

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

**COMPUTING**

**9691/03**

**Paper 3**

October / November 2003

**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 supermarket company employs an I.T. team to continuously upgrade and improve the use of I.T. across its business.

(a) The company must ensure that the workforce is trained in all aspects of the technology that are relevant to them. Explain the advantages of training programs being computer based, individual, learning sessions rather than arranging courses for the employees. [6]

(b) The supermarket I.T. team invent a new type of Point of Sale (POS) terminal.

A decision must be made about how to implement the new terminals into the supermarkets. The choice is between

(i) parallel running

(ii) pilot running

(iii) direct changeover.

Evaluate each of these methods for this application. [6]

2 Explain how memory can be managed to allow more than one large job to appear to be stored simultaneously in the memory. [5]

3 (a) Explain why an interpreter would be preferred to a compiler as a translator when writing a high level language program. [5]

(b) Describe the process of syntax analysis when compiling a program. [3]

4 (a) Explain the importance of storing return addresses when procedures are called by a program. [2]

(b) (i) State a suitable data structure for storing return addresses. [1]

(ii) State why your suggested data structure is a sensible choice. [3]

(iii) Describe other data that it would be necessary for the stack to hold. [2]

5 Describe the fetch/decode/execute/reset cycle when an ADD instruction is being executed.

You should include

- Program Counter (PC)
- Memory Address Register (MAR)
- Memory Data Register (MDR)
- Current Instruction Register (CIR)
- Accumulator

in your answer. [7]

6 Using an 8 bit byte for the mantissa (fraction) and another 8 bit byte for the exponent (characteristic)

(a) show

(i)  $10\frac{1}{2}$

(ii)  $-10\frac{1}{2}$

as 2 byte, normalised, floating point numbers.

[4]

(b) Show the bit pattern that represents

(i) the largest positive

(ii) the smallest magnitude negative

number that can be represented using this 2 byte normalised floating point form.

[4]

7 A research department in a teaching hospital needs to share the results of its research with other, interested, bodies and individuals. At present research is published and discussed via the Internet.

(a) The National Association of Teaching Hospitals (NATH) is considering the use of a private intranet for such communications.

Discuss the advantages and disadvantages of using an intranet in this example.

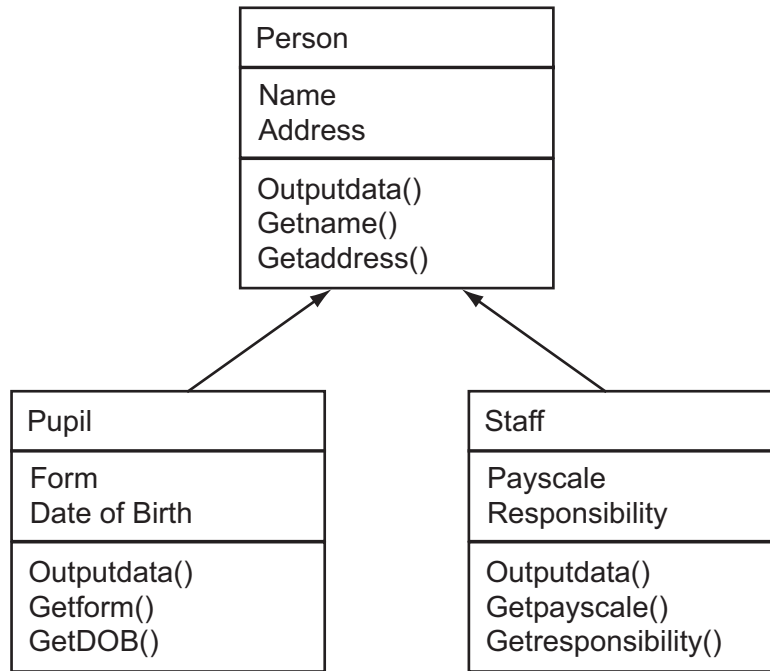
[6]

(b) The research department often simulates experiments in order to shorten the length of time it would take to do the experiment otherwise.

Computer simulations are also used in other organisations. Explain **two** other reasons for needing to use computer simulation, giving an example of a use for each.

[6]

- 8 In a particular object oriented programming language, the following classes are defined.



With reference to the diagram explain the terms:

- (i) Data encapsulation
  - (ii) Inheritance [4]
- 9 (a) Describe the process of spooling when sending jobs for printing. [3]
- (b) Explain the importance of job type when a number of jobs are being processed using a multi-programming operating system. [3]
- 10 (a) By using diagrams, or otherwise, explain how a data item can be
- (i) inserted into
  - (ii) read from (deleted from)
- a queue held in an array. [4]
- (b) Explain a problem that could arise when storing a queue in an array and state a possible solution. [2]
- 11 A garden design company keeps records of its customers. Each customer has had a design produced for them which will be one of a library of design types stored by the company. Each design type uses plants. Each customer is sent an account based on the number of plants in the design.
- (a) Draw an E-R (entity-relationship) diagram in third normal form, based on this information. [10]
- (b) Each delivery of plants to the garden design company is identified by a batch number. Explain how customers who received eucalyptus trees from batch 12 can be contacted. [4]
- [Total: 90]**