Surname	Centre Number	Candidate Number
Other Names		0



GCSE - NEW

3500U10-1



COMPUTER SCIENCE

Unit 1: Understanding Computer Science

MONDAY, 13 MAY 2019 - MORNING

1 hour 45 minutes

For Examiner's use only					
Question	Maximum Mark	Mark Awarded			
1.	4				
2.	12				
3.	4				
4.	9				
5.	6				
6.	5				
7.	13				
8.	13				
9.	4				
10.	12				
11	6				
12	12				
Total	100				

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer all questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the continuation page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

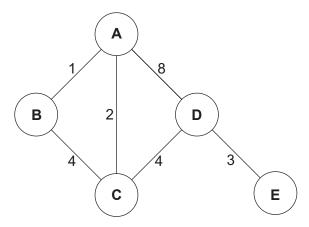
The total number of marks is 100.

Some questions will require you to draw on your knowledge from multiple areas of your course of study.

[4]

Answer all questions.

1. The diagram shows the routing cost between each node for data transmitted on a certain network.



Complete the table, indicating the lowest cost routes from node ${\bf D}$ to each destination. One of the rows has been completed for you.

Destination	Lowest Cost	Route
Α		
В		
С	4	D > C

2. The computer systems used at a school are starting to run slowly. The school is considering replacing their computers with one of the following:

Computer 1



- 5 GHz Dual-core 4MB cache
- 4 GB RAM
- 4 TB HDD, 7200 rpm
- DVD/RW
- Bluetooth mouse
- Bluetooth keyboard

Computer 2



- 2.5 GHz Quad-core 8MB cache
- 8 GB RAM
- 128 GB SSD
- Blu-ray
- USB mouse
- USB keyboard

(a)	Compare the CPU performance of the two computers in terms of cache size, clock spand number of cores.	eed [6]
	Cache size:	
•••••		
•••••		•••••
•••••		
	Clock speed:	
•••••		••••••
•••••		
	Number of cores:	
•••••		••••••
		·······

(b)	Compare the secondary storage devices used in the two computers.	[6]	on

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3. (a) State the logical operator that has been used to produce the output in the following truth table. [1]

Inp	Output	
Α	В	С
0	0	0
1	0	1
0	1	1
1	1	0

(b) State the logical operator that has been used to produce the output in the following truth table.

Inp	Output	
Α	В	С
0	0	0
1	0	0
0	1	0
1	1	1

[1]

(c) **Tick** (J) the correct boxes below to show the Boolean expression that represents the function described by each truth table.

Input **Output** В C Α 0 0 0 0 1 1 0 1 0 1 1 0

C = A.B

(i)

 $C = \overline{A + B}$

 $C = A.\overline{B}$

C = A + B

(ii) Input Output C Α В 1 0 0 1 0 0 1 0 0 1 1 0

C = A.B

 $C = \overline{A + B}$

C = A + B

 $C = \overline{A.B}$

[1]

Turn over.

- **4.** Protocols provide an agreed set of rules to allow networked devices to communicate.
 - (a) **Tick** (\checkmark) the boxes to match the protocol with the correct description.

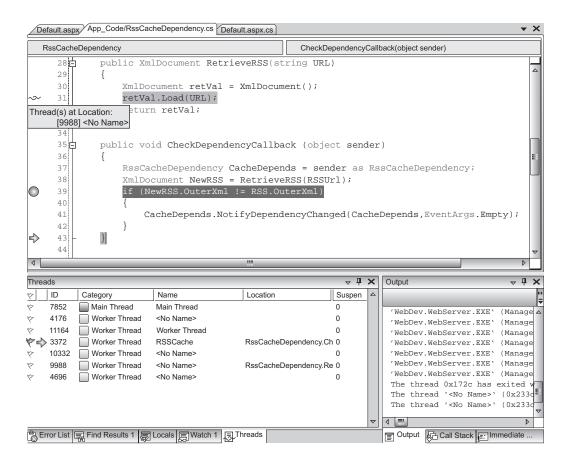
[3]

