COMPUTING   **9691/33**

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.
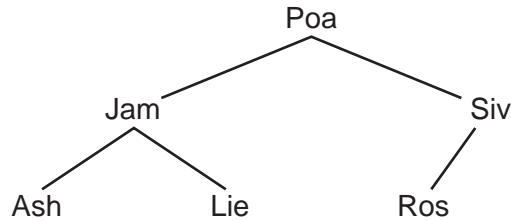

This document consists of **4** printed pages.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1 An organisation has a large workforce. It is decided that an intranet be provided for use by workers in the organisation.

   (a) Explain how an intranet differs from the Internet. [2]

   (b) Pages on the intranet are produced using hypertext mark-up language (HTML).

   Describe **three** features that can be used to enhance plain text to make the pages more user-friendly. [6]

   (c) When communicating electronically with people who are not members of the organisation, workers have to use the Internet.

   Discuss the problems of maintaining confidentiality of data held by the organisation and the techniques used to address the problems. [6]

2 A buildings maintenance company looks after a number of BUILDINGs in a city. Each BUILDING is occupied by one or more FIRMs. Each FIRM may have premises in more than one BUILDING. Each of the FIRMs has a CONTRACT with the company for their part of the BUILDINGs. Some of the FIRMs may share a CONTRACT.

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

3 Describe the fetch-execute cycle when an arithmetic instruction is being executed. Include in your description the effect of the different stages on specific registers used in the cycle. [8]

4 **(a)** Explain why an interpreter may be preferred to a compiler as a translator when writing a high-level language program. [4]

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

   (c) Describe **two** things that happen during the code generation stage of compilation. [4]

5 Describe how memory is managed in a typical computer system.
   Your answer should include an explanation of

   (i) segmentation,

   (ii) paging,

   (iii) virtual memory. [9]

6 The following data are placed in a binary tree:

Poa, Siv, Jam, Ash, Ros, Lie

(a) The tree is read using in-order traversal which follows the algorithm

Traverse the left-hand subtree
Read the root node
Traverse the right-hand subtree

Write down the nodes of the tree in the order that they will be read. [2]

(b) The tree is read using pre-order traversal which follows the algorithm

Read the root node
Traverse the left-hand subtree
Traverse the right-hand subtree

Write down the nodes of the tree in the order that they will be read. [2]

7 Floating-point numbers in a particular computer system are stored using 12 bits. The first 6 bits are used for the storage of the mantissa and the second set of 6 bits is used to store the exponent.

(a) One way to represent 6.5 as a floating-point number in this representation is 001101000100

Explain why this representation is equivalent to 6.5 [4]

(b) (i) Using the representation above to help you, write the number 6.5 as a floating-point number in normalised form. [2]

(ii) Explain the effects of changing the representation so that 8 bits are used for the mantissa and 4 bits for the exponent. [2]

(c) The numbers 011011001101 and 101100001110 are stored with 6 bits for the mantissa and 6 for the exponent.

Add the exponents of the two floating-point numbers together. [2]

8 Computer systems are used in many parts of a large store.

(a) The manager of the store uses email to send and receive information to and from head office and also to suppliers of the goods that are sold in the store.

Describe **three** facilities of email that the manager could use after an email has been received and read. [6]

(b) When the manager saves a text file it can be stored in text-only format or in rich text format.

(i) Explain the difference between text-only and rich text formats.

(ii) Give **two** advantages of using text-only format when transmitting a file over a network. [4]

(c) The manager has employed a systems analyst to produce a new point-of-sale system for use in the store.

(i) The analyst will need to produce user documentation for the point-of-sale operators to accompany the new system.

Describe the contents of the user documentation. [4]

(ii) A decision must be made about the method to be used to implement the new system. The analyst has decided that direct implementation would be too risky and that parallel implementation would be too difficult.

Describe phased and pilot methods of implementation, making it clear how each would be used in the store. [4]

9 Describe the following types of programming paradigm:

(a) procedural [2]

(b) declarative [2]

(c) object-oriented [2]

10 A computer system is used to produce weather forecasts each day in time for the evening television news broadcast. The system uses parallel processing to produce the forecasts.

(a) Explain what is meant by parallel processing. [1]

(b) Explain why parallel processing is used to create the weather forecasts. [4]

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