

CANDIDATE  
NAME

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CENTRE  
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CANDIDATE  
NUMBER

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**COMPUTING**

**9691/12**

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.

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

1 A company develops learning materials. These are computer-based and consist of a number of interactive presentations. The materials are supplied on a CD-ROM.

(a) Name the type of secondary storage medium being used.

.....[1]

(b) Explain the term interactive in this context.

.....  
.....  
.....  
.....[2]

(c) Give **one** reason why the company sells the learning materials on a CD-ROM.

.....  
.....[1]

(d) Software on the CD-ROM can record a user's progress in working through the material. The user can stop the presentation at any point and then resume where they left off at a later time.

A student buys the learning materials.

(i) State why the materials cannot be used directly from the CD-ROM.

.....[1]

(ii) State what the student must do before they can use the presentations effectively.

.....  
.....[1]

(e) One of the presentations is on the topic of verification and validation.

Explain the differences between verification and validation. Include examples in your explanation.

.....  
.....  
.....  
.....  
.....  
.....[3]

**Question 2 begins on page 4.**

2 (a) A processor controls a heating system. To do this, it uses:

- a temperature sensor
- a device in which a small electrical input current switches a much larger current for the heater

The following steps, when put into the correct sequence, describe how to switch on the heater.

Put the steps into the correct sequence using the numbers 1 to 5.

Step	Sequence number
Sensor reading is sent to the microprocessor	
Microprocessor checks sensor reading against stored temperature value	
Temperature reading is taken by the analogue sensor	
If the sensor reading is less than the stored value, the microprocessor sends a signal to switch on the heater	
Sensor reading is converted into a digital value using an ADC	

[4]

(b) Name a suitable sensor for each of the following applications.

State what the sensor detects in each case.

(i) Intruder detection system

Sensor .....

Reason for choice .....

.....

.....[2]

(ii) Switching on a street lamp when it gets dark.

Sensor .....

Reason for choice .....

.....

.....[2]

(iii) Counting people entering a building.

Sensor .....

Reason for choice .....

.....

.....[2]

3 A small business has several computers, each with a single-user operating system.

(a) State what is meant by single-user.

.....  
.....[1]

(b) The business uses an Internet Service Provider (ISP) to provide a high-speed Internet connection.

(i) State what high-speed means in this context.

.....  
.....[1]

(ii) Give **two** applications for which a high-speed broadband connection is essential.

1 .....

.....

2 .....

.....[2]

(c) Give **two** benefits of using a broadband connection, other than high speed.

1 .....

.....

2 .....

.....[2]

(d) The ISP advertises a download speed of 80 Mbits/second.

(i) State the number of Mbytes/second this is equivalent to.

.....[1]

(ii) Calculate the time taken to download an 80 Mbyte file.

.....  
.....[1]

The business complains to the ISP that the actual download speed is only 0.8 Mbits/second.

(iii) Calculate the time taken to download the same 80 Mbyte file.

.....  
.....[1]

(iv) Suggest one reason why the download speed is lower than advertised.

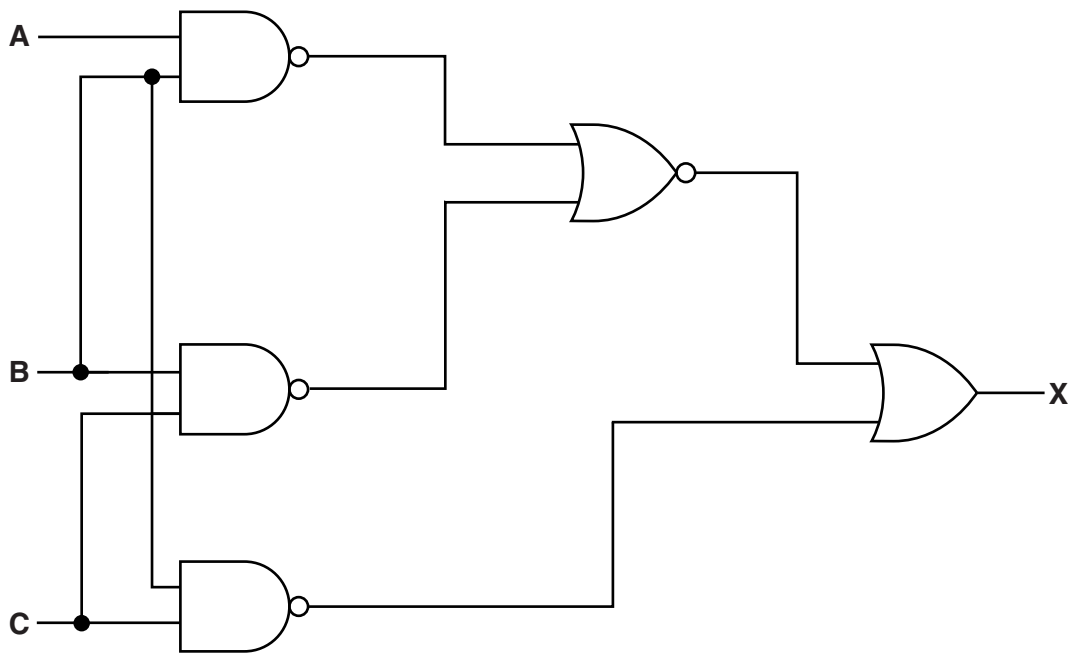
.....  
.....[1]







