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

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5061567996

COMPUTING **9691/12**

Paper 1 **October/November 2013**

1 hour 30 minutes

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.

This document consists of **15** printed pages and **1** blank page.

UNIVERSITY of CAMBRIDGE International Examinations

[Turn over

For Examiner's Use

1 Some students decide to do a survey to find out how good the general public are at Mathematics. They produce a series of questions. For each question, an answer is chosen by shading in a lozenge ⬭ on a survey form.

These survey forms are then automatically read using optical mark recognition (OMR). The computer software automatically decides which questions have been answered correctly.

(a) Describe how OMR is used to read the survey forms and how the computer software automatically decides which questions were answered correctly.

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For Examiner's Use

(b) These surveys produced a lot of data. The students decided to run a file compression utility.

(i) Describe why file compression would be useful in this application.

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..... [2]

(ii) The students frequently send each other emails with file attachments.

Describe **two** different file types where compression can be used.

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..... [2]

2 There are 4 processor component terms on the left and 10 descriptions of functions on the right.

For Examiner's Use

Draw a line connecting each description to the correct component.

	Manages execution of instructions
ALU	Carries out arithmetic operations such as addition and multiplication
	Fetches each instruction in turn
Control unit	Stores program in current use
	Carries out bit shifting operations
	Stores boot-strap loader
RAM	Carries out operations such as AND, OR, NOT
	Issues timing signals
ROM	Stores part of operating system in current use
	Stores data in current use

[10]

3 **(a)** What is meant by parallel, full duplex transmission?

For Examiner's Use

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..... [2]

(b) Explain why a protocol is needed for data transmission.

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..... [2]

For Examiner's Use

4 A company has been commissioned to design the layout of the track for a new ride in a leisure park.

(a) Name a suitable type of software to do this. Describe features of this software to justify your choice.

Type of software .....

Features .....

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..... [3]

The whole leisure park is computer controlled for safety reasons. Various sensors and digital cameras monitor the rides 24 hours a day. Data from the sensors and cameras are displayed on three computer screens in a control room.

(b) Describe how the sensors, cameras and computer system interact to maximise the safety of all of the rides at all times. Include in your answer how the staff are warned of any potential problems.

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..... [4]

(c) Discuss a suitable user interface for monitoring of this system.
Consider the following in your answer:

- how all the rides can be monitored on only 3 screens
- the type of graphics displayed
- use of colour
- suitable input devices

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For Examiner's Use

For Examiner's Use

5 A department store uses a barcode on a label on each item of goods to represent the item's product ID. The product ID, the description and price are stored as a sequential file with the product ID used as the key field.

(a) What is meant by a sequential file in this application?

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..... [1]

(b) A single level index is generated for this sequential file to produce an indexed sequential file. The index is based on the first 3 digits of the product ID.

A customer enquires about the price of a product. A barcode reader scans the barcode and outputs the corresponding product ID.

Using a diagram, describe how the price for the product with ID **210 333 222** is found in this indexed sequential file.

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[3]

For Examiner's Use

6 A combination of three lights is to be shown in a set sequence at a rock music concert. The three lights are red (R), green (G) and yellow (Y). The sequence is as follows:

- red only for 3 seconds
- red and green for 1 second
- yellow only for 3 seconds
- green only for 1 second

A counter is used which consists of three bits (A, B and C). The counter is incremented every second and recycles continually.

A logic circuit is to be built to generate the sequence of lights. A Boolean value of 1 represents the light switched on. The lighting sequence starts with red only.

(a) Complete the truth table for the sequence of lights:

counter values			**coloured lights (output)**		
A	**B**	**C**	**R**	**G**	**Y**
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

[4]

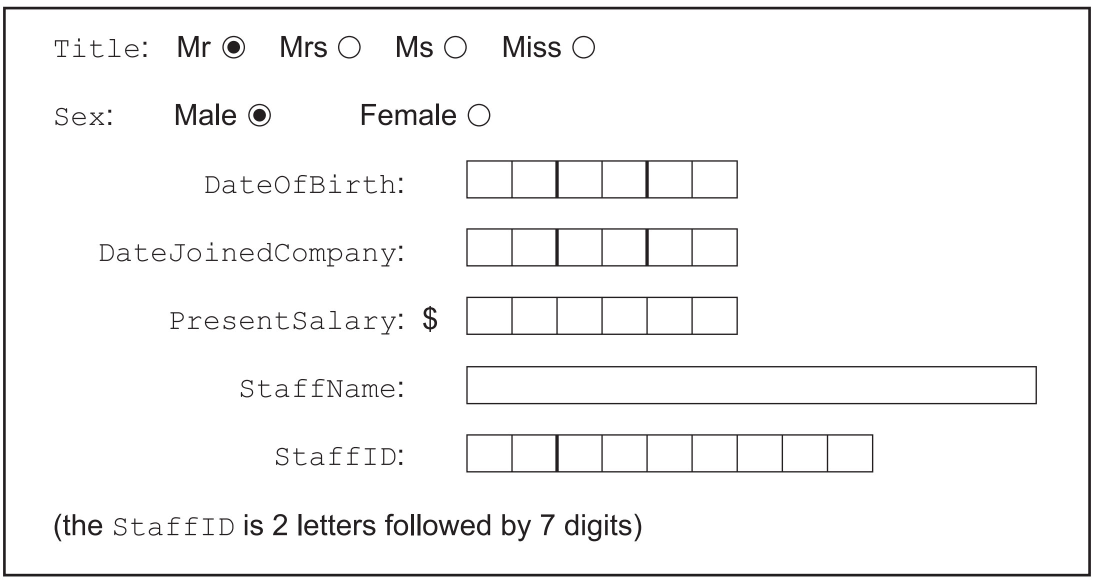
(b) The following three logic statements define the light sequence:

