruit name `FNAME` and the corresponding quantity in stock `QTY`. Which of the following best describes the result of the query below?

```
SELECT FNAME
FROM FRUIT
WHERE QTY > 0
ORDER BY QTY DESC
```

A. Fruits are listed in descending order of fruit name.
B. Fruits are listed in ascending order of the quantity in stock.
C. Fruits with low quantities in stock are listed in ascending order of fruit name.
D. Fruits are listed in descending order of the quantity in stock.

3. What are the advantages of using the following calendar box over a text box for entering a date?

(1) Avoids impossible dates.
(2) Ensures that the input is error-free.
(3) Provides a user-friendly interface.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

4. Which of the following additions of 4-bit numbers using two's complement representation will result in an overflow error?

A. `0011 + 1001`
B. `1111 + 1111`
C. `1100 + 1011`
D. `1010 + 0100 + 0001`

5. How many bits are required to represent an image of 8×8 black-and-white pixels?

A. 64
B. 64^2
C. 8^8
D. 2^{64}

6. Which of the following is correct?

	Information process	Example
A.	Data collection	Creating a statistical chart
B.	Data preparation	Validating questionnaires before input
C.	Data processing	Sorting questionnaires for data entry
D.	Data organisation	Designing an online questionnaire

7. For a photo, the file size of its BMP image is larger than that of its JPG image because _____ .

(1) the BMP image is uncompressed
(2) BMP represents a bitmap image
(3) the BMP image cannot be shown in a browser

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

8. Which of the following about mail merge are correct?

(1) A database file can be used as the data source for mail merge.
(2) A main document and a data source can be merged to produce a merged document.
(3) The content of merge fields is inserted in the merged document when the merging completes.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

9. Which of the following about a presentation of several slides supplemented with verbal annotation in presentation software is correct?

A. The presentation should be web-based.
B. The presentation should be in a video file format such as MP4.
C. Verbal annotation can be recorded for slides individually.
D. The duration of each slide for verbal annotation is the same.

Go on to the next page

10. In the following spreadsheet, a formula is entered in `B6` based on `B2:B4` to calculate the class fee. Classmates want to limit the class fee to $1,000 by cutting the budget for the study tour.

	A	B
1	Expenditure for S6 (30 classmates)	$
2	Reference books	6,000
3	Photocopy fee	900
4	Budget for the study tour	30,000
5		
6	Class fee per classmate	1,230

When using the 'goal seek' function for 'what-if' analysis, which of the following sets of data should be used?

A.

Set cell:	B4
To value:	1000
By changing cell:	B6

B.

Set cell:	B4
To value:	30000
By changing cell:	B6

C.

Set cell:	B6
To value:	1000
By changing cell:	B4

D.

Set cell:	B6
To value:	30000
By changing cell:	B4

11. Why should characters be represented by character sets such as ASCII in computers?

(1) To standardise the data representation
(2) To enhance the data encryption
(3) As data in computers is stored in binary numbers

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

12. Why is information literacy important in a knowledge-based society?

(1) People should be able to identify fake information and hoaxes on the Internet.
(2) People should be able to write artificial intelligence (AI) programs.
(3) People should understand that some information from the Internet lacks credibility.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

13. When developing a management information system, which of the following should be the first item to be considered?

A. The technologies involved
B. The personnel involved
C. The cost of the system
D. The purpose of the system

14. Which of the following is/are the common specification(s) of a home use printer?

(1) 802.11n
(2) Parallel port
(3) 1200 dpi

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

15. A standalone computer runs slow when working on database software. Which of the following hardware components should be upgraded?

(1) RAM
(2) ROM
(3) Network interface card

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

16. Why would a fast food shop install a thermal printer instead of a laser printer to print receipts at the cashier?

(1) The printout is black and white.
(2) The printer is smaller in size.
(3) The text on the printout will fade faster.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

17. One day, Mary finds that she cannot access the Internet through her computer at home. Which of the following is a possible cause?

A. The size of ROM is small.
B. The data transfer rate of the hard disk is low.
C. The graphics card is out of order.
D. The network interface card is out of order.

