COMPUTING **9691/03**

Paper 3 **October/November 2007**

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.
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 bus company runs services throughout a country. The company proposes to introduce a new computerised ticketing machine on its buses. The analyst who is in charge of the introduction considers
    - phased
    - pilot
    - direct
implementation of the new system.
Evaluate each of these types of implementation for this application. [6]

2   There are a number of TEAMs which represent a school.
Each team has a TEACHER who runs it and a teacher may run more than one team.
Each team has a number of PLAYERs and each one may play for more than one team.

Draw an entity relationship (E-R) diagram to represent this data model in third normal form and label the relationships. [6]

3   A retail business specialises in souvenir items for tourists. It has a number of shops in different cities.
Discuss how the Internet can be used in this business. [6]

4   Describe changes to the working patterns of office workers following the introduction of computerised communications. [5]

5   **(a)** State **two** different types of interrupt and give an example of how each may be generated. [4]

    (b) Explain the process carried out by the operating system on receipt of an interrupt. [5]

6   Names are to be stored in a binary tree according to the algorithm

    1. Repeat
    2. If Name > node then take right pointer
    3. Else take left pointer
    4. Until empty node
    5. Insert Name

    (a) Given that the root node is DAMON, create the binary tree resulting from inserting:

                CANDU   RISH   AAMON   TENAR   GLAN

    in the given order. [3]

    (b) Describe an algorithm for using the tree to read the names in alphabetic order. [3]

7   Describe how a variable in a high level language program is dealt with by a compiler. [6]

8 **(a)** Using an example application, explain why some applications require parallel processing rather than serial processing. [3]

   (b) Describe what is needed to run a parallel process rather than a serial process. [3]

9 **(a)** State the purpose of the Memory Address Register (MAR) in a computer. [1]

   (b) Describe **two** stages of the fetch/execute cycle which would change the contents of the MAR. State clearly, in each case, what the MAR contains. [4]

10 A computer stores fractional numbers in floating point binary representation. Five bits are used for the mantissa and three bits for the exponent. All values are stored in two's complement form.

Mantissa   Exponent
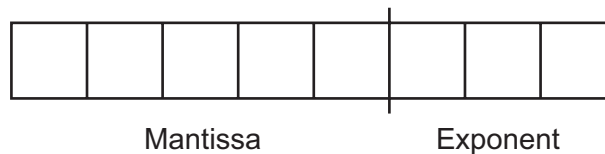
   (a) By using a diagram of this representation, state the value of each of the bits. [4]

   (b) By using 2 ½ as an example, explain how real numbers can be shown in normalised form in this representation. [3]

   (c) State the floating point binary value of - ¾ in this representation. [2]

11 **(a)** Describe the characteristics of

       (i) a procedural programming language, [2]

       (ii) a declarative programming language. [2]

   (b) Explain what is meant by the following terms when referring to object-oriented languages:

       (i) Data encapsulation, [2]

       (ii) Inheritance. [2]

12 A computer system is being developed.

   Describe the use of **two** software tools, apart from an entity relationship (E-R) diagram, that could help manage the development of the design. [8]

13 A mail order company employs a number of computer operators who take orders by telephone. There is also a warehouse department from which orders are dispatched. The management staff interrogate the data to inform their decisions. The computers in all three areas are networked with a central storage facility.

(a) Discuss, the different topologies and media available for transmitting data around the network, with reference to suitability for this example. [8]

(b) Describe how various users can be given different access to the data held on the central database. [2]