UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Level

COMPUTING **9691/31**

Paper 3 **October/November 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.

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International Examinations

[Turn over

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1 (a) State **one** example of an organisation that stores data which has a commercial value.   [1]

   (b) Give **three** examples of data that the organisation in **(a)** holds which have commercial value.
       For each piece of data explain why it has commercial value.   [6]

2 A bank has a large number of offices spread throughout a country. It is important for information
   to be passed freely between the bank's offices.

   (a) Explain why the bank uses an intranet to communicate between offices rather than the
       internet.   [4]

   (b) Customers have to use the internet in order to do electronic banking.

       Discuss the problems of maintaining confidentiality of data on the internet and the techniques
       used to address the problems.   [5]

3 Different methods of addressing are used when programming in a low level language.

   (a) By drawing a diagram, or otherwise, describe indirect addressing of memory.   [3]

   (b) Describe how indirect addressing can be used to solve a problem arising from the addressing
       of data in memory.   [2]

4 A school is designing a computer system to satisfy its administration requirements.
   The head teacher, the system administrator and five office staff will all require regular access.
   It is decided to use a single, large, computer with a number of terminals to satisfy demand.

   (a) Describe a suitable hardware configuration for the head teacher's office.   [3]

   (b) Compare the use of different media for transmitting data between the head teacher's system
       and the main computer.   [3]

   (c) The system administrator will need to be trained in how to maintain the system.

       The office staff will need to be trained to use the system to run the school.

       (i) Describe why the training requirements are different.   [2]

       (ii) Describe the advantages of the office staff being given a CD-ROM based training course
            rather than one based in a classroom.   [4]

   (d) The student records are stored using direct access with a full index based on student name.
       The index is arranged in alphabetical order of student name.
       The index can be stored in a static or dynamic data structure.

       (i) State an advantage and a disadvantage of using a static data structure for storing this
            index.   [2]

       (ii) It is decided to store the index as a linked list. Describe an algorithm for the insertion of a
            new student.   [6]

5 Describe the fetch/decode/execute/reset cycle when a jump instruction is being processed. [6]

6 Two of the stages which a high level language program undergoes during compilation are lexical analysis and syntax analysis.

Discuss how errors are discovered during each of these two stages. [5]

7 (a) (i) State what is meant by a real-time application. [1]

(ii) Give **one** example of a computer application, other than a burglar alarm system, which must be real-time, justifying your choice. [2]

(b) A burglar alarm system uses a number of sensors to collect information.

State **three** types of sensor which could be used to collect data, saying why each is necessary. [6]

8 (a) Describe the function and purpose of the following parts of a database management system (DBMS):

(i) data dictionary, [2]

(ii) data description language, [2]

(iii) data manipulation language. [2]

(b) Three advantages of using a relational database rather than flat files are:

(i) reduced data duplication,

(ii) improved data security,

(iii) improved data integrity.

Explain what is meant by each of these and why they are features of a relational database. [6]

9 (a) A typical desktop PC operating system is a single-user operating system.

(i) State what is meant by a single-user operating system. [1]

(ii) Describe **two** components of a typical desktop PC operating system. [4]

(b) A network operating system offers other components.

Describe the following components of a network operating system:

(i) transparency, [2]

(ii) directory services. [2]

10 A complex problem is to be solved. The analyst has split the problem up into a number of different tasks to be carried out.

  A   represents the collection of information about the problem.
  B   represents the analysis of the information.
  C   represents the design of the solution.
  D   represents the creation of data files.
  E   represents the writing of the software.
  F   represents the testing of the solution.
  G   represents the creation of the documentation.
  H   represents the installation of the finished project.

(The units used on the chart are days.)
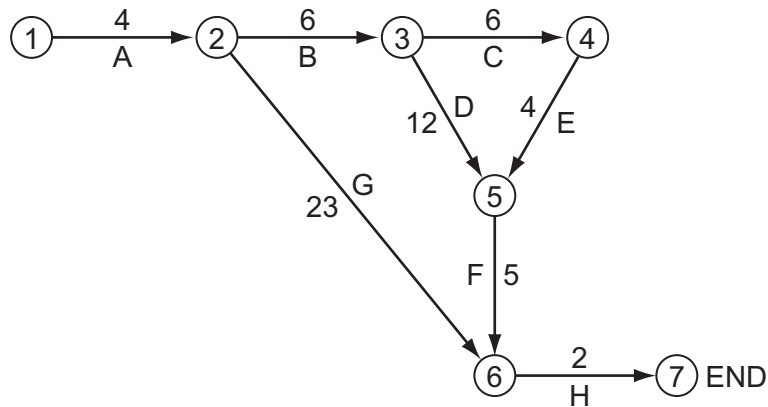
The Program Evaluation and Review Technique chart (PERT) has been drawn to allow critical path analysis of the problem.

  (i) Explain what the chart shows about the relationships between the various tasks. [6]

  (ii) State the critical path. [1]

  (iii) State the least time required to complete the project. [1]

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