CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

COMPUTING **9691/31**

Paper 3 **May/June 2011**

2 hours

Candidates answer on the Question Paper.

No additional materials are required.

No calculators allowed.

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.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
No marks will be awarded for using brand names for 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.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1 Name **three** different types of bus in a processor and state what each is used for.

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.... [6]

2 (a) Explain the relationship between assembly languages and machine code.

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.... [2]

(b) Describe how an assembler produces machine code from assembly language.

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.... [2]

(c) The address part of a low-level instruction can be the address of the data to be used. This is a direct address.

Describe the following types of addressing:

(i) Indirect addressing;

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.... [2]

(ii) Indexed addressing;

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.... [2]

(iii) Relative addressing.

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.... [2]
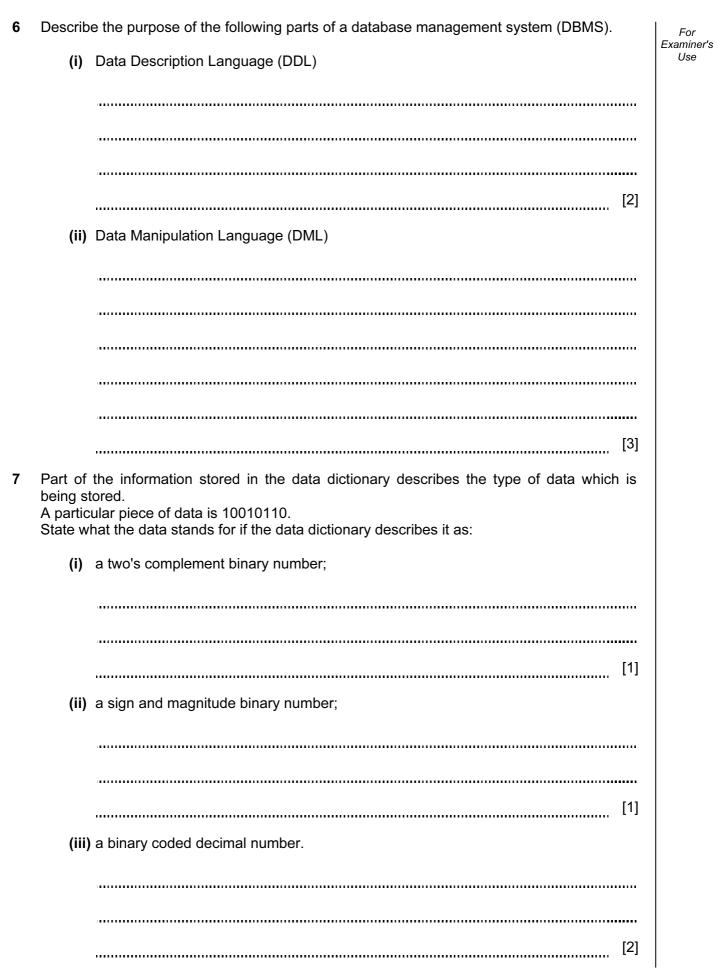
3   Discuss the different types of data transmission media.   Include a comparison of data transfer rates and transmission ranges in your answer.

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.... [8]

4 (a) State what is meant by a real-time application.

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.... [1]

(b) An air conditioning system is a real-time application.
Explain how sensors and actuators are used to control an air conditioning system in an apartment.

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.... [4]

(c) Give **one other** example of a real-time application. Justify why your choice is a real-time application.

Example ....

Justification ....

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.... [2]

5 **(a)** Describe what is meant by the spooling of files.

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.... [2]

(b) (i) State why files which are sent to a shared printer on a local network will be spooled.

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(ii) Explain how this spooling is carried out.

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.... [5]

6 Describe the purpose of the following parts of a database management system (DBMS).

    (i) Data Description Language (DDL)

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    .... [2]

    (ii) Data Manipulation Language (DML)

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    .... [3]

7 Part of the information stored in the data dictionary describes the type of data which is being stored.
A particular piece of data is 10010110.
State what the data stands for if the data dictionary describes it as:

    (i) a two's complement binary number;

    ....

    ....

    .... [1]

    (ii) a sign and magnitude binary number;

    ....

    ....

    .... [1]

    (iii) a binary coded decimal number.

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    .... [2]

8 (a) (i) Explain the difference between static and dynamic implementation of data structures.

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.... [2]

(ii) Give **one** advantage and **one** disadvantage of storing a queue in an array rather than in a linked list.

Advantage ....

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Disadvantage ....

.... [2]

(b) (i) Draw a diagram to show how the following members of a Computing class can be stored in a linked list in alphabetic order:

FRO, TSI, DON, ROS, BEV

[5]

(ii) Describe an algorithm to insert a new member of the class into the correct position in the list.

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.... [5]

9 **(a)** Explain the need for reverse Polish notation.

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.... [2]

(b) Show, with the aid of diagrams, how a stack is used to turn the reverse Polish expression

ab+cde-*-

into an expression in infix notation.

[6]

10 A country has a national football competition based on leagues.
Each LEAGUE has a number of TEAMs but each TEAM is only in one LEAGUE.
Each TEAM plays at a number of GROUNDs during the season and each GROUND will host a number of TEAMs during the season.

    (i) State the relationship between LEAGUE and TEAM.

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Draw the entity-relationship (E-R) diagram to show this relationship.

[2]

    (ii) State the relationship between TEAM and GROUND.

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Draw the E-R diagram to show this relationship.

[2]

    (iii) Explain how the relationship between TEAM and GROUND can be designed in third normal form.

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.... [4]

11 (a) Describe the differences between interpretation and compilation of a high-level language program.

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.... [3]

(b) When a program is run the processor uses special purpose registers.
Describe how the contents of each of the following registers changes during the fetch-execute cycle:

(i) Memory Address Register (MAR)

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.... [2]

(ii) Memory Data Register (MDR)

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.... [2]

12 A business uses the Internet to communicate with suppliers and to pay bills electronically. Discuss the problems of maintaining confidentiality of data on the Internet and techniques that can be used to address these problems.

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.... [6]

14

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