AQA

AS
COMPUTER SCIENCE

Paper 2 Additional Questions

These questions focus primarily on topics that were not covered by the AQA AS and A-level Computing specifications, introduced in 2009. It is hoped that teachers will find questions on these new topics to be particularly useful.

Many example questions on topics that are common to the new and old specifications can be found on past papers for COMP1, 2 and 3 on our website. Past papers that are more than three years old can be accessed via e-AQA.

This document contains additional questions; it is not intended to be treated as a complete paper.

The questions do not provide balance coverage of the specification or the assessment objectives in the same way that a fully live paper would do.

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Answer **all** questions in the spaces provided.

0 1 $\mathbb{R}$ denotes the set of real numbers. A real number can either be rational or irrational.

0 1 . 1 Describe the set of rational numbers.

[2 marks]

0 1 . 2 Explain why all integers are rational numbers.

[1 mark]

3

0 2 . 1 What is the binary equivalent of the decimal number 102_{10}?

[1 mark]

0 2 . 2 What is the hexadecimal equivalent of the decimal number 87_{10}?
Show your working.

[2 marks]

0 2 . 3 Provide an example of where we continue to use hexadecimal notation to represent data in computing and explain why we do not use binary.

[2 marks]

0 2 . 4 A computer represents numbers using 8-bit two's complement binary.

Using this representation perform the calculation showing all your working:

[2 marks]

00001001_2
00000011_2 x

Answer:

Question 2 continues on the next page

A number is to be represented in binary using 6 bits and twos complement.

0 2 . 5 What is the largest possible positive number that can be represented using this representation.

[1 mark]

0 2 . 6 Explain the difference between a kibibyte and a kilobyte.

[1 mark]

9

0 3 The ASCII binary code for character a is 1100001_2

0 3 . 1 If the ASCII character has been received during a transmission, with the most significant (leftmost) bit being used as a parity bit and the odd parity system in use, explain whether or not the character has been received correctly and how you have determined this.

[2 marks]

0 3 . 2 A system uses majority voting to send ASCII characters from one device to another. The receiver obtains the following for the transmission of one ASCII character

000 010 011 111 110 000 010 011

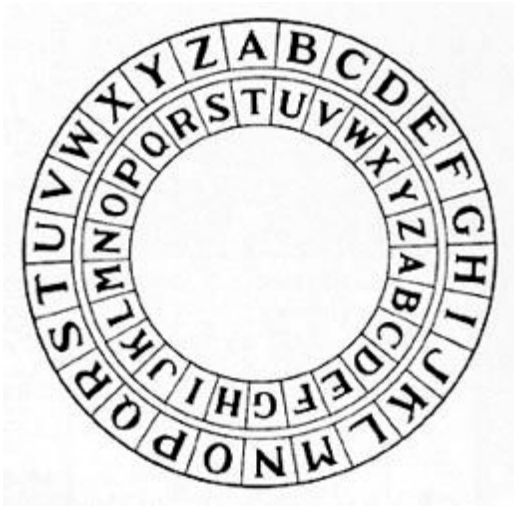
Determine the 8 bits that the receiver should use to represent the transmitted ASCII character.

[1 mark]

3

0 4 **Figure 1** shows a message being encrypted using a Caesar cipher.

Figure 1



Plaintext: MONKEY

↓

Ciphertext: FHGDXR

0 4 . 1 Encrypt the plaintext "COMPUTING" using the Caesar cipher with the settings shown in **Figure 1**.

[1 mark]

0 4 . 2 Decrypt the ciphertext "IRMAHG" using the Caesar cipher with the settings shown in **Figure 1**.

[1 mark]

0 4 . 3 Using the Vernam cipher method, the plaintext "SOS" is to be encrypted. "S" will be encoded using 8-bit ASCII as 01010011 and "O" as 01001111.

The key 10111001 00110101 00011010 will be used to perform the encryption.

Perform this encryption, showing how you have worked out what the ciphertext would be from the plaintext.

[3 marks]

5

0 5 A screen contains black text on a solid white background. One line of the screen might be represented as follows with W representing white pixel and B representing a black pixel.

WWWWWWBBBWWWWWWWWWWWWBBBBBBWBBBWWWW

0 5 . 1 Explain what the term pixel means.

[1 mark]

A compression technique is applied to the line of data and results in the following:

6W3B12W6B1W3B4W

0 5 . 2 State what data compression algorithm has been applied.

[1 mark]

Another data compression technique is JPEG, which is a lossy compression algorithm.

0 5 . 3 Explain what is meant by lossy compression.

[1 mark]

A JPEG file contains data about the pixels that form the image as well as metadata.

0 5 . 4 Provide **two** examples of information that might be contained within the metadata for an image.

[2 marks]

5

0 6 There are four types of system software. The operating system is one type.

Name the other **three** types, and describe the role of all **four** types. Use examples to illustrate your descriptions.

[6 marks]

6

0 7 A group of developers are creating a new social networking site for science students that will allow users worldwide to discuss current topics and post messages to each other. The site will be available over the Internet.

Discuss the ethical, legal and cultural issues that the developers will face when setting up and running the service.

[9 marks]

0 8 There are many system design issues that affect processor performance and the use of multiple cores and cache memory are two of these.

Name and explain **two** more system hardware decisions that will effect processor performance and describe all **four** effects. Use examples to illustrate your description.

[6 marks]

END OF QUESTIONS