INTRODUCTION TO COMPUTER ORGANIZATION AND ARCHITECTURE

**TUTORIAL 2**

Q1. Convert the following numbers from the given base to the other two bases listed in the table. Use the Radix Divide and Multiply for the conversions from decimal numbers. Stop at the 4th digit for the fractional part (chopping) for binary and 2 digits for hexadecimal:

Decimal Binary Hexadecimal

4017.312 ? ?

? 101.1112 ?

? ? F3C7.A16

Q2. Convert the following real numbers from decimal to binary and octal using the Sum of Weight. Stop at 3 digits.

1. 27.625
2. 37.9

Q3. Perform the following operations:

1. 1011011012 + 100110112
2. 2AB316 + 35DC16
3. 11012 x 1012
4. 0.518 + 0.178
5. 2AB316 x 5DC16

Q4 The range of different number systems:

* 1. How many of numbers can be represented by the following words?
     1. hexadecimal, 3 digits
     2. binary, 8 digits
  2. How many digits are required to represent the *unsigned* number 3023410 in the following number system in
     1. Hexadecimal
     2. Binary
  3. Based on the solutions to (b), make a conclusion about the relationship between the base and the number of digits given a fixed range of a number system.

**PRACTICE QUESTIONS**

Q1. Perform the base conversions for (i), (ii) and (iii) as shown below. Stop when the fractional part is 8 digits in length for binary and 2 digits for hexadecimal.

|  |  |  |  |
| --- | --- | --- | --- |
| Binary | Decimal | Octal | Hexadecimal |
| (i) | 267.288 | (ii) | (iii) |

Q2. Convert the following numbers to decimal:

* 1. 4E16
  2. 3D716
  3. 3D7016
  4. 0.1012
  5. 0.01012
  6. 101.1114
  7. 2.AF16

Q3. Convert the following hexadecimal numbers to binary:

1. 4F6A16
2. 990216
3. A3AB16
4. 100016

Q4. Convert the following decimal numbers to binary:

a) 133

b) 65

c) 189

Q5. Change 0.110101012 to base 8, base 16 and base 10

**Complement Numbers**

Q1. Add 2 numbers below using 9’s complement method.

* 1. 41 -25
  2. 35 – 15
  3. 297 –136
  4. 48- 13

Q2 Add 2 numbers below using 10’s complement method.

1. 451 – 325
2. 1237 -1115
3. 313 – 287
4. 34- 12

Q3. Assume an 8-bit binary system:

* 1. Obtain the sign-and-magnitude, 1’s and 2’s complements of the following decimal numbers:

25, -37, -12

* 1. Perform the following operations in binary using 1’s and 2’s complements.
     1. (-37) 25 + (-12)

Q4. Use the “number complement” approach to do the following. You have to show every step of your work.

1. 458882 – 1388 (6 digit 9’s complement)
2. 1101111 – 1001110 (7 digit 2’s complement)
3. 488 – 266 (3 digit 10’s complement)