Go on to the next page

18. Why do we need to regularly update software?

(1) Fix program bugs.
(2) Provide new functions.
(3) Improve the software performance.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

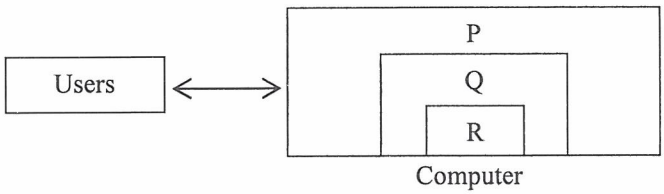
19. A company develops a computer system for autopilot driving, so that a vehicle can collect and use image data from the environment and drive on the road safely. It is a real-time processing system because _____.

A. the computers involved should have a high processing power
B. there should be no time delay between data input and the data processing
C. a large amount of data should be collected over a period of time
D. it provides resources and services to multiple users at a time

20. There are one hundred 300GB surveillance video files. Without any file reorganisation and compression, how many 2TB hard disks are needed to store all the video files?

A. 15
B. 16
C. 17
D. 32

21. In a typical situation, what are P, Q and R?



	P	Q	R
A.	Operating system	Hardware	Application software
B.	Application software	Operating system	Hardware
C.	Application software	Hardware	Operating system
D.	Operating system	Application software	Hardware

22. Which of the following describe(s) the URL, *https://www.abc.edu.hk/en/* ?

(1) *en* is a path on the web server.
(2) The domain name is *abc*.
(3) The web site is registered as an educational institution in Hong Kong.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

23. Which of the following are the potential benefits of e-learning?

(1) It can track individual learning progress.
(2) It reduces computer hardware resources.
(3) It provides flexible learning schedules.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

24. Which of the following should be considered when designing web pages?

(1) The time for loading web pages
(2) The user-friendliness of browsing
(3) The colour combination

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

25. Fibre optics is used in a computer network because _____.

(1) it supports both wired and wireless connections
(2) its data transfer rate is very high
(3) it supports a connection with a long distance

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

26. Internet Protocol (IP) is used in a computer network because _____.

A. data can be transmitted under the same communication rules
B. computers in the network are installed with the same operating system
C. the maximum data transfer rates between computers are the same
D. the network is a LAN instead of a WAN

27. Amy uses a computer to watch streaming videos. Which of the following should she consider?

(1) Network bandwidth
(2) Anti-virus software
(3) Hard disk storage size

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

Go on to the next page

28. The final values of `X` and `Y` in the following two algorithms are the same:

Algorithm 1

```
X ← 10
Y ← 0
REPEAT
   X ← X + 1
   Y ← Y + 2
UNTIL (X = 20) OR (Y > 15)
```

Algorithm 2

```
X ← 10
Y ← 0
WHILE [Missing part] DO
   X ← X + 1
   Y ← Y + 2
```

What is the missing part in Algorithm 2?

A. `(X = 20) AND (Y > 15)`
B. `(X = 20) OR (Y > 15)`
C. `(X <> 20) AND (Y <= 15)`
D. `(X <> 20) OR (Y <= 15)`

29. What input value for the algorithm below will **not** output '`Complete!`'?

```
Input N
flag ← TRUE
While flag = TRUE do
     If remainder of (N/4) > 0 then
          flag ← FALSE
Output 'Complete!'
```

A. 1
B. 2
C. 4
D. 6

Answer Questions 30 and 31 with reference to the following algorithm.

```
j ← 0
Input N
While N <> 888 do
   j ← j + N
   Input N
Output j
```

30. What is the purpose of the algorithm?

A. Counts the number of input values.
B. Finds the maximum input value.
C. Calculates the sum of input values.
D. Calculates the average of input values.

31. What is the use of the value '888'?

A. Terminates the input.
B. Checks positive input values.
C. Limits the range of input values.
D. Adds input values to `j`.

32. What is the importance of a problem definition in problem-solving?

A. The design and the scope of work can be set.
B. Problem analysis can be skipped.
C. There is no need to define sub-problems.
D. An error-free algorithm will be developed.