DESCRIPTION		PROTOCOL				
	DESCRIPTION	Ethernet	IMAP	SMTP	ТСР	
to be sen	ocol that allows packets at and received between r systems.	1	2	3	4	
	ol that stores email es on a mail server.	5	6	7	8	
The proto email from email ser	ocol used to deliver m the sender to an ever.	9	10	11	12	
(b)	Describe the network I transmission:	ayer and physic	cal layer in the	TCP/IP 5-layer	model for data [4]	
	Network layer:					
•····						
•••••						
	Physical layer:					

•••••						
(c)	Identify one protocol from IP 5-layer model for data		used in each of	f the following la	yers in the TCP/	
	Application Layer:				[1]	
	Transport Layer:				[1]	

[6]

5. An example of an Integrated Development Environment (IDE) is shown. An IDE is a software application that provides programmers with facilities to develop software.



-	·-	•		
Facility 1:				
•••••	 		 	
Facility 2:				
racility 2	 		 	
• • • • • • • • • • • • • • • • • • • •	 		 	
Facility 3:	 		 	

Identify and describe three facilities provided by this IDE.

Clearly showing each step, simplify the following Boolean expressions using Boolean algebrand identities:					
(a)	P.(0 + P)	[1]			
(b)	Q.(Q + P) + P.(Q + P)	[4]			

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[2]

7. (a) Complete the table, converting between denary and hexadecimal numbers.

Denary	Hexadecimal
123 ₁₀	7B ₁₆
	29 ₁₆
253 ₁₀	

(b) Complete the table to calculate the binary addition of 18_{10} to 89_{10} using an 8-bit register. [4]

Denary Equivalent	128	64	32	16	8	4	2	1
18 ₁₀								
89 ₁₀								
Carry								
Answer								

(c)	Use a suitable example of binary addition to demonstrate the concept of overflow.	[3]
• • • • • • • • • • • • • • • • • • • •		••••••
•····		
•••••		•••••••

Perf	orm arithmetic shifts and state the effect of each of these operations.	
(i)	Arithmetic shift left by one place on 01111001 ₂ .	[2]
•••••		•••••••••••••••••••••••••••••••••••••••
•••••		••••••
(ii)	Arithmetic shift right by two places on 01100100 ₂ .	[2]

8.	Grap	phics, sound and text are all stored using a computer system.				
	(a)	Expl	lain how the following are stored using a computer system.			
		(i)	A graphic.	[3]		
			A			
		(ii)	An analogue sound wave.	[3]		
		(iii)	Text.	[2]		

(b)	Lossy and lossless are two types of data compression used to compress digital graphics
	A certain method uses the following compression ratios:

Lossy	10:1
Lossless	10:9

(i) 		ach compression type for a 200 KB image. [2]
(ii)	Lossy file size:	Lossless file size: types is unsuitable for a text document. [3]

9.	Explain the purpose and typical contents of an acceptable network use policy. [4	Examiner only

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10.	Com	outers	systems are vulnerable to cyberattack.	
	(a)	Desc	cribe the following forms of cyberattack:	
		(i)	Worms.	[2]
		•••••		
		•••••		
		•••••		
		•••••		
		(ii)	Spyware.	[2]
		•••••		
		•••••		
		(iii)	Trojans.	[2]
		•••••		
		•••••		

b) [Desc	cribe the following three methods of identifying vulnerabilities.	
	(i)	Footprinting:	[2]
	•••••		
	(ii)	Ethical hacking:	[2]
((iii)	Penetration testing:	[2]

11.	Describe the functionality of three utility software tools.] on
		-
		-

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12.	Human-computer Interaction is dependent upon an interface.				
	Discuss the advantages and disadvantages of different types of interface.	[12]			
		·····•			
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END OF PAPER

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