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]

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

Working .....

.....

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Denary value ..... [1]

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

Explanation .....

.....

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.....

.....

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.

$$\begin{array}{r} 1\,0\,0\,1\,1\,1\,1\,0 \\ 0\,1\,1\,0\,0\,0\,0\,1 \\ +\,0\,0\,0\,1\,1\,0\,0\,1 \\ \hline \end{array}$$

[3]

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]