IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
PROGRAMA DEL DIPLOMA DEL BI

COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1

Monday 17 May 2004 (afternoon)

1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Section A: answer **all** the questions.
- Section B: answer **three** questions.

SECTION A

*Answer **all** the questions.*

1. Outline the functions of the ALU and CU. *[4 marks]*

2. Define the term *protocol*. *[2 marks]*

3. Define the term *utility software* **and** outline the function of *defragmentation software*. *[3 marks]*

4. Outline how a web-browser allows a user to jump from one web page to another, without entering the address of the new page. *[2 marks]*

5. In a factory 17 sensors need to be connected to a computer. Each sensor is to be allocated an ID number from 1 to 17 and this value is to be stored in a register as a binary number.

(a) How many bits are required to store the sensor ID? *[1 mark]*

(b) Using the number of bits indicated in part (a), how would sensor 14 be represented as a binary number? *[1 mark]*

6. Outline the difference between data *security* and data *integrity*. *[2 marks]*

7. Outline **two** reasons why *modularity* of a program design is important when performing modification to software. *[2 marks]*

8. Describe **one** method of detecting an error when transmitting data and **one** method of attempting to recover from the transmission error. *[4 marks]*

9. State what form of processing best suits the following computer systems.

(a) An airline booking system *[1 mark]*

(b) A bank's cheque processing system *[1 mark]*

10. Define the terms *client* and *server*. *[2 marks]*

11 Calculate the number of 650 MB CD-ROM's that would be needed to archive 3 GB of data. *[2 marks]*

12. A program requires the following three items of data to be held for a number of different cities:

the name of the city (CITY), its average rainfall per year (AVR) and whether or not there is an airport (AP).

State a suitable data type for each of the items. *[3 marks]*

SECTION B

*Answer **three** questions.*

13. The names of the members of a cycling club are stored in the 1-dimensional array NAMES as shown below.

[1]	[2]	[3]	[4]	[5]	[6]
SMITH	DELL'AVA	DUPONT	NASHAH	DOI	SINGH

After a competition, a 1-dimensional array of positions POS is formed as follows.

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

There was a tie for second place.

(a) State the name of the person who came last in the race. *[1 mark]*

Consider the following algorithm fragment.

```
declare TEMP string array [1..6]
declare NAMES string array [1..6]
declare I integer
declare POS integer array [1..6]
  for I <-- 1 upto 6 do
      TEMP[I] <-- "ZZZ"
  endfor
  for I <-- 1 upto 6 do
      TEMP[POS[I]] <-- NAMES[I]
  endfor
  for I <-- 1 upto 6 do
      NAMES[I] <-- TEMP[I]
  endfor
```

(b) Copy and complete the following trace table for values 1 to 6 in the second for...endfor loop in the algorithm. *[4 marks]*

I	POS[I]	TEMP[POS[I]]
1	2	SMITH

(c) List the contents of the array NAMES after the third for...endfor loop has been executed. *[2 marks]*

(d) State the purpose of the algorithm. *[1 mark]*

(e) Suggest how the problem with the two competitors who tied could be avoided. *[2 marks]*

14. Network Question

A business has **three** offices in different parts of a large city. Within each office there is a network and these three networks are connected together using a communication system.

(a) State the type of network used

(i) within each office. *[1 mark]*

(ii) between the three offices. *[1 mark]*

(b) Identify **two** items of hardware that affect communication speed. *[2 marks]*

(c) Explain the importance of **two** security issues that the organization should be aware of by allowing employees to use e-mail and the Internet. *[4 marks]*

Communication between the offices needs speeding up.

(d) Outline **one** way in which the use of communications between the offices improves the working efficiency of the business. *[2 marks]*

15. Computer System Software Selection

A music store is considering going online to advertise its services and expand its potential market.

(a) Outline **one** objective of the *systems analysis phase* (stage) in the *software life cycle*. *[1 mark]*

During the analysis phase the analyst says that there is a software package called e-music that will provide the functionality required.

(b) Outline **one** advantage and **one** disadvantage of buying pre-written software. *[2 marks]*

(c) State the software that a potential customer requires access to. *[1 mark]*

(d) Suggest a suitable backup strategy that the music store could adopt, and explain why the strategy is important. *[4 marks]*

(e) Outline **one** way in which the company can use a website to further promote its business. *[2 marks]*

16. Temperature sensors are used to measure ocean temperature at 100 points along a coastline. Each day two temperature readings are taken and stored by the small computer system that operates the data capture. This data is transmitted once a month to a central computer.

(a) State the format of the data collected by the temperature sensor. *[1 mark]*

(b) State the type of conversion that is needed to store the temperature measurement in the computer. *[1 mark]*

(c) Outline **one** way in which the data received by the central computer at the end of the month can be verified and **one** way in which it can be validated. *[4 marks]*

The readings from the sensors are used to calculate an overall average temperature for each sensor.

(d) Explain why a sequential file would be suitable for this processing. *[2 marks]*

This data is to be stored over many years for future use, so that researchers can use it.

(e) Discuss how this could be done. *[2 marks]*
