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

COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1

Wednesday 22 May 2002 (afternoon)

1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all of Section A.
- Answer three questions from Section B.

SECTION A

*Answer **all** questions.*

1. State which data type is best for storing a telephone number (*e.g.* 01623 440325) and give **two** reasons why. *[3 marks]*

2. State what type of search would always be used on unsorted data and explain why. *[2 marks]*

3. Explain what is meant by a *transaction* file. *[3 marks]*

4. State **two** items that would be found in *system documentation* and explain why it is necessary to produce *system documentation*. *[4 marks]*

5. State the purpose of the following algorithm.

```
function F (ref S:string, B, E: integer):integer
   declare I as integer declare St as string
   for I <-- B to E do
      St <-- St + S[I]
   enddo
   F <-- St
end F
```

[4 marks]

6. Explain how *top down design* and *modularity* work together to produce better solutions to problems. *[3 marks]*

7. Describe **one** "safe" method of upgrading a networked computer system. Explain how it could be used to avoid a catastrophic failure. *[3 marks]*

8. Compare *procedures* and *functions* by describing how each handles parameters and return values. *[5 marks]*

9. Explain the difference between *logical*, *syntax* and *run-time* errors. *[3 marks]*

SECTION B

*Answer **three** questions.*

10. The start of a trace table for the following algorithm is given below.

```
procedure P(val I integer)
   declare C, D integer
   declare A integer array [0..7]
   D <-- 128
   for C <-- 0 upto 7 do
      A[7-C] <-- I div D
      if A[7-C] = 1 then
         I <-- I-D
      endif
      D <-- D div 2
   endfor
endprocedure P
```

I	C	D	A[7]	A[6]	A[5]	A[4]	A[3]	A[2]	A[1]	A[0]
197	0	128	1							
69	1	64	1	1						

(a) Copy and complete the trace table. *[6 marks]*

(b) State the function of procedure P. *[1 mark]*

Another procedure has been written that performs a similar task.

```
   procedure P1(val I short integer)
1     declare A, B integer
2     declare C, D char declare N string
3     N = "0123456789ABCDEF"
4     A <-- I div 16
5     B <-- I mod 16
6     C <-- N[A]
7     D <-- N[B]
   endprocedure P1
```

(c) State the purpose of lines 4 and 5. *[1 mark]*

(d) State the purpose of lines 6 and 7. *[1 mark]*

(e) State the function of the procedure. *[1 mark]*

11. A group of twelve architects work together in an office. A local area network with a central server is installed and they each have access to the same software and peripherals. Each architect uses one workstation, which is not used by anyone else.

(a) Outline the advantages of a LAN for the architects. *[2 marks]*

(b) Identify a suitable *output device* for an architectural design, stating why it is suitable. *[4 marks]*

(c) The architects store and transmit many different types of file within the office and to clients. Outline the need for standard format in the storing and transmitting of files. *[2 marks]*

(d) When a change to a design is made, the architect is asked to confirm the changes before the file is updated. Explain the type of data input check. *[2 marks]*

12. A telephone directory is held as a *direct access* computer file. The name and telephone number of subscribers are stored so that the request for the number of a particular person can be quickly answered. The database is held centrally and linked to various centres across the country. People wanting information phone their local centre and an operator uses the database to answer the enquiry.

(a) With reference to the telephone directory, describe a *direct access* file. *[2 marks]*

(b) Explain why this process is *on-line*. *[2 marks]*

(c) Describe the type of computer that would be needed to hold the central database. *[3 marks]*

(d) Draw a system flow chart to demonstrate the process of an enquirer requesting the number of a particular person. *[3 marks]*

13. An electronic bank is set up which deals entirely over the Internet. Customers cannot withdraw or deposit cash but can pay via a credit card, which is debited immediately from the account. Customers can also have money, including salaries, paid into the bank. There are no local branches to call into or to telephone. Everything is controlled from one main office which houses a computer system. The computer is connected directly to the central banking system and to the Internet. Clients manage all their finance by the Internet.

(a) Outline **two** precautions that could be taken to ensure that the data flow to and from the central banking system is as secure as possible. *[4 marks]*

(b) Explain **one** method of ensuring *data integrity* in the transmission of data. *[2 marks]*

(c) Discuss the advantages and disadvantages of this type of banking. *[4 marks]*