33. Which of the following is/are the advantage(s) of modularity in programming?

(1) The user manual is simpler.
(2) It is easier to trace a program.
(3) It facilitates programming through team work.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

34. Why should appropriate test data be prepared?

(1) To detect mistakes in algorithms
(2) To test whether exceptional input data can be handled
(3) To verify expected results from given input data

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

35. Peter just finds that he cannot open some important files in a computer in his office due to a ransomware attack. What should he do immediately?

A. Format the hard disk.
B. Disconnect the network connection.
C. Update anti-virus software.
D. Enable a firewall.

36. A shopping mall plans to develop a mobile application for customers to register their shopping records and gain bonus points for gifts. Which of the following considerations should be the **least** important?

A. Network security
B. Personal data privacy
C. Operating system
D. Application file size

Go on to the next page

37. John plays Internet games and uses social media all the time. Which of the following are likely the consequences of such indulgence in Internet activities?

(1) A higher chance of having anxiety and attention problems
(2) Infringement of copyright in Internet activities
(3) A decline in physical fitness

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

38. Which of the following are appropriate when using a social media application?

(1) Understand the terms of use of the application.
(2) Provide necessary personal information only.
(3) Forward information sent from others to friends as soon as possible.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

39. Peter installs a software package on his computer. He also installs it on another computer. He does not infringe copyright because _____.

(1) the license of the software package allows such installation
(2) the two computers are located in different countries
(3) the operating systems of the two computers are different

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

40. Which of the following about the use of robots are correct?

(1) Robots can follow working procedures accurately.
(2) Robots can replace the work of all the employees.
(3) Robots can take up dirty, dangerous jobs.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

END OF SECTION A

2022-DSE
ICT

PAPER 1
(SECT B)

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2022

Please stick the barcode label here.

Candidate Number									

INFORMATION AND COMMUNICATION TECHNOLOGY

PAPER 1

SECTION B: Question-Answer Book

This paper must be answered in English

INSTRUCTIONS

(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) **ANSWER ALL QUESTIONS.** 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.

(4) 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.

(5) 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.

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

* A 2 0 0 E 0 1 B *

Answer all questions.

1. Peter decides to buy a computer with a quad-core CPU instead of a dual-core CPU.

(a) (i) Why does Peter make this decision?

(1 mark)

(ii) Suggest another CPU technical specification that he might consider.

(1 mark)

(b) Peter will use his computer to edit and render videos. Give **two** hardware components that he should consider, other than the CPU. Explain briefly.

(2 marks)

(c) Peter buys a new computer with a pre-installed operating system.

(i) List **two** common functions of the operating system, other than file management.

(2 marks)

(ii) He uses free cloud storage for storing video files. Give an advantage and a disadvantage of using the cloud storage over a portable hard disk.

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Please stick the barcode label here.

(d) Peter considers installing open source software and freeware. State **two** differences between them.

_____

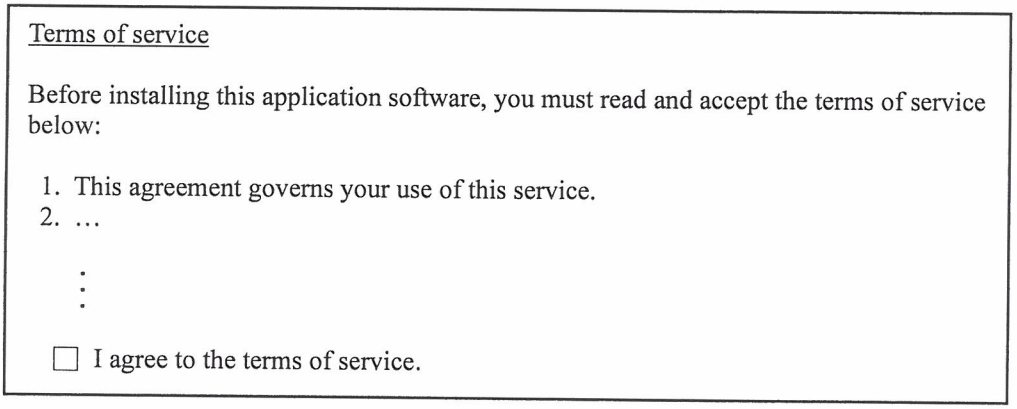
_____

_____

_____

(2 marks)

(e) When Peter installs application software, the following dialogue box is shown:



Give a term of service regarding privacy. Describe the potential risk of accepting this term that Peter might encounter.

