**IFT103 – OS Architecture**

**Assignment 3a – Number System**

**Instructions: Answer the following question in a Word or PDF file. Hand written answers are acceptable but must be legible. SHOW YOUR WORK OR YOU WILL GET ONLY PARTIAL CREDIT.**

1. (5 points) Convert the following binary number to decimal number :

a) 100001111

1=28

0=27

0=26

0=25

0=24

1=23

1=22

1=21

1=20

= (1 x 28)(0x27)(0x26)(0x25)(0x24)(1x23)(1x22)(1x21)(1x20)

= 256 + 8 + 4 + 2 + 1

**= 271**

b) 11111110011

1=210

1=29

1=28

1=27

1=26

1=25

1=24

0=23

0=22

1=21

1=20

= (1 x 210)(1x29)(1x28)(1x27)(1x26)(1x25)(1x24)(0x23)(0x22) (1x21)(1x20)

= 1024+512+256+128+64+32+16+2+1

**= 2035**

1. (10 points) Convert the hexadecimal number DEADBEEF to binary (Show your work!).

123456789ABCDEF

A=10

B=11

C=12

D=13

E=14

F=15

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| D | E | A | D | B | E | E | F |
| 13 | 14 | 10 | 13 | 11 | 14 | 14 | 15 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 13 | 14 | 10 | 13 | 11 | 14 | 14 | 15 |
| 8,4,2,1 | 8,4,2,1 | 8,4,2,1 | 8,4,2,1 | 8,4,2,1 | 8,4,2,1 | 8,4,2,1 | 8,4,2,1 |
| 1,1,0,1 | 1,1,1,0 | 1,0,1,0 | 1,1,0,1 | 1,0,1,1 | 1,1,1,0 | 1,1,1,0 | 1,1,1,1 |
| 1101 | 1110 | 1010 | 1101 | 1011 | 1110 | 1110 | 1111 |

**DEADBEEF Binary = 11011110101011011011111011101111**

1. (5 points) What decimal value does the 8-bit binary number 10011110 represent?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |

= (1 x 27)(0x26)(0x25)(1x24)(1x23)(1x22)(1x21)(0x20)

= 128+16+8+4+2

=158

1. (5 points) What decimal value does the 8-bit binary number 10110100 represent?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |

= (1 x 27)(0x26)(1x25)(1x24)(0x23)(1x22)(0x21)(0x20)

= 128+32+16+4

=180

1. (5 points) Define ASCII: is the most common character encoding format for text data in computers and on the internet.
2. (5 points) Convert the following decimal values to binary.
   1. 65 = 1000 0001
      1. 65/2 = 32 remainder 1
      2. 32/2= 16 remainder 0
      3. 16/2= 8 remainder 0
      4. 8/2= 4 remainder 0
      5. 4/2= 2 remainder 0
      6. 2/2= 0 remainder 0
      7. 1/2= 0 remainder 1
   2. 45 = 101101
      1. 45/2 = 22 remainder 1
      2. 22/2= 11 remainder 0
      3. 11/2= 5 remainder 1
      4. 5/2= 2 remainder 1
      5. 2/2= 0 remainder 0
      6. 1/2= 0 remainder 1
   3. 255 = 1111 1111
      * 1. 255/2 = 127, remainder is 1
        2. 127/2 = 63, remainder is 1
        3. 63/2 = 31, remainder is 1
        4. 31/2 = 15, remainder is 1
        5. 15/2 = 7, remainder is 1
        6. 7/2 = 3, remainder is 1
        7. 3/2 = 1, remainder is 1
        8. 1/2 = 0, remainder is 1
3. (5 points) Using an online ASCII Conversion Chart, provide the 8-bit binary of your first name.  
   01011001 01100101 01101110 01100111 01101011 01101111 01101110 01100111
4. (5 points) Convert 85 to Hexadecimal.

85 = 55

86/16 = 5 remainder 5

5/16 = 0 remainder 5

1. (5 points) Provide a brief definition and the base for each of the following:
   1. Binary - binary is a system where numbers and values are expressed 0 or 1
   2. Hexadecimal - relating to or using a system of numerical notation that has 16 rather than 10 as its base
   3. Decimal - a fraction whose denominator is a power of ten and whose numerator is expressed by figures placed to the right of a decimal point.