CANDIDATE NAME	

| CENTRE NUMBER | | | | | | CANDIDATE NUMBER | | | | |

COMPUTING **9691/11**

Paper 1 **May/June 2016**

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 an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

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.

[Turn over

1   A programmer is developing an expert system. The expert system will diagnose problems in car engines.

Describe **four** stages in the development of the expert system.

1 ....

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2 ....

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3 ....

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4 ....

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[4]

2 Computer systems often use several types of storage. This storage is both primary and secondary.

(a) State a use for each of the storage devices shown below.

RAM ....

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ROM ....

....

....

Hard disk drive ....

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Optical storage device ....

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....

[4]

(b) Another type of storage device is a solid state drive (SSD).

Give **four** advantages of using an SSD when compared with using a hard disk drive.

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[4]

3 Six statements and eight input devices are shown below.

Draw a line to link each statement to the correct input device.

Statement	**Input device**

| Device for reading text from a printed document and converting it into a form that can be used in a word processor | Magnetic Ink Character Reader (MICR) |

Sensor

| Device that reads parallel lines of various widths and spacing | Magnetic stripe reader |

| Device that collects data values from the real world | Optical Character Reader (OCR) |

| Device that reads pencil or pen marks in pre-determined positions on a page | Digital camera with video capture card |

Barcode reader or Barcode scanner

| Device that reads the data from a magnetised band on the back of a card or ticket | Keyboard |

| Device that acquires the images of an intruder entering a building | Optical Mark Reader (OMR) |

[6]

4   A teacher recruitment agency holds records of all its members on a database. The data for each teacher are entered into the database using a keyboard.

Four of the fields are:

* teacher's unique 8-digit identification number (ID number)
* hourly rate in dollars (for example, 28.50)
* date of birth (DD/MM/YYYY)
* contact telephone number (for example, 0-123-456-7890)

At the data entry stage, the data are validated. A presence check is one possible type of validation check.

For **each** field, complete the following table to:

* State another possible validation check.
* Give an example of data value that would **fail** your chosen validation check.

Each validation check and example must be **different** for each of the four fields.

Field name	Type of validation check	Example of data which would fail the validation check
IdNumber	....	....
HourlyRate	....	....
DateOfBirth	....	....
PhoneNumber	....	....

[8]

5 (a) Three descriptions about data transmission are given below.

For each description, tick (✓) the correct box to show:

- whether the data transmission is serial or parallel
- whether the transmission mode is simplex, half-duplex or full-duplex

(i) Data travel down a single wire one bit at a time in one direction only.

Type of transmission	Tick (✓)
serial	
parallel	

Mode of transmission	Tick (✓)
simplex	
half-duplex	
full-duplex	

[2]

(ii) Data can travel in both directions at the same time along a number of data channels/wires.

Type of transmission	Tick (✓)
serial	
parallel	

Mode of transmission	Tick (✓)
simplex	
half-duplex	
full-duplex	

[2]

(iii) One byte of data travelling in only one direction along eight data channels/wires.

Type of transmission	Tick (✓)
serial	
parallel	

Mode of transmission	Tick (✓)
simplex	
half-duplex	
full-duplex	

[2]

(b) Five communication terms are described below.

In each case, name the term.

Communication method in which data are
divided up into blocks; blocks travel to the
destination by a variety of routes. ....

Communication that sends data along
a single channel and uses the entire
bandwidth of the medium. ....

Set of rules that govern the communication
between computers on a network; for
example, the type of parity to be used. ....

Communication method in which multiple
analogue signals, each occupy a part of
the bandwidth to carry data. ....

Communication method where a network
uses the full bandwidth of a channel
between two nodes before communication
starts; only the two nodes can use the
channel and they release it only when
transmission ends. ....

[5]

6 A company designs and sells computer games. John works in the marketing department. His manager asks him to produce a presentation to be shown in a large shopping mall to advertise the company's products.

The presentation contains the following:

- graphs
- video with sound
- animation

(a) Give **one** benefit and **one** drawback of using each one of these.

Graphs

Benefit ....

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....

Drawback ....

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Video with sound

Benefit ....

....

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Drawback ....

....

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Animation

Benefit ....

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Drawback ....

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....

[6]

(b) Different departments in the company use the following software:

- desktop publishing
- spreadsheet
- graphics package
- word processor

For each type of software, describe **one** application relevant to the design and sales of the company's games.

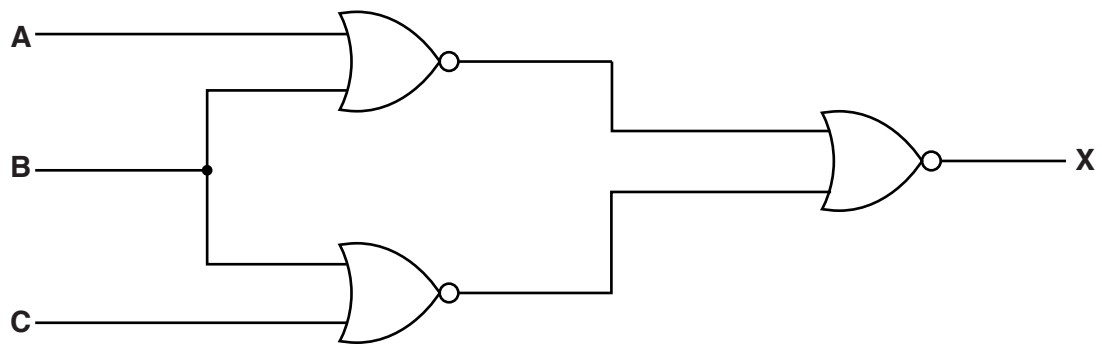Desktop publishing ....

