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GCSE

COMPUTER SCIENCE

UNIT 1

Understanding Computer Science

SAMPLE ASSESSMENT MATERIALS

1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use pencil or gel pen. Do not use correction fluid.

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 pages 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.

You are reminded of the need for good English and orderly, clear presentation in your answers. The quality of your written communication, including appropriate use of punctuation and grammar, will be assessed in your answer to question 12.

The use of calculators is not permitted in this examination.

The total number of marks is 100.

Questions 4 and 8d(i) and will require you to draw on your knowledge from multiple areas of your course of study.

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1. High level languages are used by programmers.

Tick (✓) the correct boxes below to show whether the statements are TRUE or FALSE for a high level language. [3]

STATEMENT	TRUE	FALSE
They are easier to understand, learn and program as commands are similar to natural language.	1	2
They require less time for translation into machine code.	3	4
They are preferred when the execution speed is critical.	5	6

2. Below is a partially labelled diagram of a Von Neumann type architecture computer, with a single core Central Processing Unit (CPU).
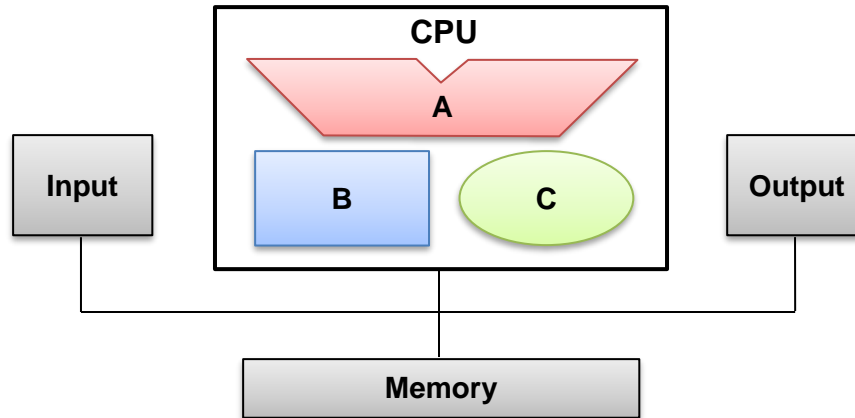
(a) State the purpose of the components A, B and C above. [3]

Component A: …………………………………………………………………………

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Component B: …………………………………………………………………………

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Component C: …………………………………………………………………………

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(b) Cache size, clock speed and number of cores are the **three** main factors that affect performance. Describe how performance is affected by these **three** factors. [6]

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(c)   Other hardware components are used in most computer systems.

Describe the role of each of the following.

(i)   Sound card.   [2]

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(ii)   Motherboard.   [2]

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3. Syntax errors are a type of programming error.

Giving specific examples, describe **two** other different types of programming errors.

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4. A partially complete data structure design, for storing customer details, is shown below.

Complete the table, suggesting:

- **Three most** suitable data types
- **Three different** methods of validation. [6]

Field name	Data type	Example data	Validation check
Customer ID		3	
First Name	String	Warren	Presence check
Surname	String	Davies	Presence check
Gender		M	Presence check
Date of birth	Date	28/11/1981	
Address	String	123 Western Avenue	Presence check
Post code	String	CF12 3AB	
Telephone number		029 2026 5137	Length check

5. Cyber security is essential in the protection against different types of malware.

(a) Describe **two** methods of protection against the use of key loggers. [4]

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(b) Describe **two** characteristics of a computer virus. [2]

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6.　(a)　Showing your workings, complete the table below, converting between denary, binary and hexadecimal numbers as necessary.　　[6]

Denary	Binary	Hexadecimal
104_{10}	01101000_2	68_{16}
	01001101_2	$4D_{16}$
28_{10}		$1C_{16}$
147_{10}	10010011_2	

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　　(b)　(i) Showing your workings, add 01011101_2 and 00010011_2.　　[2]

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(ii) Using an example of binary addition, explain the concept of overflow.　[4]

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(c) Perform arithmetic shifts on the numbers below and state the effect of each of these operations.

(i) Arithmetic shift left by one place on 01011110_2. [2]

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(ii) Arithmetic shift right by two places on 00111100_2. [2]

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7. Three resources managed by an operating system are output devices, the backing store and Central Processing Unit (CPU).

Describe the role of the operating system when managing **each** of these resources.

