Worksheet CH1-Information Representation 20191107

Q1

1 **(a)** Each of the following bytes represents an integer in two's complement form.

State the denary value.

(i) `0111 0111` Denary ..... [1]

(ii) `1000 1000` Denary ..... [1]

(iii) Express the following integer in two's complement form.

`-17`

[1]

(iv) State in denary, the range of integer values that it is possible to represent in two's complement integers using a single byte.

Lowest value .....

Highest value ..... [1]

(b) **(i)** Convert the following denary integer into Binary Coded Decimal (BCD).

`653`

.....[1]

(ii) A 3-digit BCD representation has been incorrectly copied. It is shown as:

0	1	0	0	1	1	1	0	0	0	1	0

State how you can recognise that this is not a valid BCD representation.

.....

.....[1]

(iii) Describe a practical application where BCD is used.

.....

.....[1]

Q2

8 **(a)** Six computer graphics terms and seven descriptions are shown below.

Draw a line to link each term to its correct description.

Term	Description
Bitmap graphic	Measured in dots per inch (dpi); this value determines the amount of detail an image has
Image file header	Picture element
Image resolution	Image made up of rows and columns of picture elements
Pixel	Image made up of drawing objects. The properties of each object determine its shape and appearance.
Screen resolution	Specifies the image size, number of colours, and other data needed to display the image data
Vector graphic	Number of samples taken per second to represent some event in a digital format
	Value quoted for a monitor specification, such as 1024 × 768. The larger the numbers, the more picture elements will be displayed.

[6]

2 A logo is designed as a bitmap image.

(a) Describe what is meant by a **bitmap image**.

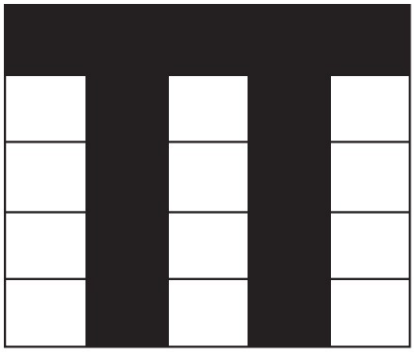
.....

.....

.....

.....[2]

(b) A black and white bitmap image is shown.



(i) Explain how a computer can store this bitmap image.

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.....[2]

(ii) The image is compressed before it is attached to an email.

Explain how run-length encoding (RLE) will compress the image.

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.....[2]

(c) The finished logo is 500 pixels by 1000 pixels and uses 35 different colours.

Estimate the file size for the logo. Give your answer in kilobytes. Show your working.

Working .....

.....

.....

.....

.....

Answer .....

[4]

(d) The logo is redesigned as a vector graphic.

State **two** benefits of a vector graphic compared to a bitmap image. Give a reason for each benefit.

Benefit 1 .....

.....

Reason 1 .....

.....

Benefit 2 .....

.....

Reason 2 .....

.....

[4]

Q3

2 **(a)** Sound can be represented in a computer in a digital format.

(i) Give the definition of the term sampling.

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.....

.....[1]

(ii) Give **one** reason why 16-bit sampling is used in an audio compact disc (CD).

.....

.....[1]

(iii) Explain what is meant by the term sampling resolution.

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.....

.....

.....[2]

(iv) Give **one** benefit and **one** drawback of using a higher sampling resolution.

Benefit .....

.....

Drawback .....

.....[2]

(b) Describe **two** typical features found in software for editing sound files.

1 .....

.....

2 .....

.....[2]

(c) Explain the difference between *lossless* and *lossy* data compression techniques.

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.....

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.....

.....[3]

Q4

2 **(a)** When recording a video, state what is meant by frame rate.

.....

.....[1]

(b) Video streaming can use either interlaced encoding or progressive encoding.

Describe what is meant by the following terms.

Interlaced encoding

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.....

.....

.....

Progressive encoding

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.....

.....

.....[4]

(c) **(i)** Name the video terms described below:

Description	Term
Pixels in two video frames have the same value in the same location. There is duplication of data between frames.	.....
A sequence of pixels in a single video frame have the same value.	.....

[2]

(ii) Give **one** file technique that could be applied when either of the two features, described in **part (c)(i)**, are present.

.....

.....[1]