IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
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M05/5/COMSC/HP2/ENG/TZ0/XX

22057012

COMPUTER SCIENCE
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PAPER 2

Tuesday 10 May 2005 (morning)

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.

1. An even parity check bit is appended to a group of 7 bits to make the sum of all the bits, including the appended bit, even.
For example:
1 is added to 0110111 to give 0110111**1**
and **0** is added to 0110110 to give 0110110**0**

(a) State whether a parity check would detect that the byte, 0110111**1**, has been corrupted. *[1 mark]*

The following 8 x 8 two dimensional array uses the right hand column to even parity check the rows and the bottom row to even parity check the columns. The data has been corrupted.

Parity Column

	1	2	3	4	5	6	7	8
1	0	1	0	1	0	1	0	**1**
2	1	1	1	1	0	0	0	**0**
3	1	1	0	0	0	0	0	**0**
4	0	0	0	1	1	0	1	**0**
5	0	1	0	1	0	1	1	**0**
6	1	1	0	0	0	0	1	**1**
7	1	0	1	1	0	1	1	**1**
8	**0**	**1**	**0**	**1**	**1**	**1**	**1**	**1**

← Parity Row

(b) State which column and row the corrupt bit is in. *[2 marks]*

(c) Construct a function, called `HAMMING`, that will accept a 2D array of **integer**, called `BOOLDATA`, and return the row position of a corrupted bit. If no corrupt bit is located the function should return a value of 0. If more than 1 bit is corrupted it should return a value of -1. *[15 marks]*

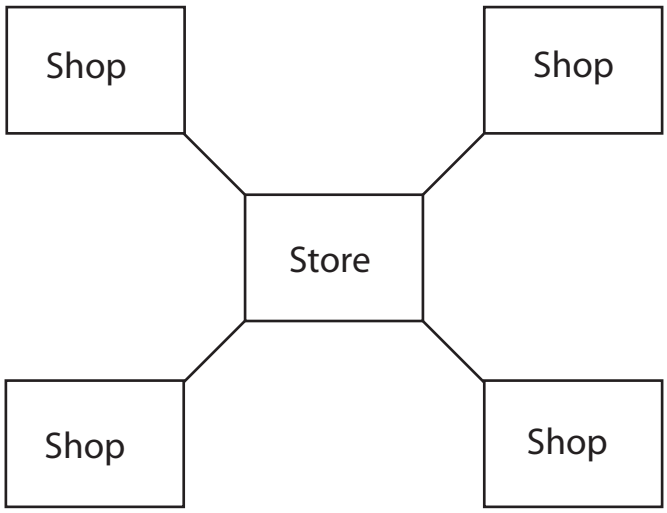
It is possible to use the **same** function, `HAMMING`, to check the columns if it is sent the array with the columns and rows swapped.

(d) Construct a procedure called `SWAP` that will accept `BOOLDATA` and place the rows into columns and the columns into rows. *[4 marks]*

(e) Construct a procedure that accepts `BOOLDATA` and checks for a single error. If a single error occurs the procedure corrects the error. If more than one error occurs an error message is displayed. The sub-routine **must** use `HAMMING` and `SWAP` to perform all major processing. Call the procedure `CHECK`. *[8 marks]*

This question requires the use of the Case Study.

2. A shop owner has several shops in various locations within a large town. The owner wants to keep track of stock at all locations so that a central store can re-order in time but not too soon.



(a) State the name given to this type of stock control. *[1 mark]*

(b) Describe the benefits of organizing orders in this way. *[4 marks]*

(c) Describe how this type of ordering is achieved using information systems. *[4 marks]*

The owner, whose experience of computing is limited to using his laptop, intends to design the system himself and install it one holiday whilst the shops are closed. The employees will then arrive on the next day and have the new system to work with.

(d) Explain **one** advantage of his plan. *[2 marks]*

(e) Explain **two** disadvantages of his plan. *[6 marks]*

(f) Describe a better plan for the design stage and state why it is better. *[3 marks]*

(g) Describe a better plan for the installation stage and state why it is better. *[3 marks]*

(h) Describe **two** additional benefits to the owner once the new system has been installed. *[4 marks]*

(i) **Without** reference to **hacking** or **viruses**, suggest how the new system could expose the business to new problems. *[3 marks]*

3. An electricity company is designing a form that will be posted to customers. The customers will be expected to read their own electricity meters and record the reading on the form before posting it back to the company. The forms that arrive at the customers' homes already have the unique number of the electricity meter, the name of the customer and the address.

(a) Outline **one** advantage and **one** disadvantage of this type of data capture. *[2 marks]*

The forms are generated by computer and read back into the computer when the customer has completed and returned them.

(b) Outline a suitable method of generating the forms by computer and describe how the customer information can be retrieved when the forms are read back. You should include the input device needed to read the forms as well as any processing that may be needed. *[6 marks]*

The numerical reading that the customers will record on the form can have values between 0 and 99999. Automatic machines will be used to read these numbers from the form.

(c) State the **most suitable** method for recording this information on the form and describe how it works. *[3 marks]*

(d) Discuss why it is the most suitable method by comparing it with one other method of data capture. *[4 marks]*

4. Two players can play a computerised game over the Internet. Each computer has a copy of the game.

A. The scores for each player are calculated as they play.
B. The scores for each player are updated on both screens when they change.
C. After each game the player's scores are saved to a central database.
D. At the end of each day a 'highest-score' list is generated and the results displayed on a website.

(a) Draw a **system flowchart** of the complete system. *[6 marks]*

State which of the above activities A to D is:

(b) Online processing. *[1 mark]*

(c) Real time processing. *[1 mark]*

(d) Batch processing. *[1 mark]*

(e) Transaction processing. *[1 mark]*

(f) (i) Outline the reasons for each player holding a copy of the game on their machine. *[2 marks]*

(ii) Discuss the advantages of using the Internet to play a game in this way. *[3 marks]*

5. A network supervisor has chosen to make weekly backups of a large network on tape so that the network's data can be restored in case of failure.

(a) Suggest why tape was chosen by comparing four characteristics of tape with:

(i) hard disk. *[4 marks]*

(ii) floppy disk. *[4 marks]*

The data on the tapes will stay good for about one year. The network supervisor wants the data to last longer.

(b) Describe an alternative strategy for storing the data files. *[4 marks]*

(c) State where the backup media should be kept and explain why. *[3 marks]*