

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE – NEW**

3500U10-1



S19-3500U10-1

**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	
<b>Total</b>	<b>100</b>	

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**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.

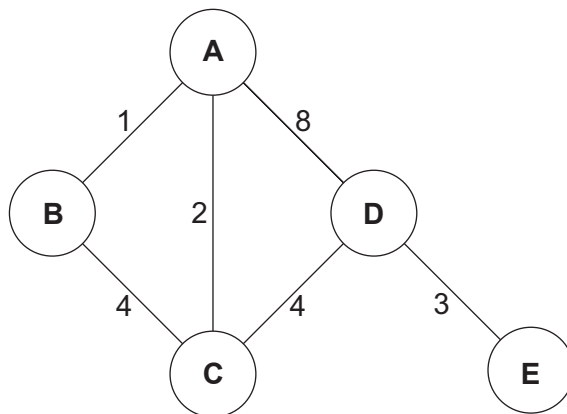
The total number of marks is 100.

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

Answer all questions.

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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 **D** to each destination. One of the rows has been completed for you.

[4]

Destination	Lowest Cost	Route
<b>A</b>		
<b>B</b>		
<b>C</b>	4	<b>D &gt; C</b>

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	Computer 2
 <ul style="list-style-type: none"> <li>• 5 GHz Dual-core 4MB cache</li> <li>• 4 GB RAM</li> <li>• 4 TB HDD, 7200 rpm</li> <li>• DVD/RW</li> <li>• Bluetooth mouse</li> <li>• Bluetooth keyboard</li> </ul>	 <ul style="list-style-type: none"> <li>• 2.5 GHz Quad-core 8MB cache</li> <li>• 8 GB RAM</li> <li>• 128 GB SSD</li> <li>• Blu-ray</li> <li>• USB mouse</li> <li>• USB keyboard</li> </ul>

(a) Compare the CPU performance of the **two** computers in terms of cache size, clock speed and number of cores. [6]

**Cache size:**

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**Clock speed:**

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**Number of cores:**

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(b) Compare the secondary storage devices used in the **two** computers.

[6]

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

Input		Output
A	B	C
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. [1]

Input		Output
A	B	C
0	0	0
1	0	0
0	1	0
1	1	1

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

(i) [1]

Input		Output
A	B	C
0	0	0
1	0	1
0	1	0
1	1	0

$$C = A.B$$

 1

$$C = \overline{A + B}$$

 2

$$C = A.\overline{B}$$

 3

$$C = A + B$$

 4

(ii) [1]

Input		Output
A	B	C
0	0	1
1	0	0
0	1	0
1	1	0

$$C = A.B$$

 1

$$C = \overline{A + B}$$

 2

$$C = A + B$$

 3

$$C = \overline{A.B}$$

 4

4. Protocols provide an agreed set of rules to allow networked devices to communicate.

(a) Tick (✓) the boxes to match the protocol with the correct description. [3]

DESCRIPTION	PROTOCOL			
	Ethernet	IMAP	SMTP	TCP
The protocol that allows packets to be sent and received between computer systems.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
A protocol that stores email messages on a mail server.	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>	8 <input type="checkbox"/>
The protocol used to deliver email from the sender to an email server.	9 <input type="checkbox"/>	10 <input type="checkbox"/>	11 <input type="checkbox"/>	12 <input type="checkbox"/>

(b) Describe the network layer and physical layer in the TCP/IP 5-layer model for data transmission: [4]

**Network layer:** .....

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**Physical layer:** .....