_____

_____

_____

_____

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Go on to the next page

2. A spreadsheet file with two worksheets, Sheet1 and Sheet2, are used for processing an inter-house singing contest. In Sheet1, Column A stores the house code (HCODE) and Column B stores the names of houses (HOUSE). Part of the data is shown below:

Sheet1

	A	B
1	HCODE	HOUSE
2	R	Red
3	Y	Yellow
4	B	Blue
5	G	Green

Sheet2

	A	B	C	D	E	F	G
1	HCODE	HOUSE	Participant_Code	Score_1	Score_2	Score_3	FS
2	B		01	80	80	80	80
3	Y		02	96	94	92	95
4	R		03	60	64	64	64
5	G		04	80	80	80	80
6	G		05	70	80	90	85
7	B		06	75	75	69	75
8	G		07	60	68	68	68

(a) In Sheet2, the final score FS is the average of the highest two scores from the three scores in columns D to F. A formula in G2 is copied to G3:G8. Write down the formula in G2.

_____

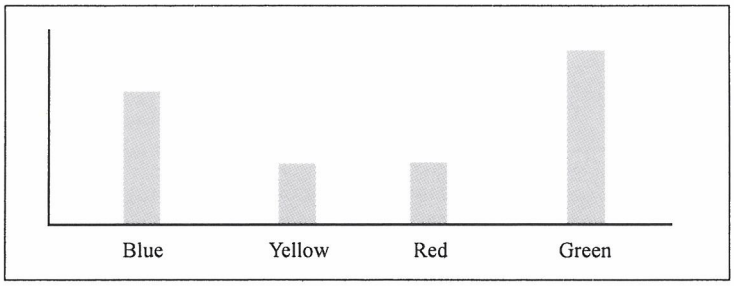
(2 marks)

(b) In Sheet2, a formula =vlookup(A2, Sheet1!A2:B5, 2, false) is entered in B2 and then copied to B3:B8. It is found that not the names of all houses are correctly shown. Write down the correct formula in B2.

=vlookup (, , ,)

(2 marks)

(c) In Sheet2, a pivot chart is created for displaying the number of participants in each house.



(i) Complete the following parts to create the pivot chart.

ROWS	VALUES
_____	_____

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Please stick the barcode label here.

(ii) The pivot chart can be inserted into a document using two methods, linking and embedding. Give an advantage of each method.

(2 marks)

(d) Sheet2 is converted to a database table `TB2`.

(i) Suggest a primary key for `TB2` : _____

(1 mark)

(ii) Based on the given data in Sheet2, what is the output after executing the following SQL statement?

```
SELECT HCODE, MAX(FS) FROM TB2 GROUP BY HCODE
```

(2 marks)

(e) Would you suggest using a spreadsheet or database to process the data of the singing contest? Explain briefly.

(1 mark)

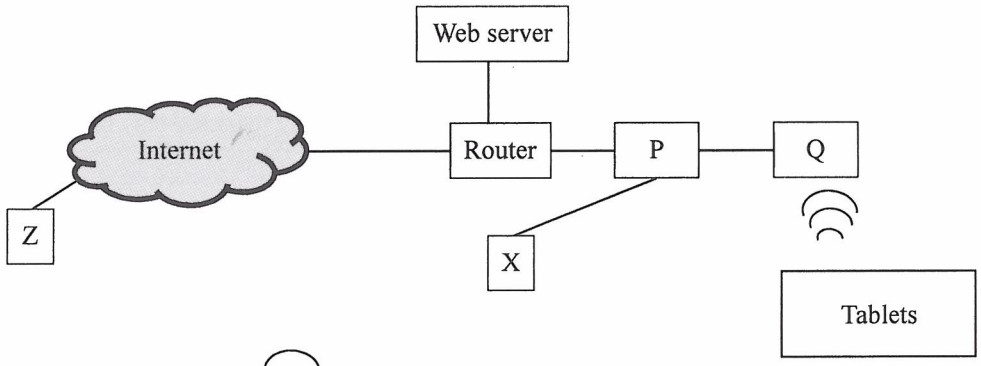
Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Go on to the next page

3. A school designs the following computer network. P and Q are common network connecting devices. A computer X connects to P. Some tablets connect to Q.