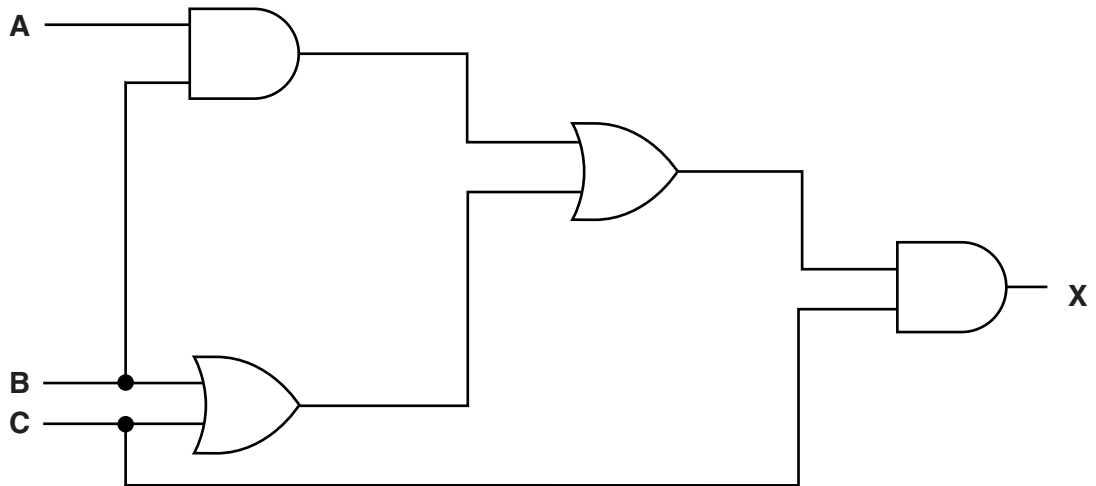
5 (a) Complete the truth table for the following logic circuit.



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

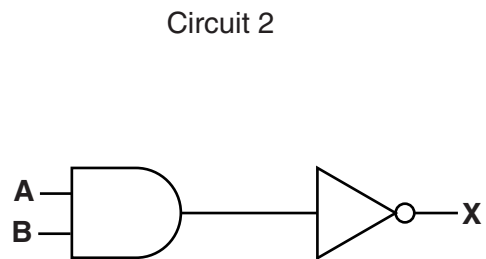
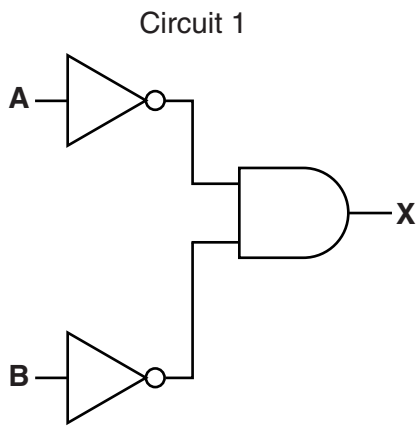
[4]

(b) Write a logic statement which represents the following logic circuit.



.....  
 .....  
 .....  
 .....[3]

(c) For each circuit below, state the equivalent single logic gate.



