Unit 1.1 Number Systems

1. **(a) Four** denary to 8-bit binary conversions are given.

Tick (√) to show if each denary to 8-bit binary conversion is **Correct** or **Incorrect**.

Denary	Binary Conversion	Correct (√)	ncorrect (√)
145	10010001		
179	10110101		
11	00010011		
100	01100010		

[4]

(b) Convert the **12-bit** binary number into hexadecimal.

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

....[3]

2. A long-distance running race uses an electronic counter that counts each competitor who finishes the race.

The count is stored as binary in a **12-bit** register.

A denary value of the count is displayed on a screen above the finish line.

(i) The screen currently displays:

0	0	3	9

State the binary value that is currently stored to display the count shown.

....

.... [2]

(ii) More competitors cross the finish line and the screen now displays:

0	3	5	0

State the binary value that is currently stored to display the count shown.

....

.... [2]

(iii) At the end of the race the binary value stored is:

011011000111

Give the denary value that would be displayed on the screen at the end of the race.

Show your working.

....

....

....

....[2]

3. Hexadecimal is used for MAC addresses

(a) Part of a MAC address is given:

97 – 5C – E1

Each pair of digits is stored as binary in an 8-bit register.

Show what the binary register stores for each pair of the given digits.

97 | | | | | | | | | |

5C | | | | | | | | | |

E1 | | | | | | | | | |

(b) Give **two** other examples where hexadecimal can be used.

Example 1 ....

....

Example 2 ....

....[2]

4. Victoria is building a website for her cake design business.

She uses the hexadecimal colour code **#D2E3F5** as the background colour for her website. The colour code is stored in two 12-bit binary registers.

Show how the code would be stored in the registers

D2E	1	1	0	1	0	0	1	0	1	1	1	0

3F5	0	0	1	1	1	1	1	1	0	1	0	1

5. An electronic guessing game compares denary integer values input by a user with pre-stored values. The pre-stored values are held in 10-bit binary format.

(a) Convert the binary values in the table to denary.

Binary	Denary
0001001110	
0110110111	
1000000001	

[3]

(b) When planning the game, the designer decided to use hexadecimal notation to represent the binary values.

Explain why the designer used hexadecimal notation.

....

....

....

....[2]

(c) State the hexadecimal equivalent of the binary value 1010110101

....[3]

6. An 8-bit binary register contains the value:

0	0	1	1	0	1	0	0

(a) Convert the binary value to denary.

....

....[1]

(b) The contents of the register shifted one place to the right would give the result:

0	0	0	1	1	0	1	0

The contents of the register shown at the start of question 4 are shifted two places to the

left. Show the contents of the register after this shift has taken place.

[1]

(c) State the effect this shift has on the denary value in **part (a)**.

.... [1]