COMPUTING **9691/01**

Paper 1 **May/June 2008**

2 hours 30 minutes

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.
You may use a soft pencil for any diagrams, graphs 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
International Examinations

[Turn over

1 (a) State what is meant by the

    (i) hardware of a computer system, [1]

    (ii) software of a computer system. [1]

A computer system controls a cashcard machine (ATM).

(b) For each of the following, state **one** device that could be used in the ATM and state what it would be used for.

    (i) Input

    (ii) Output

    (iii) Storage [6]

(c) The operating system, used by the computer controlling the ATM, must work in both batch and real-time modes.

    (i) State what is meant by a batch processing operating system and explain why it would be necessary in the ATM. [3]

    (ii) State what is meant by a real-time operating system and explain why it would be necessary in the ATM. [3]

2 (a) State what is meant by

    (i) source code,

    (ii) object code. [2]

(b) Explain the need for translator programs in a computer system. [2]

(c) When a computer runs a program, the program may fail to run successfully because there are errors in the code.
Describe **two** types of error that may be present, giving an example of each. [6]

3 (a) (i) State **two** types of data stored in RAM when a computer is running. [2]

    (ii) State **one** piece of software which is entirely contained in ROM and say why it is stored in ROM rather than RAM. [2]

(b) Describe the function of the following parts of a processor.

    (i) Control Unit [2]

    (ii) ALU [2]

4 (a) The water level in a reservoir is controlled by a computer system.
During normal operation the water level (**W**) is between the high water (**H**) and low water (**L**) marks. At these times the input valve (**I**) and output valve (**O**) are both open.

If the level reaches **H** then the input valve is shut off until the level falls below **H** again.

If the level falls below **L** then the output valve is shut off until the level rises above **L** again.

If the level falls below **L** for more than 1 hour, the system sends an alarm signal to the operator.

Using the variables **W,H,L,I,O** produce an algorithm to control the water level in the reservoir.
[8]

(b) The alarm signal, together with all the other values from the system, is sent to a central control room. All the water supplies in the city are controlled from this central room by a single operator.

Explain the importance to the operator of good interface design, stating any features which should be considered. [5]

5 (a) Draw a diagram of a linked list to show the codes for the following examination papers when they are stored in numerical order.

9691.01   1276.02   9754.01   9691.03

[4]

(b) (i) Explain what is meant by LIFO and FIFO data structures. [2]

(ii) Give **one** advantage and **one** disadvantage of using a linked list structure to store a queue rather than using an array structure. [2]

(iii) Explain why a linked list is a more sensible structure than an array for storing a stack. [3]

The remaining questions refer to the following information.

A large store has a number of departments, each selling different types of goods.
Each department has its own stand-alone computer system.

6 It is decided to network the computers. A bus topology and a star topology are considered.
Describe these topologies and give an advantage of each in this application. [8]

Customers are allowed to open personal accounts so that they can buy things and pay with a single payment once a month.
As a security measure, customers have to use a store card to buy something on their account.

7 **(a)** The card has the customer's picture on it.
Describe how the customer's picture is produced digitally on the card. [5]

(b) When the card is used at a terminal, a bar code, which is printed on the card, is scanned and an output is produced.

   (i) Describe how the bar code works in this example. [2]

   (ii) Identify **two** different output formats which would be used at the point of sale terminal, stating why they are necessary. [4]

8 Explain why many customers might be worried about having an account. [4]

9 The data collected from the use of the cards is input to a management information system (MIS). Describe the characteristics of an MIS and how it would be used. [4]

10 The system was fully tested before being installed into the store. However, it requires continued maintenance.

(a) Describe **two** different types of maintenance required. [4]

(b) Explain why the system has a limited life span. [3]