Circuit 1 .....  
 Circuit 2 .....[2]

6 An airport car park is made up of 5 rows, each with 8 bays. When a car enters the car park, a computer system captures its registration plate (number plate) data. The computer system is able to determine the row and bay in which the car is parked.

(a) Outline a suitable method for capturing the registration data of each car.

.....  
 .....  
 .....  
 ..... [2]

(b) When a customer wants to leave the car park with their car, they enter their registration plate data at a ticket machine.

The machine calculates and displays the parking fee and the location of the car (for example row 5, bay 4).

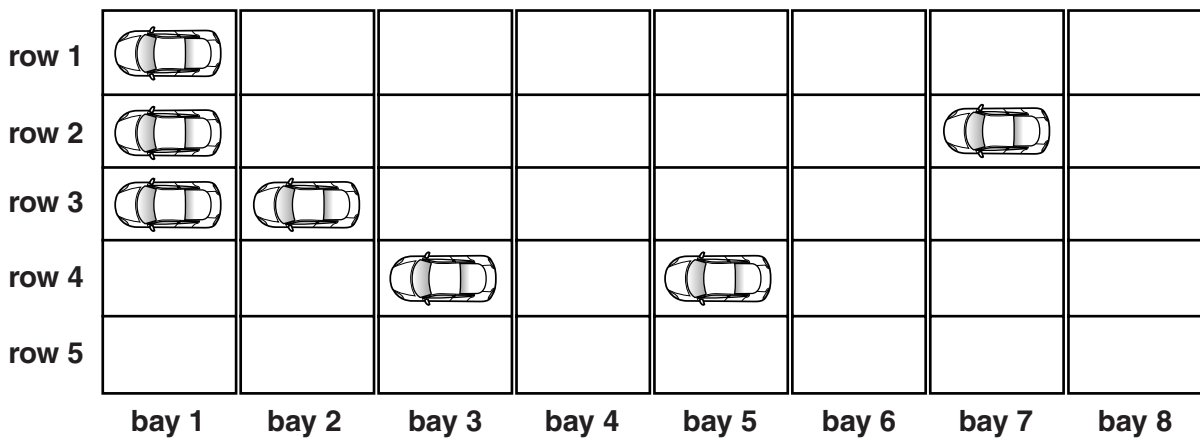
(i) Name a suitable device to enter the car registration and display the location of the car.

..... [1]

(ii) Describe how the computer system can calculate the parking fee.

.....  
 .....  
 .....  
 ..... [2]

The layout of the car park is shown. There are currently seven parked cars.



The computer system stores the registration plate data of each parked car in a 2-dimensional array, `ParkingArea`.

(c) (i) Explain how the computer system initialises the `ParkingArea` array.

.....  
.....  
.....  
.....[2]

(ii) Using the given diagram, state whether or not there is currently a car registration stored in `ParkingArea[4, 3]`.

.....[1]

(iii) When the driver parked the car, the computer system stored the registration plate data in the appropriate element of the `ParkingArea` array.

When paying the parking fee, the driver enters the registration plate data at the car park ticket machine.

Describe how the computer system uses the `ParkingArea` array to find the location of the car.

.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

(d) The car park has ten levels.

Suggest how a programmer could modify the `ParkingArea` array to store the data for all ten levels.

.....  
.....  
.....  
.....  
.....[2]

7 A student wrote the following five statements on a computing exam paper.

Explain why each statement is incorrect.

(i) *“Backing up data on a pen drive always allows a user to recover data in the event of data loss caused by a virus.”*

.....  
.....  
.....  
.....[2]

(ii) *“A stack data structure operates on the first-in, first-out principle and is controlled by two pointers.”*

.....  
.....  
.....  
.....[2]

(iii) *“The two bytes 0 1 0 0 1 1 0 0 and 0 1 1 0 1 1 1 0 both have even parity since their denary values, 76 and 110, are even.”*

.....  
.....  
.....  
.....[2]

(iv) *“Broadband is a method of communication which is digital in nature; it uses a single channel that uses the entire bandwidth of the medium.”*

.....  
.....  
.....  
.....[2]

(v) *“Buffers use ROM memory.”*

.....

.....

.....

..... [2]

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