UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

COMPUTING **9691/03**

Paper 3 Written **For Examination from 2011**

SPECIMEN PAPER

2 hours

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

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.

No marks will be awarded for using brand names of software packages or hardware.
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.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	

This document consists of **13** printed pages and **1** blank page.

For Examiner's Use

1 One reason for producing a simulation would be to save the cost of producing the real thing.

State **three** other reasons for producing a simulation.
For each of your reasons:

- give an example of a situation where it would be appropriate to produce the simulation,
- explain why the simulation would be preferable to the real thing.

Reason 1 .....

Example .....

Explanation .....

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Reason 2 .....

Example .....

Explanation .....

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Reason 3 .....

Example .....

Explanation .....

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..... [9]

For Examiner's Use

2 **(a)** A bookshop contains a number of books.
Each BOOK is about a single SUBJECT. There may be more than one BOOK about each SUBJECT. A BOOK may have more than one AUTHOR and each AUTHOR may have written more than one BOOK.

Draw an entity relationship (E–R) diagram to represent this data model in third normal form and label the relationships.

[7]

(b) Using examples from this database, explain what is meant by:

(i) a primary key,

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..... [2]

(ii) a secondary key,

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..... [2]

(iii) a foreign key.

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..... [2]

For Examiner's Use

3 **(a)** Explain why an interpreter may be preferred to a compiler as a translator when writing a high-level language program.

[5]

(b) Describe how the code is checked during the syntax analysis stage of compilation.

[3]

4 The contents of the Current Instruction Register (CIR) for one instruction are

ADD 01011011

(Note: The 'ADD' operation would normally be stored as a binary code.)

(i) Explain what is meant by a mnemonic and why it is used.

[3]

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(ii) Describe how this address is used if it is an indirect address.

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..... [2]

(iii) Describe how this address is used if it is an indexed address.

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..... [2]

(iv) The address is actually an immediate operand which is to be added to the value 01011101 which is held in the accumulator.

Carry out this addition, showing your working.

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..... [3]

For Examiner's Use

5 Data is held about the following cities:

Paris, Cairo, Singapore, Durban, Amman, Sydney

(a) Draw a binary tree of the cities by taking Paris as the root and reading through the list sequentially. Your tree should use an algorithm which will create a suitable tree for reading the data in alphabetical order.

[2]

(b) Describe an algorithm that will read your tree, producing a list of the cities in alphabetical order.

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(c) Explain how the original list can be sorted into alphabetical order using an insertion sort method.

For Examiner's Use

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..... [6]

For Examiner's Use

6 Describe how memory is managed in a typical computer system.

Your answer should include an explanation of:

(i) segmentation,

(ii) paging,

(iii) virtual memory.

(You are advised that diagrams may be helpful in your answers.) [9]

For Examiner's Use

7 **(a)** Explain the need for parallel architecture when using a computer to forecast the weather.

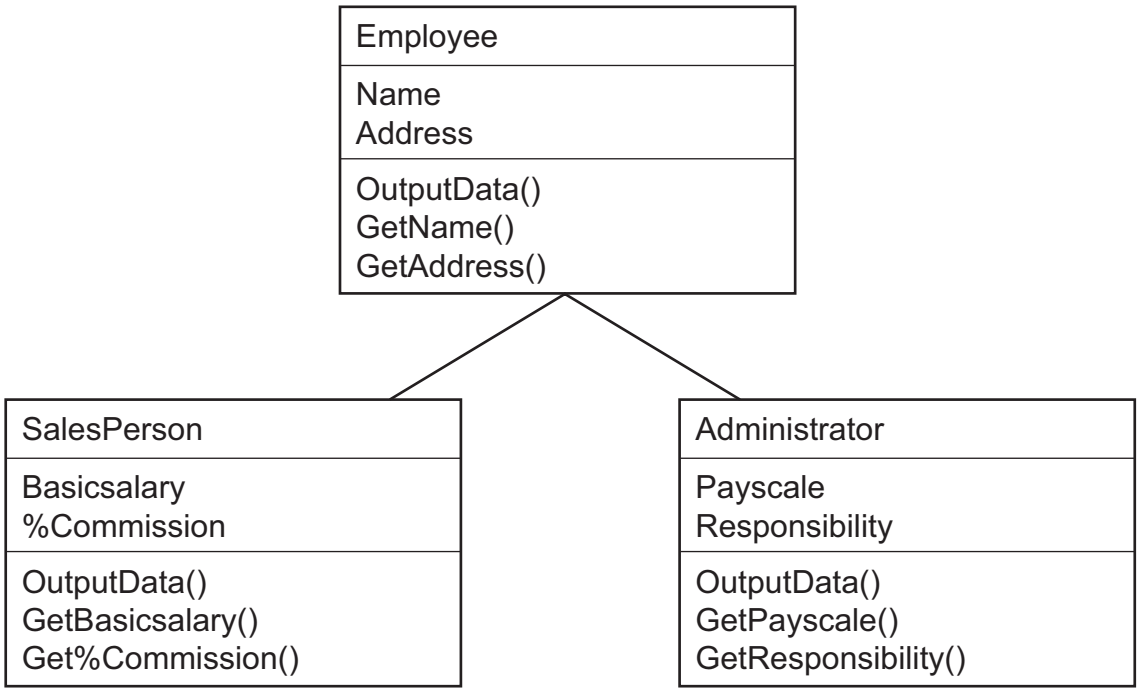
[4]

(b) Explain what an array processor is designed to do and explain why it would be useful when creating a weather forecast.

[4]

8 (a)

For Examiner's Use



In a particular object-oriented programming language the above classes are defined for use in a payroll program.

With reference to the diagram explain the terms:

(i) data encapsulation,

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..... [2]

(ii) inheritance.

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..... [2]

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(b) (i) Explain the need for reverse Polish notation.

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..... [2]

(ii) Change ab+cd-/ into an infix expression.

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..... [3]

(iii) Change $\frac{a}{2 * (b + c)}$ into a reverse Polish expression.

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..... [3]

For Examiner's Use

9 An import/export company is based in two offices in London and Lahore. Each office has an accounts department and a warehousing department. Each department has a network of computers. It is important that at each office the accounts and warehousing departments must be able to communicate. The London and Lahore offices must also be able to communicate electronically.

With reference to this example, explain the use of the following:

(i) copper cabling,

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..... [2]

(ii) wireless communication,

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(iii) routers,

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(iv) bridges,

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..... [2]

(v) modems.

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