



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Advanced Level

---

**COMPUTING**

**9691/32**

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.



- 1 A new computerised checkout system has been developed for a large food store.

Explain to the manager of the store the implications of using each of the following implementation approaches:

- (a) direct implementation, [3]  
 (b) phased implementation, [3]  
 (c) pilot implementation. [3]

- 2 Parallel processing is necessary to provide long term weather forecasts. Describe **two** types of parallel processor that could be used. [4]

- 3 This question is about sorting data in files into order.

File A: CHO, SYG, DAN, ROG, BRI  
 File B: ADA, COU, LAC, LOV  
 File C: HEL, SAR, PAU, GRA, CHR, STE

- (a) By using file A to illustrate your answer, describe how an insertion sort can be used to sort data into alphabetical order. [3]  
 (b) By using your sorted file A and file B to illustrate your answer, describe how a merge sort can be used to sort two files into one file in alphabetical order. [3]  
 (c) (i) Draw a binary tree using the data in file C and HEL as the root node.  
 (ii) Explain the rules which you used to draw the tree.  
 (iii) Describe how your tree can be used to output the file in alphabetical order. [7]

- 4 (a) Describe the characteristics of low level programming languages and their instructions. [5]

- (b) (i) Describe what is meant by a procedure. [2]  
 (ii) Describe the purpose of linkers and loaders. [3]

- (c) (i) Explain the difference between a local variable and a global variable. [2]  
 (ii) Explain the difference between passing a parameter by value and by reference. [2]

- (d) A procedure is created to calculate a student's average mark in three examinations.

The examination marks for the student are added together to give the total mark, which is then divided by three to give the average.

State which of the four types of variable in **part (c)** are appropriate for the following uses, justifying your choices:

- (i) variables to hold the three examination marks, [2]  
 (ii) total mark. [2]

- 5 A large sports stadium is being designed. The architect has to decide how many entrances there should be.

Entrances are of two types:

1. Automatic, which are used by ticket holders. The ticket has a magnetic stripe which is read, allowing access to the stadium for one person per ticket.
2. Manned, which are used by non-ticket holders. These entrances have cashiers present to take money and allow access to the stadium.

It is decided to produce a simulation of the stadium entrances in order to help the architect to make decisions.

(a) Explain why the architect needs to use a simulation to study the situation. [3]

(b) State **four** values which will be important to the success of the simulation. [4]

- 6 (a) Describe the purpose of hypertext linking and how it works. [3]

(b) Describe **three** features of a mark-up language other than page links. [6]

- 7 A library uses a computer system to store data in a database.

There are a large number of members of the library whose details are stored in the MEMBER table.

There are a large number of books, details of which are stored in the BOOK table.

Members can borrow books. Each member can borrow more than one book and each book can be borrowed by many members.

(a) (i) State the type of relationship between the MEMBER and BOOK tables. [1]

(ii) Draw the relationship between the MEMBER and BOOK tables in third normal form as an E-R diagram. [2]

(b) Use examples of attributes in the MEMBER table to explain what is meant by:

(i) primary key, [2]

(ii) foreign key, [2]

(iii) secondary key. [2]

- 8 Explain how scheduling, job queues and priorities are used to manage job throughput. [6]

9 (a) Express the denary number 94 as:

(i) a BCD value, [2]

(ii) an octal value, [2]

(iii) a hexadecimal value. [2]

(b) (i) Work out the answer to the following binary addition sum. (All values are given in two's complement form. You should show your working.)

```

01001101
00101011
01000101 +

```

[2]

(ii) Explain why the binary result does not give the correct answer. [1]

10 Explain the importance of standardisation when developing computer solutions. [6]