(a) (i) What are P and Q?

P: _____ Q: _____

(2 marks)

(ii) What is the main function of the router in the network?

_____

_____

(1 mark)

(b) Computer X sends a file to a computer Z. Complete the following steps to describe how data is transmitted.

1. The file _____

_____.

2. The packets are sent out from X.

3. The packets _____

_____.

4. The completion of the transmission of all the packets is ensured.

5. The packets _____

_____.

(3 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

(c) Is it a must to install a DNS in the school in order that the web server can be accessed by the public? Explain briefly.

(2 marks)

(d) Give **two** reasons why a firewall is enabled in X.

(2 marks)

(e) The school plans to set up an e-payment system. Other than security tokens, suggest **two** methods of making secure electronic transactions.

(2 marks)

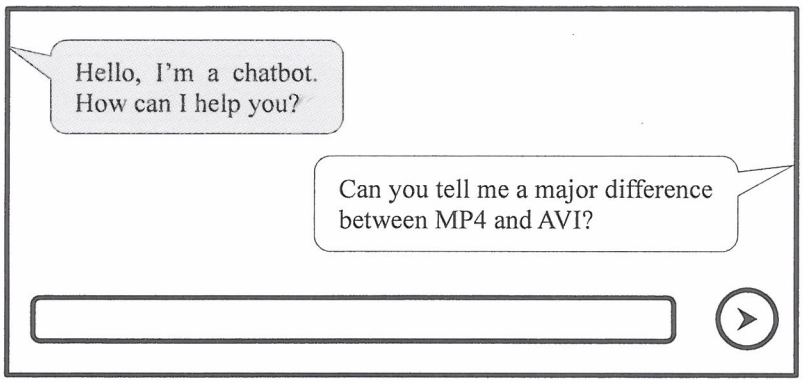
Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Go on to the next page

4. John develops an Artificial Intelligence (AI) chatbot application to chat with online users and answer ICT questions.

(a) A dialogue between the chatbot and an online user is shown in the following example:



(i) According to the dialogue, suggest an answer for the chatbot to reply.

_____

_____

(1 mark)

(ii) Suggest an improvement to the application for visually impaired people.

_____

_____

(1 mark)

(b) Give **two** ways in which chatbots can influence society.

_____

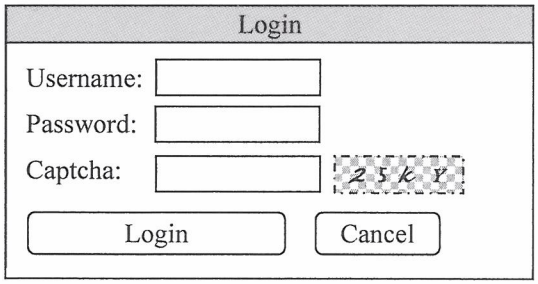
_____

_____

_____

(2 marks)

(c) John develops the login page for using the chatbot application.



Answers written in the margins will not be marked.

(i) Users should set a password of at least 8 characters that must include an uppercase letter, a lowercase letter, a digit and a symbol. Give **two** good practices for users when setting a password, other than having a long password.

(2 marks)

(ii) How can Captcha enhance the security of the login page?

(1 mark)

(d) John considers encoding symbols into bit patterns in the application. The following table shows the bit patterns of symbols using two different methods.

Symbol	Bit pattern	
	Method 1	Method 2
☺	10	1
☹	01	01
😐	00	000
☹	11	001

(i) Encode ☺ 😐 ☹ ☹ using Method 1: _____

(1 mark)

(ii) Decode '001011' using Method 2: _____

(1 mark)

(iii) Find the number of bits required for encoding the symbols in each row below.

