UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

COMPUTING   **9691/03**

Paper 3

October/November 2005

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 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
International Examinations   **[Turn over**

1   (a) Explain what is meant by a flat file.   **[2]**

    (b) Describe **three** advantages of using a relational database over flat files.   **[6]**

2   (a) Explain what is meant by each of the following types of addressing of memory.

        (i)   Indirect addressing.   **[3]**

        (ii) Indexed addressing.   **[3]**

    (b) Explain under what circumstances

        (i)   indirect addressing,

        (ii) indexed addressing

        are useful in low level language processing.   **[4]**

3   A robotic vehicle is designed to keep the floor of a factory clean. It is equipped with a 'map' of where things are on the floor of the factory, and an algorithm that instructs it where to go next.

    (a) State **two** problems that may arise which are not covered by the 'map' of the factory floor. **[2]**

    (b) Describe the input and output hardware necessary for the vehicle to be able to move safely.
                                                                                           [6]

4   A processor is to carry out the instruction ADD 200. This instruction means that the contents of memory location 200 should be added to the accumulator.

    Describe the steps of the fetch-execute cycle, stating the effect on the registers in the processor, when carrying out this instruction.   **[8]**

5   (a) State the purpose of an interrupt in a computer system.   **[1]**

    (b) Describe what is meant by a

        (i)   timer interrupt,

        (ii) hardware interrupt.   **[4]**

    (c) Explain the role of

        (i)   linkers,

        (ii) loaders

        in the running of programs   **[4]**

6 (a) Explain the difference between static and dynamic data structures. **[2]**

(b) Give an example of a

   (i) static,

   (ii) dynamic

   data structure, giving an advantage of each. **[4]**

(c) The details of a car part are stored in a binary tree according to this algorithm

```
READ VALUE NEW_PART
START AT ROOT NODE
WHILE NODE NOT EMPTY, DO
      IF NEW_PART < VALUE AT NODE
            THEN FOLLOW LEFT SUBTREE
            ELSE FOLLOW RIGHT SUBTREE
      ENDIF
ENDWHILE
INSERT NEW_PART AT NODE
END
```

   (i) Show the binary tree after the following values have been input

      Radio   Visor   Brakes   Tyres   Alternator   Windscreen **[3]**

   (ii) Explain how Clutch is added to the tree in **(i)**. **[5]**

   (iii) Describe an algorithm that can be applied to the binary tree of car parts, so that the tree is read in alphabetic order. **[3]**

7 (a) Some messages which are passed on a network are confidential.

   State the meanings of the terms

   (i) encryption,

   (ii) message authentication

   and explain how they are used to maintain confidentiality of messages. **[6]**

(b) (i) Explain how

      (I) partitioning,

     (II) duplication

     may be used to distribute data on a network. **[2]**

   (ii) Explain the implications, to both the data and the network manager, of duplicating the data. **[4]**

8 A systems analyst is employed to produce a new computer system for a large business.

The analyst is able to use a number of software tools to help in the work.

One software tool allows for the production of Gantt charts.

(a) Describe the features of a software tool to produce Gantt charts. **[4]**

(b) Identify and describe the features of **one** other software tool that can be used during the development of a new system. **[4]**

9 A national company designs, manufactures and fits kitchen furniture.

Before the company computerised their systems, a typical commission would be

- Customer sees an advert in a magazine and calls the firm to arrange for a home visit

- A sales representative travels in to a regional office to collect the appointments for the day

- The sales representative delivers plans created for other customers

- A number of appointments would be held at the customer's house. Each time the representative would go away to draw up plans and a likeness of what the finished kitchen will look like

- When the customer is in agreement with the plans, the representative takes the plans in to the office

- The plans are sent to the factory where the units would be made according to stock availability

- After the kitchen is fitted an invoice is sent to the customer

Discuss how computerisation will affect the business. **[10]**