[3]

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8. Sound sampling is used in the digital storage of sound.
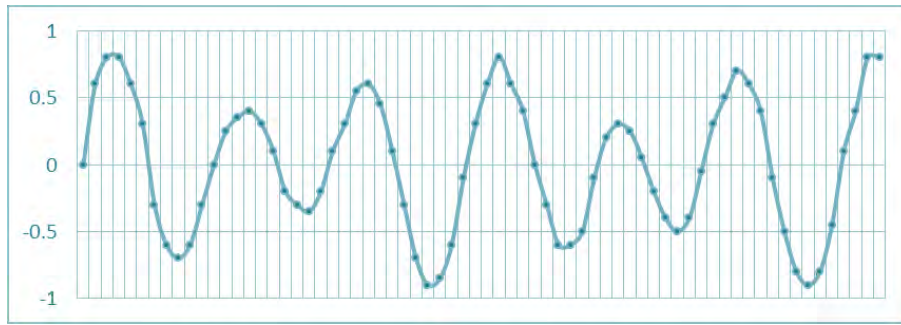
(a) Explain the process of sound sampling. [3]

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(b) Describe how sound samples are stored. [2]

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(c) Give **two** examples of metadata stored in sound files. [2]

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(d)   A lossy algorithm is used to compress a sound file whose original file size was 540 KB.

      (i)   Describe how a lossy algorithm would compress the sound file.   [2]

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      (ii)   Following compression, the sound file size is reduced to 54 KB. Calculate the compression ratio.   [2]

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9. TCP/IP is a protocol used for communication between computers when transmitting data over networks.

(a) Complete the diagram below, which shows the typical contents of a TCP/IP packet. [3]

…………………………	The destination address
Reassembly data / packet order number	
Other tracking information	
………………….……….	………………….……….
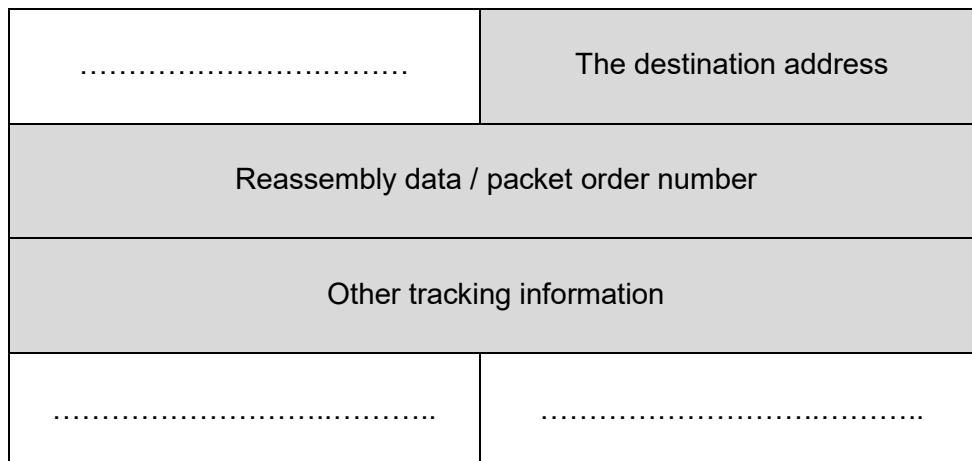
(b) State the name of each layer in the TCP/IP 5-layer model. [5]

Layer 5: …..………………………………………………

Layer 4: …..………………………………………………

Layer 3: …..………………………………………………

Layer 2: …..………………………………………………

Layer 1: …..………………………………………………

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10. (a) (i) Complete the following truth table. [4]

A	B	$\overline{B}$	$A.B$	$A.\overline{B}$	$B + (A.\overline{B})$
1	1				
1	0				
0	1				
0	0				

(ii) Use this truth table to simplify the expression. [1]

$$B + (A.\overline{B})$$

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(b) (i) Using the following identities:

$$P.1 = P$$

$$P.Q + P.R = P.(Q + R)$$

$$P + \overline{P} = 1$$

simplify the Boolean expression: [3]

$$X = A.B + A.\overline{B}$$

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(ii)   Draw a truth table for the expression: [4]

$$X = A.B + A.\overline{B}$$

11.   Explain how a domain name is used to access a web site using Domain Name
       System (DNS) servers.   [6]

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12. A large organisation stores confidential data about its customers on its network.

Describe the dangers that can arise from the use of networks and discuss the importance of network security, giving suitable security preventions for the organisation. [10]

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END OF PAPER