

# Cambridge International AS & A Level

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

# 0 1 2 3 4 5 6 7 8 9

#### **COMPUTER SCIENCE**

9618/01

Paper 1 Theory Fundamentals

For examination from 2021

SPECIMEN PAPER

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

#### **INSTRUCTIONS**

- Answer all questions.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do not use an erasable pen or correction fluid.
- Do not write on any bar codes.
- You may use an HB pencil for any diagrams, graphs or rough working.
- Calculators must not be used in this paper.

#### **INFORMATION**

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [].
- No marks will be awarded for using brand names of software packages or hardware.

This document has 14 pages. Blank pages are indicated.

© UCLES 2018 [Turn over

1	(a)	State <b>one</b> difference between a <b>kibibyte</b> and a <b>kilobyte</b> .	
			[1]
	(b)	Give the number of bytes in a <b>mebibyte</b> .	
			[1]
	(c)	(i) Complete the following binary addition. Show your working.	
		10011010	
		<u>+11110111</u>	
		(ii) Describe the error that occurred when you added the binary numbers in part (c)(i).	[2]
		(ii) Describe the error that occurred when you added the binary humbers in part (c)(i).	
			[2]
	(d)	Complete the binary subtraction. Show your working.	
		01100111	
		-00110010	

[2]

### **BLANK PAGE**

(a)	The website has a URL and an IPv6 address.
	Describe, using an example, the format of an IPv6 address.
	[4
(b)	An IP address can be static or dynamic. Describe static and dynamic IP addresses.
	Static
	Dynamic
	[4
(c)	Yvette's company has a LAN (Local Area Network) that has hybrid topology.
	(i) Describe the characteristics of a LAN.
	[2

© UCLES 2018 9618/01/SP/21

2

(ii)	The LAN has a range of different topologies. One subnetwork connects four computers and one server set up as a star topology.
	Describe how packets are transmitted between two of the computers in this subnetwork.
	[3]
( <b>d</b> ) Th	e LAN has both wired and wireless connections.
(i)	Ethernet cables connect the computers to the server.
	Identify <b>three</b> other hardware components that might be used to set up the LAN.
	1
	2
	3
	[3]
(ii)	Describe how Carrier Sense Multiple Access/Collision Detection (CSMA/CD) manages collisions during data transmission.
	[3]

				6		
3	Mel	hrdad	d has a holiday company datab	pase that includes:		
	•		a about holidays, such as the last a such as the last about the customers and the			
	(a)	Mel	nrdad has <b>normalised</b> the data	abase, which has three to	ables.	
		(i)	Draw an entity–relationship (l	E–R) diagram for the <b>nor</b>	malised table	es.
						[3
		(ii)	Complete the table to identify you identified in <b>part (a)(i)</b> . If			or each of the table
			Table name	Primary key	F	Foreign key
						[3
		(iii)	Explain why the holiday datal	base is in Third Normal F	orm (3NF).	-

**(b)** The holiday company has several members of staff. The database has **two** additional tables to store data about the staff.

STAFF(<u>StaffID</u>, FirstName, SecondName, DateOfBirth, Role, Salary)
SCHEDULE(<u>ScheduleID</u>, StaffID, WorkDate, Morning, Afternoon)

The following table shows some sample data from the table SCHEDULE.

ScheduleID	StaffID	WorkDate	Morning	Afternoon
210520-1	ВС	21/05/2020	TRUE	TRUE
210520-2	JB	21/05/2020	TRUE	FALSE
220520-1	BC	22/05/2020	FALSE	TRUE
220520-2	LK	22/05/2020	TRUE	FALSE

(i)	Write an SQL script to display the first name and second name of all staff members working on 22/05/2020.
	[4]
(ii)	Write an SQL script to count the number of people working on the morning of 26/05/2020.
	[3]

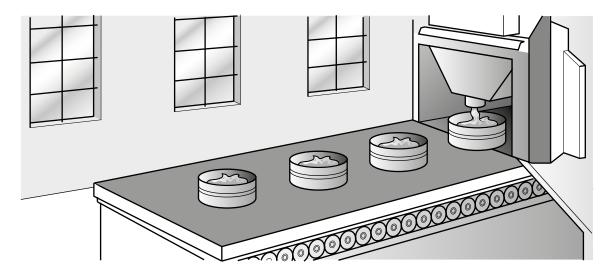
A cake factory uses machines to make cakes .

a ...... to measure the values.

