UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Level

COMPUTING **9691/03**

Paper 3 **May/June 2009**

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   Describe **four** facilities provided by email systems to help with managing messages ~~received~~ [4]

2   **(a)** State what is meant by each of the following types of programming paradigm:

    (i) object-orientated, [1]

    (ii) declarative. [1]

  (b) Functions and procedures may be used to develop a program using stepwise refinement.

    (i) Explain what is meant by stepwise refinement. [2]

    (ii) Describe what is meant by a function. [2]

  (c) A set of data items is stored in a sorted binary tree.

    Describe a procedure which will insert a new data item into the correct position in the sorted binary tree. [4]

  (d) The finished program is to be run on a computer system.

    Explain the purpose of:

    (i) linkers,

    (ii) loaders

    in preparing the program to be run. [4]

3   **(a)** Describe how e-commerce works. [3]

  (b) Explain how the use of e-commerce could be beneficial for a small company. [4]

4 A furniture shop sells a large number of different items whose details are stored i̶ table.

The shop has a large number of customers whose details are stored in the CUSTOMER tab

Some customers have an account. Each customer can only use one account. Some accounts can be used by more than one customer (for example all the members of one family may use the same account). Details of accounts are stored in the ACCOUNT table.

(a) Draw the relationship between the CUSTOMER and ACCOUNT tables in the form of an entity-relationship (E-R) diagram.   [1]

A number of stock items will be stored on each account. Each type of stock item will be stored on many accounts.

(b) (i) State the type of relationship between the ACCOUNT and STOCK tables.   [1]

  (ii) Draw the normalised relationship between the ACCOUNT and STOCK tables in the form of an E-R diagram.   [2]

(c) By using examples from the CUSTOMER table, explain what is meant by:

  (i) primary key,   [2]

  (ii) secondary key,   [2]

  (iii) foreign key.   [2]

(d) Discuss the need for controlling access to the database tables and how access can be controlled.   [6]

5 **(a)** Describe basic Von Neumann processor architecture.   [3]

  (b) At a particular point in a program, the program counter (PC) contains the value 200.

  (i) State the expected value contained in the PC after the instruction held at location 200 has been fetched.

  Explain your answer.   [2]

  (ii) After the instruction is processed, the value in the PC is 180.

  Explain why the value has changed to 180.   [2]

6 **(a)** Show how the denary number –90 can be represented, using 8 bits, in:

    (i) sign and magnitude,

    (ii) two's complement.

(b) The denary number 10¾ is to be represented as a floating point binary number using 12 bits. The first 8 bits are to be used for the mantissa and the remaining four bits are to be used for the exponent.

    (i) Explain what is meant by the mantissa of a floating point number. [2]

    (ii) Explain what is meant by the exponent of a floating point number. [2]

    (iii) Show why 001010110101 is a floating point representation of 10¾. [3]

    (iv) Normalise the floating point value given in **(iii)**. [2]

7 **(a)** Describe a Gantt chart and explain how it can be used in the development of a computer system. [4]

(b) When a new computer system has been produced it is necessary to supply documentation with it.

Explain what is meant by user documentation and what it would be expected to contain. [6]

8 A large supermarket has been designed.

The operation of the supermarket is to be simulated in order to carry out thorough testing of the design.

(a) Explain why simulation needs to be used to test the design. [3]

(b) One aspect of the simulation is to ensure that people can leave the building safely if a fire breaks out.

    (i) State **three** variables which would need to be input in order to set up the simulation. For each of your variables explain why they are necessary. [6]

    (ii) Explain why it may be useful to use parallel processing to run the simulation. [2]

9 Explain how interrupts are dealt with by a processor and how interrupted jobs may later be resumed. [6]