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Spreadsheets ....

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Graphics packages ....

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Word processor ....

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[4]

10

7 (a) Complete the truth table for the following logic circuit.

INPUT			Workspace	OUTPUT
A	B	C		X
0	0	0		0
0	0	1		0
0	1	0		1
0	1	1		1
1	0	0		0
1	0	1		1
1	1	0		1
1	1	1		1

[4]

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(b) Draw a logic circuit which corresponds to the following logic statement.

$$X = ((NOT\ A\ \ AND\ \ B)\ \ OR\ \ (NOT\ B\ \ OR\ \ C))\ \ OR\ \ (B\ \ AND\ \ C)$$

A ——

B —— X

C ——
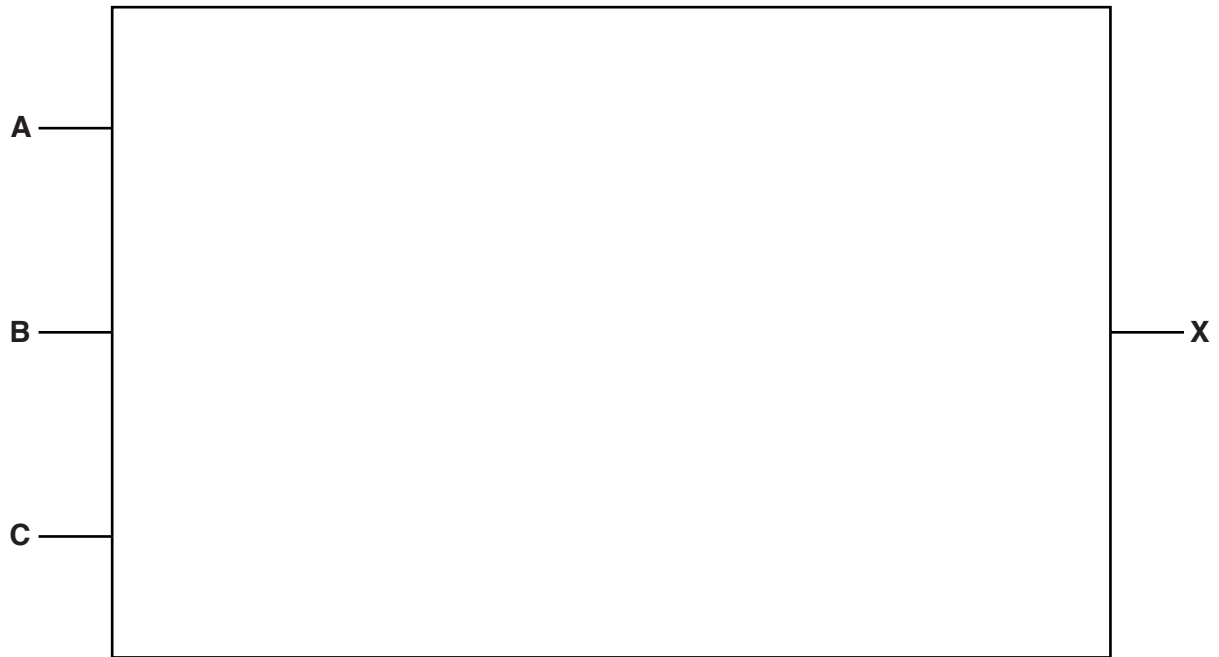
[6]

8 Two players, X and O, play a game. The players take turns to place either 'X' or 'O' in any one of the empty squares on the board. The board shows a current game in play.

	1	2	3	4	5	6	7
1	X	O					
2	X						
3	O						
4							
5			O				
6	X	O	O	X			
7	O	X	X	X	O		

Either player (X or O) wins when there are four 'X's or four 'O's next to each other:

- in a row, or
- in a column, or
- in a diagonal line

A programmer is writing a computer program for the game.

The programmer stores the mark 'X' as the value 1 and the mark 'O' as the value 2.

The programmer uses a 2-dimensional array, `Board[1 : 7, 1 : 7]`, to store the current value in each square.

(a) State what value the programmer could use to represent an empty square.

....

[1]

(b) Describe how the programmer could initialise the array `Board` for the start of the game.

....

....

....

....

....

....

[2]

(c) For the game shown above, show the values that are currently stored in the following array elements. State whether the first index number is used for the row or column.

`Board[6, 4]` ....

`Board[7, 5]` ....

[2]

(d) It is possible to play the game against the computer. Player O is the computer and player X is a human. Player X selects where to place their 'X' in the game.

Player X plays the game on a standard personal computer with a keyboard, mouse and monitor.

Describe **two** different ways in which player X could select the square for each of their moves.

1 ....

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....

2 ....

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[2]

(e) Explain how the computer program would determine, after each turn, if a player has won the game.

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[3]

9 A customer wishes to buy a new car. The customer visits a car factory which has a sales area. The customer specifies various features for their car using a computer system. The car features to choose include model, body colour, seat material and engine size.

The factory accepts the customer's specification and provides them with their chosen car within an hour.

(a) Name a suitable hardware device to capture the customer's choices. Describe the interface that allows the customer to specify the features of their car.

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[4]

(b) The factory stores cars in a 30-level warehouse that has separate storage areas, known as pods. A computer-controlled forklift system removes a car from its pod.

Each pod has a unique identification; for example, A17 refers to pod A on level 17.

A database stores data for all the cars that are stored in the pods.

Explain how the customer's car specification is matched to a car in one of the pods and how the car is then withdrawn from the pod.

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[4]

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16

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