(a)	Complete the following descriptions of types of system. Write the correct missing term in t spaces.					
	The factory uses a system to record data such as the number					
	of cakes being produced each hour.					
	When the data collected from sensors are analysed and used as					
	it is a system. One example					
	of this system, used in the factory, is to maintain a constant temperature in the ovens. It uses					

[4]

**(b)** Cake mixture is mixed in a large pot. A conveyer belt moves the cake tins beneath the pot. The conveyer belt stops and a set quantity of the cake mixture fills the cake tin. The conveyer belt then moves and another cake tin is positioned beneath the pot.



Explain how the control system will ensure the correct amount of mixture is placed in the cake tins.
[5]

The mad	cake factory has servers that store its confidential recipes and control the factory chines.
(i)	Describe the implications of a hacker gaining access to the cake factory's servers.
	[4]
(ii)	Explain how the company could protect its data against hackers.
	[4]
	(i)

(d)	The machines have a counter to record the number of cake tins filled. Each time a cake tin is
	filled, the counter is increased by 1. The value is stored in an 8-bit register, the current value
	is shown.

0	0	0	0	1	0	0	1

(i) Show the value of the binary number after another five cake tins have been filled.

1 1		
1 1		
1 1		
1 1		

[1]

(ii) The following table shows some assembly language instructions for a processor which has one general purpose register, the Accumulator (ACC).

Instruction		Explanation
Op code	Operand	
AND	#n	Bitwise AND operation of the contents of ACC with the operand
AND	<address></address>	Bitwise AND operation of the contents of ACC with the contents of <address></address>
XOR	#n	Bitwise XOR operation of the contents of ACC with the operand
XOR	<address></address>	Bitwise XOR operation of the contents of ACC with the contents of <address></address>
OR	#n	Bitwise OR operation of the contents of ACC with the operand
OR	<address></address>	Bitwise OR operation of the contents of ACC with the contents of <address></address>
LSL	#n	Bits in ACC are shifted logically n places to the left. Zeros are introduced on the right hand end
LSR	#n	Bits in ACC are shifted logically n places to the right. Zeros are introduced on the left hand end.

Write the assembly language statement to reset the register to 0.	

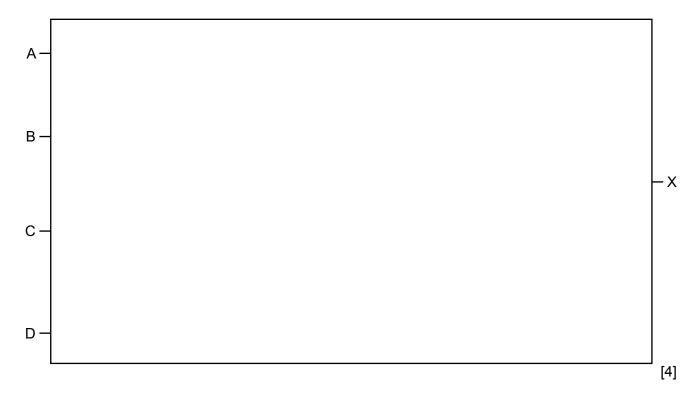
At the end of each day, the register is reset to 0.

.....[

	(iii)	A two-place part (d).	logica	al shi	ft to t	the I	eft is	perfo	rmed	on the	binar	y num	nber :	shown in	1
		Show the res	ult of tl	his log	ical sh	nift.									
								<u> </u>	<u> </u>					[1]	]
	(iv)	State the manumber.	athema	ntical r	result	of a	one-p	olace	logica	al shif	<b>t</b> to th	e <b>rig</b> h	nt on	a binary	′
														[1]	]
(e)	The	factory server	rs run s	softwa	re tha	t mal	kes us	e of A	rtificia	Intelli	gence	(AI).			
	Ехр	lain how the u	se of A	Al can	help ir	npro	ve the	safet	y and (	efficier	cy of tl	ne fac	tory.		

**5** (a) Draw a logic circuit diagram for the logic expression:

## X = NOT (A OR B OR C) OR (B AND C AND D)



**(b)** Complete the truth table for the logic expression:

X = (A XOR B) OR NOT (A OR B OR C)

Α	В	С	Working space	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		
		ı		[4]

#### **BLANK PAGE**

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.