CAMBRIDGE INTERNATIONAL EXAMINATIONS
Cambridge Diploma in Computing
Advanced Level

DIPLOMA IN COMPUTING

Module 1

5216

May/June 2003

2 hours

Additional Materials: Answer Booklet/Paper

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
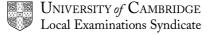You may use a soft pencil for any diagrams, graphs, music or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **4** printed pages.

UNIVERSITY *of* CAMBRIDGE
Local Examinations Syndicate

[Turn over

1 (a) Distinguish between operating system software and applications software. **[2]**

(b) State **three** utility programs associated with the use of a hard drive. Explain the purpose of each of the programs. **[6]**

2 (a) State what is meant by each of the following modes of use.

    (i) Batch processing.

    (ii) Real-time processing.

    (iii) On-line processing.

    (iv) Off-line processing. **[4]**

(b) A computer game involves driving a racing car around a track. State which **two** of the above modes of use would be appropriate, justifying your answers. **[4]**

(c) State **two** advantages and **one** disadvantage of having a network of computers, rather than a series of stand alone machines, in a school classroom. **[3]**

3 (a) Describe each of the following types of program error, giving an example in each case.

    (i) Syntax error.

    (ii) Logic error.

    (iii) Arithmetic error. **[6]**

(b) Describe **two** methods used to assist in finding program errors. **[4]**

4 (a) Explain what is meant by a LIFO data structure. **[2]**

(b) Draw a simple diagram to show how a stack can be stored in an array. **[2]**

5 A company employs approximately 2000 workers whose details are stored in a personnel file in a computer system.

Each worker's record has a unique 7 digit identification number.

- The first digit is from 0 to 5 and refers to the department in which the person works.
- The second digit is a 0 or a 1 and refers to the sex of the employee.
- The next two digits refer to the year that the employee joined the company.
- The last three digits are used to make the identification number unique.

The file is accessed randomly by using a hash table.

(a) Devise a suitable hashing algorithm which limits the degree of redundancy to allow access to the hash table. **[2]**

(b) State two identification numbers that will cause a collision using your hashing algorithm. **[1]**

(c) Describe **two** methods to overcome the problem of collision in part (b). **[4]**

6 **(a)** Describe the purpose of the

    (i) control unit

   (ii) memory unit

  (iii) arithmetic logic unit

    in a computer. **[6]**

(b) Explain the difference between main memory and secondary storage. **[2]**

7 **(a)** Explain the difference between

    (i) serial and parallel,

   (ii) simplex and duplex

    modes of data transmission. **[4]**

(b) When data is transmitted it is subject to corruption. Explain how a parity check could be used to determine whether corruption has taken place. **[4]**

The remaining questions refer to the following information.

A college stores its student files on paper which is kept in filing cabinets. The decision is taken to computerise these student files.
A systems analyst is employed to supervise the process.

8   Explain why the college authorities and the analyst need to work together to define the problem accurately. **[4]**

9   The college decides to extend the system to include a web site for marketing purposes. The analyst is asked to design the site.

   (a) Explain what information the analyst must collect before designing the site. **[4]**

   (b) State **two** other types of software that could be used for marketing purposes, saying how they could be used. **[4]**

10   Much confidential information about the students is to be stored on the computer system. Explain the measures that can be taken to ensure that such information remains confidential. **[5]**

11   The data stored needs to be as accurate as possible. Twice each year examination grades are entered (A to G) for each subject. Describe how the techniques of

   (i) verification,

   (ii) validation

   are used to ensure that the stored data is as accurate as possible. **[6]**

12   When a new student is enrolled, a new record is added to the file immediately. The examination grades of all students are updated twice a year.

   Discuss the processing implications of these two requirements. **[6]**

13   Discuss the range of information that the system can supply to the administrative and teaching staff of the college. **[5]**

[Total: 90]