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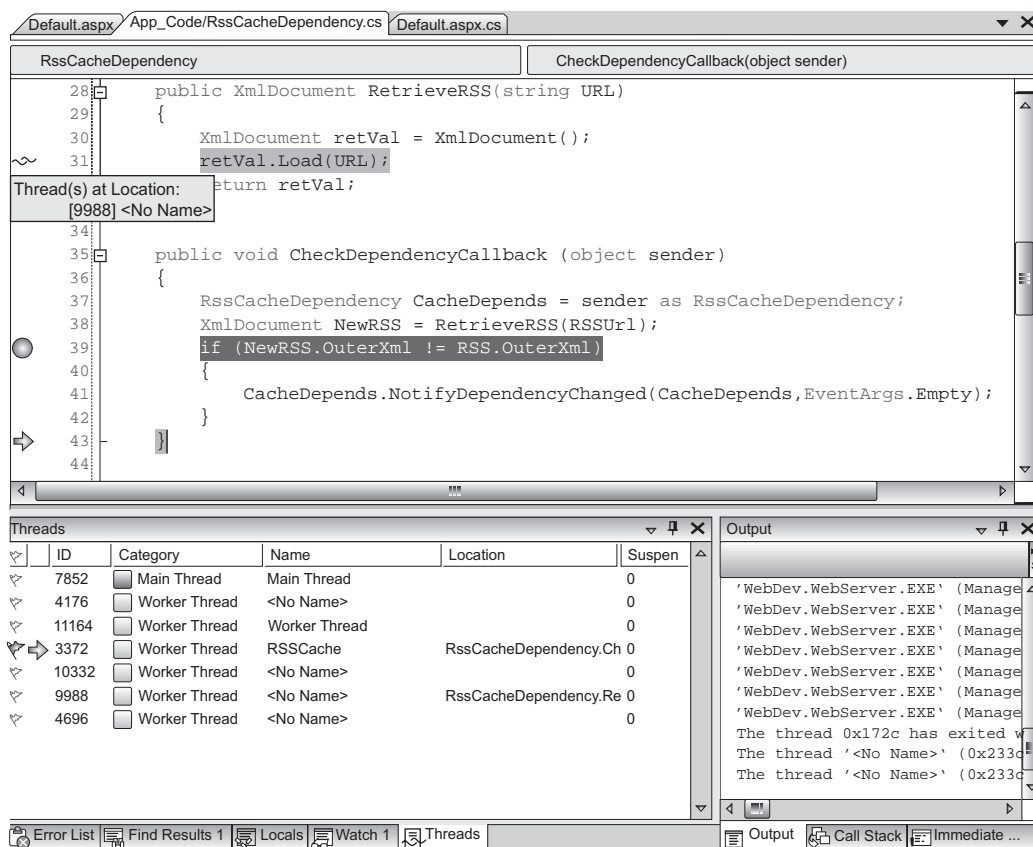
(c) Identify **one** protocol from question 4(a) used in each of the following layers in the TCP/IP 5-layer model for data transmission.

**Application Layer:** ..... [1]

**Transport Layer:** ..... [1]



- 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.



Identify and describe **three** facilities provided by this IDE.

[6]

**Facility 1:** .....

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**Facility 2:** .....

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**Facility 3:** .....

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6. Clearly showing each step, simplify the following Boolean expressions using Boolean algebra and identities:

(a)  $P.(0 + P)$  [1]

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(b)  $Q.(Q + P) + P.(Q + P)$  [4]

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

[2]

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Denary	Hexadecimal
123 <sub>10</sub>	7B <sub>16</sub>
	29 <sub>16</sub>
253 <sub>10</sub>	

- (b) Complete the table to calculate the binary addition of 18<sub>10</sub> to 89<sub>10</sub> using an 8-bit register.

[4]

Denary Equivalent	128	64	32	16	8	4	2	1
18 <sub>10</sub>								
89 <sub>10</sub>								
<b>Carry</b>								
<b>Answer</b>								

- (c) Use a suitable example of binary addition to demonstrate the concept of overflow.

[3]

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(d) Perform arithmetic shifts and state the effect of each of these operations.

(i) Arithmetic shift left by **one** place on  $01111001_2$ . [2]

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(ii) Arithmetic shift right by **two** places on  $01100100_2$ . [2]

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8. Graphics, sound and text are all stored using a computer system.

(a) Explain how the following are stored using a computer system.

(i) A graphic. [3]

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(ii) An analogue sound wave. [3]

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(iii) Text. [2]

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

<b>Lossy</b>	10:1
<b>Lossless</b>	10:9

(i) Calculate the resulting file size using each compression type for a 200 KB image. [2]

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**Lossy file size:** ..... **Lossless file size:** .....

(ii) Explain why one of these compression types is unsuitable for a text document. [3]

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9. Explain the purpose and typical contents of an acceptable network use policy.

[4]

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10. Computer systems are vulnerable to cyberattack.

(a) Describe the following forms of cyberattack:

(i) Worms. [2]

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(ii) Spyware. [2]

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(iii) Trojans. [2]

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(b) Describe the following **three** methods of identifying vulnerabilities.

(i) Footprinting: [2]

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(ii) Ethical hacking: [2]

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(iii) Penetration testing: [2]

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11. Describe the functionality of **three** utility software tools.

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**For continuation only.**

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