

1 (a) (i) Convert the binary number into hexadecimal.

101100111010

..... [1]

(ii) Convert the denary number into Binary Coded Decimal (BCD).

108

..... [1]

(iii) Convert the 12-bit two’s complement binary integer into denary.

Show your working.

111110111100

Working
.....
.....
.....

Denary value

[2]

(b) (i) The following binary addition is performed using 8-bit registers.

Complete the calculation using binary addition.

1 0 1 1 0 0 1 1

+ 0 1 1 1 1 0 0 0

[1]

(ii) Name and describe the error that can occur when binary addition is performed.

[2]

2 (a) Data in a computer system is represented in binary.

Put **one** tick (✓) in each row to identify the minimum number of bits used to store each example of data.

Example of data	Number of bits						
	4	8	16	24	32	64	128
the hexadecimal value F139							
16 000 000 unique amplitude values							
an IPv4 address							
256 unique colours							
an IPv6 address							
the denary value 65 000							

[3]

(b) Convert the denary number −108 into a 12-bit two’s complement binary number.

..... [1]

(c) A three-place arithmetic shift to the right is performed on the following two’s complement negative integer.

Show the result of this arithmetic shift.

10010011

..... [1]

(d) Convert the following positive binary integer into hexadecimal.

1110001100111011

..... [1]

2 (a) Convert the denary integer 558 into 12-bit binary and hexadecimal.

Binary
Hexadecimal [2]

(b) (i) Convert the two’s complement binary integer 11100010 into denary.

.....
.....
..... [1]

(ii) Write the smallest and the largest two’s complement binary integers that can be represented in 8 bits.

Smallest
Largest [2]

(c) Give one application where Binary Coded Decimal (BCD) is used and justify its use.

Application
Justification
..... [2]

6 A computer system stores text, images and sound.

(a) A character set is used to represent characters in a computer.

Identify **and** describe **one** character set.

Character set

Description

..... [2]

(b) The colour of each pixel in a bitmapped image is represented by 8 bits.

(i) State the largest number of different colours that can be represented by 8 bits.

..... [1]

(ii) State **one** drawback of increasing the number of bits that represents each pixel in the bitmap image.

..... [1]

(iii) A bitmap image can be compressed using lossy compression.

Explain the reasons why lossy compression is often suitable for a bitmap image.

..... [2]

(c) (i) Explain how an analogue sound wave is converted into digital data.

[2]

(ii) Describe **one** method of compressing a sound file using lossy compression.

[2]

8 (a) Convert the hexadecimal number 1FAB into denary.

Working
.....
.....

Denary value [1]

(b) Explain how to convert the two's complement integer 10011111 into denary. Give the denary value after conversion.

Explanation
.....
.....
.....
.....

Denary value [3]

(c) Describe the difference between a right logical binary shift and a right arithmetic binary shift.

.....
.....
.....
..... [2]

7 Complete the binary addition. Show your working.

1 0 0 1 1 1 1 0
0 1 1 0 0 0 0 1
+ 0 0 0 1 1 0 0 1

7 A computer stores binary data.

(a) Tick (✓) **one** box only to identify the **largest** file size.

- ☐ 3300 kibibytes
- ☐ 0.3 megabytes
- ☐ 3 mebibytes
- ☐ 3300 kilobytes

[1]

(b) Subtract the denary number 10 from the denary number 100 using binary subtraction.

Show your working.

Working

.....

.....

.....

.....

.....

Answer

[3]

(c) Convert the hexadecimal number C0F into denary.

Show your working.

Working

.....

.....

Answer

[2]