	Method 1	Method 2
☺ ☺ ☺ ☹ ☹ ☹		
☹ ☹ ☹ 😐 😐 😐		

(2 marks)

(iv) Under what scenario will Method 2 be better than Method 1?

(1 mark)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Go on to the next page

5. Mary designs a subprogram with an array `A`. She considers algorithms ALG1, ALG2 and ALG3.

ALG1

Line number	Content
1	`B ← 0`
2	`for i from 1 to N do`
3	`    if A[i] = 1 then`
4	`        B ← B + 1`
5	`if B >= N/2 then`
6	`    ch ← 'X'`
7	`else`
8	`    ch ← 'Y'`

(a) Suppose that `N = 6`. Execute ALG1 with the following initial content of `A`:

A[1]	A[2]	A[3]	A[4]	A[5]	A[6]
1	0	1	0	0	0

Write down the final values of `B` and `ch`.

B: _____ ch: _____

(2 marks)

(b) Suppose that `N = 6`. Execute ALG1 with the following initial content of `A`:

A[1]	A[2]	A[3]	A[4]	A[5]	A[6]
1	1	1	1	0	0

How many times will Line 3 be executed? _____ (1 mark)

ALG2

Line number	Content
1	`i ← 1`
2	`B ← 0`
3	`while (i <= N) AND (B < N/2) do`
4	`    if A[i] = 1 then`
5	`        B ← B + 1`
6	`    i ← i + 1`
7	`if B >= N/2 then`
8	`    ch ← 'X'`
9	`else`
10	`    ch ← 'Y'`

(c) Suppose that `N = 6`. Execute ALG2 with the initial content of `A`:

A[1]	A[2]	A[3]	A[4]	A[5]	A[6]
1	1	1	1	0	0

(i) How many times will Line 4 be executed? _____ (1 mark)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

(ii) ALG2 can be more efficient than ALG1. Why?

_____

_____

(1 mark)

(d) Complete the following initial content of `A` such that the number of executions of the statement '`if A[i] = 1 then`' in both ALG1 and ALG2 would be the same.

A[1]	A[2]	A[3]	A[4]	A[5]	A[6]
1	1				

(2 marks)

(e) ALG1 and ALG3 below should always produce the same result. Complete Line 3 below.

ALG3

Line number	Content
1	`B ← 0`
2	`for i from 1 to N do`
3	`    B ← B + A [ _____ ]`
4	`if B >= N/2 then`
5	`    ch ← 'X'`
6	`else`
7	`    ch ← 'Y'`

(1 mark)

(f) The value of `N` is very large. Which algorithm, ALG1 or ALG3, is more efficient? Explain briefly.

_____

_____

_____

_____

(2 marks)

(g) A computer executes Mary's subprogram. State **two** components in the CPU that are involved in the fetch-decode-execute cycle, other than IR (instruction register).

_____

_____

(2 marks)

END OF PAPER

Answers written in the margins will not be marked.

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Database (SQL commands – based on SQL–92 Standard)

Constants	TRUE, FALSE
Operators	+, –, *, /, >, <, =, >=, <=, <>, %, _ , ' , AND, NOT, OR
SQL	ABSOLUTE (ABS), AVG, INT, MAX, MIN, SUM, COUNT, AT, CHAR_LENGTH (LEN), LOWER, TRIM, SPACE, SUBSTRING (SUBSTR/MID), UPPER, AS, BETWEEN, BY, ASC, DESC, DISTINCT, FROM, GROUP, HAVING, LIKE, NULL, ORDER, SELECT, WHERE

Electronic Spreadsheet

Constants	TRUE, FALSE
Operators	+, –, *, /, <, >, =, <>, <=, >=
Functions	ABS, INT, RAND, SQRT, ROUND, AND, NOT, OR, CHAR, CONCATENATE (&), ISBLANK, LEFT, LEN, LOWER, MID, PROPER, RIGHT, TEXT, TRIM, UPPER, VALUE, AVERAGE, COUNT, COUNTA, COUNTBLANK, COUNTIF, MAX, MIN, RANK, SUM, SUMIF, FIND, VLOOKUP, IF