Unit 1.1 Number Systems

1. **(a)** Convert the denary number 107 to binary.

   ....[1]

   (b) Represent the denary number 300 as it would be stored in a 12-bit binary register.

   .... [2]

   (c) Convert the denary number 179 to hexadecimal.

   ....[2]

2. Six binary or hexadecimal numbers and **six** denary conversions are given

(a) Draw a line to connect each binary or hexadecimal number to the correct denary conversion.

Binary or hexadecimal	Denary
01001011	75
4E	78
11011010	157
10011101	167
A7	25
19	218

[5]

(b) Hexadecimal is often used by computer programmers to represent binary values.

Explain why computer programmers may choose to use hexadecimal.

....

....

....[2]

3. Computers use a character set to convert text into binary.

One character set that can be used is ASCII.

Each letter in ASCII can also be represented as a denary value.

(a) The word BUS has the denary values

B	U	S
66	85	83

Convert the denary values into 8-bit binary.

66 | | | | | | | | |
|---|---|---|---|---|---|---|---|

85 | | | | | | | | |
|---|---|---|---|---|---|---|---|

83 | | | | | | | | |
|---|---|---|---|---|---|---|---|

[3]

(b) Each letter in ASCII can also be represented as a hexadecimal value.

The word KEY has the 8-bit binary values:

K	E	Y
01001011	01000101	01011001

(i) Convert the three 8-bit binary values into hexadecimal.

01001011 ....

01000101 ....

01011001 ....

[3]

(ii) Give **three** other uses of hexadecimal notation in computer science.

1 ....

2 ....

3 .... [3]

(iii) State **two** benefits of using hexadecimal notation to represent binary values.

Benefit 1 ....

 ....

Benefit 2 ....

....
[2]

4. The MAC address of a device is represented using hexadecimal.

A section of a MAC address is shown. Each pair of hexadecimal digits is stored using 8-bit binary.

(a) Complete the table to show the 8-bit binary equivalents for the section of MAC address. The first number has already been converted.

6A	FF	08	93
01101010			

[3]

(b) Explain why data is stored as binary in computers.

....

....

....

....[2]

5. A register in a computer contains binary digits

0	0	1	1	0	1	1	1

(a) The contents of the register could represent a binary integer. Convert the binary integer to denary and hexadecimal.

Denary

....

Hexadecimal

....[2]

(b) The contents of the register could represent the ASCII value for the single denary digit '7'.

Write down the ASCII value for '9' in binary, denary and hexadecimal.

Binary ....

Denary ....

Hexadecimal ....[3]

6. (a) Identify **three** uses for hexadecimal and for each one give an example of hexadecimal that matches the use.

Use 1 ....

....

Example ....

Use 2 ....

....

Example ....

Use 3 ....

....

Example ....[6]

(b) Explain why hexadecimal is used to represent binary numbers.

....

....

....

....

....

....[2]