- R = 1 IF (A is NOT 1)
- G = 1 IF (B is 1 AND C is 1)
- Y = 1 IF (A is 1 AND NOT (B is 1 AND C is 1))

Draw the logic circuit that directly combines ALL three of these logic statements and produces **three** outputs R, G and Y.

[5]

7 The following on-screen form has been designed to input data about staff in a company:



`Title`: Mr ◉ Mrs ○ Ms ○ Miss ○

`Sex`: Male ◉ Female ○

`DateOfBirth`:

`DateJoinedCompany`:

`PresentSalary`: $

`StaffName`:

`StaffID`:

(the `StaffID` is 2 letters followed by 7 digits)

For Examiner's Use

For Examiner's Use

(a) Describe a suitable validation check for each of the following fields. Each validation check should be different.

(i) `PresentSalary`

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(ii) `StaffName`

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(iii) `StaffID`

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..... [3]

(b) Some validation checks involve the data from one field being used to validate the data in another field.

Describe suitable validation checks for the following pairs of fields.

(i) `Title` and `Sex`

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(ii) `DateOfBirth` and `DateJoinedCompany`

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..... [2]

(c) The above data need to be transmitted to head office.

Name and describe one method which can be used to check for errors during data transmission.

Method .....

Description .....

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..... [3]

For Examiner's Use

8 The managers of a car showroom have decided to upgrade the existing computer system and a systems analyst has been asked to help with the problem.

(a) Describe **three** ways a systems analyst could perform fact finding (research) on the current system. Explain the benefits of each method chosen.

Method 1 .....

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Benefit .....

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Method 2 .....

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Benefit .....

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Method 3 .....

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Benefit .....

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..... [6]

For Examiner's Use

(b) (i) Technical documentation is produced alongside the development of the solution.

Give a reason why technical documentation is necessary.

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(ii) Describe **three** items you would expect to see in the technical documentation.

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2 .....

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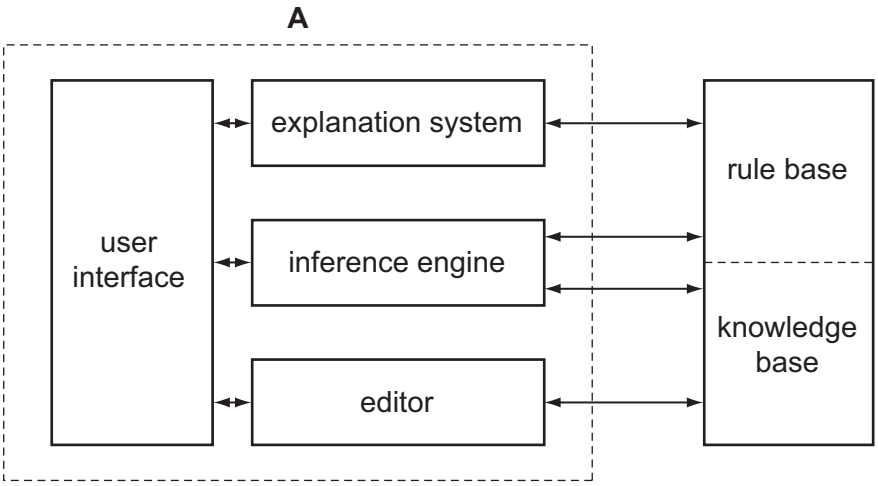
For Examiner's Use

9 Study the following diagram which shows the components that make up an expert system.



(a) What is the general name for the components that make up part **A**?

.....[1]

(b) Explain the function of each of the six components shown in the diagram:

user interface .....

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explanation system .....

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inference engine .....

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editor .....

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rule base .....

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knowledge base .....

.....[6]

(c) Describe **three** possible drawbacks of using an expert system.

For Examiner's Use

1 .....

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2 .....

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3 .....

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..... [3]

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