



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Level

COMPUTING

9691/31

Paper 3

October/November 2010

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.



1 A company employs five sales assistants in an office. The sales assistants all use stand-alone computers. The company decides to network the computers in a local area network (LAN).

(a) The data which is held about customers can all be kept together in a single file on the network. When each assistant used their own computer they had their own copy of the file.

Describe **one** advantage and **one** disadvantage of holding the customer file on the network. [4]

(b) The accounts department is in an office on a different floor of the building. It has a star network to allow access to the data required by the workers in the accounts department. It is decided to link the two networks so that there can be communication between them.

The chief accountant also needs access to the Internet.

Describe how each of the following network components would be used in this example:

(i) switch [2]

(ii) bridge [2]

(iii) modem [2]

(c) The workers in the offices are given access to the company intranet.

Explain the advantages of using an intranet rather than the Internet. [4]

2 The leaders of a youth club want to create a database to store details of:

MEMBERS; SESSIONS and ACTIVITIES.

The sessions are each evening from Monday to Friday. Each member can sign up for one or more of the five sessions.

Each session offers a number of activities but each activity is only offered in one of the sessions.

Draw an entity-relationship (E-R) diagram to represent this model in third normal form. [5]

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

(b) (i) Explain what the accumulator holds and how the contents change during the fetch-execute cycle. [2]

(ii) Explain what the program counter (PC) holds and how the contents change during the fetch-execute cycle. [3]

4 (a) Explain differences between using an interpreter and a compiler when translating and executing a source code program. [6]

(b) Explain the lexical analysis phase of compilation. [5]

- 5 (a) Describe **two** different types of interrupt. [4]
- (b) Explain how interrupts are dealt with by a processor and how interrupted jobs may later be resumed. [5]
- 6 A set of data is stored in a sorted binary tree.
- Describe how to insert a new data item into the correct position in the sorted binary tree. [4]
- 7 A computer stores floating point numbers using 2 eight-bit bytes. The first byte is used to store the mantissa and the second stores the exponent.
- (a) The normalised form of the floating point representation of $9\frac{1}{2}$ is 0100110000000100.
- (i) Explain this representation of $9\frac{1}{2}$. [4]
- (ii) Give the floating point value of $22\frac{1}{4}$ using this representation. [2]
- (b) It is decided to change the representation by using 10 bits for the mantissa and 6 bits for the exponent.
- Explain the effect of this decision on the range and accuracy of the data represented. [4]
- 8 A chain of shoe shops has shops in most of the large cities in a country.
- (a) Describe how the management of the company can use videoconferencing to help run the chain of shops.
- Explain the benefits compared to holding monthly meetings of the shop managers. [4]
- (b) Explain how the use of e-commerce could be beneficial to the chain. [4]
- The management of the chain of shops invests in a new computerised point of sale (POS) system for its stores.
- (c) Explain why technical documentation and user documentation will be required. [4]
- (d) It may be necessary to carry out three types of maintenance on the POS software:
- (i) corrective
- (ii) adaptive
- (iii) perfective
- Explain each of these types of maintenance and give an example of why they may be necessary. [6]

9 Describe the following types of programming paradigm:

- (i) object-oriented [2]
- (ii) declarative [2]
- (iii) low level [2]

10 A system is set up to simulate the ways in which crystals grow. Each molecule of chemical reacts with all those around it to create the final shape. It is decided to use parallel processing to simulate the growth of the crystals.

- (a) (i) Explain what is meant by parallel processing.
- (ii) Explain why parallel processing is used in this simulation. [4]
- (b) Give **one** disadvantage of using parallel processing in this simulation. [1]