UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education

Advanced Subsidiary Level and Advanced Level

COMPUTING **9691/03**

Paper 3

May/June 2004

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.

1 (a) In relation to databases, describe what is meant by each of the following terms.

    (i) Primary key.

    (ii) Secondary key.

    (iii) Foreign key.   **[1]**

(b) Using, as an example, the database of student records in a school,

    (i) explain why different users should be given different access rights;   **[4]**

    (ii) describe how these access rights can be implemented.   **[4]**

2 Following the widespread access to technology, many workers who previously worked in an office are working from home.

Discuss the benefits and disadvantages to the

    (i) worker,

    (ii) business,

    (iii) society

of such a change in working patterns.   **[9]**

3 (a) Describe what is meant by Von Neumann architecture.   **[3]**

(b) Explain the purpose of each of the following special registers in a processor.

    (i) Program Counter (Sequence Control Register).   **[2]**

    (ii) Current Instruction Register.   **[2]**

    (iii) Memory Address Register.   **[2]**

    (iv) Memory Data Register.   **[2]**

    (v) Accumulator.   **[2]**

4 Describe what happens during the syntax analysis stage of compilation.   **[5]**

5 (a) Describe the objectives of scheduling in a multi-user operating system.   **[3]**

(b) Describe **two** common scheduling policies.   **[4]**

(c) State **five** methods by which the priority of a job may be determined.   **[5]**

6   **(a)** Represent

    (i) +102,

    (ii) +117

    as 8-bit numbers in two's complement form.   **[2]**

  (b) **(i)** Add the answers in part **(a)** together to give a binary result.   **[2]**

    (ii) Turn your binary answer into an equivalent denary result.   **[2]**

    (iii) Explain the validity, or otherwise, of your result.   **[2]**

  (c) A stack is to be held in an array. With the aid of a diagram, explain how an item may be

    (i) added to,

    (ii) deleted from

    the stack, while maintaining the integrity of the structure.   **[6]**

7   VARIABLE NAME is defined in a particular language as an alphabetic character which may be
followed by two digits or another alphabetic character.
Given that, in Backus-Naur Form (BNF), an alphabetic character is called an ALPHA and is
defined as
<ALPHA> ::= A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|S|T|U|V|W|X|Y|Z
and a digit is defined as
<DIGIT> ::= 0|1|2|3|4|5|6|7|8|9

  (a) Use BNF and the above definitions (that do not need to be written out again), to define
    <VARIABLE NAME>   **[4]**

  (b) The definition of a variable name is altered.
    A variable name is now defined as either

        • an alpha followed by two digits, where the first digit must not be zero,
          OR
        • an unlimited set of alpha characters.

    Write new rules in BNF that will define the new <VARIABLE NAME>.   **[4]**

8   Explain the part played in network systems by

    (i) switches;

    (ii) routers;

    (iii) bridges;

    (iv) modems.   **[8]**

9 A major software project is being developed by a project manager using SSADM.

(a) Give **four** advantages of using SSADM in designing the new system.

(b) Describe **two** software tools that can assist the work of the project manager. [6]