1. **The method of successive divisions/multiplications**

* **it is recommended for *h < b*, *b* –source base and *h*- destination base.**
* **calculations in the source base**

**Integer part**: **successive divisions** by the destination base (***h***) are performed

* the process of successive divisions ends when 0 is obtained as quotient.
* the remainders, in the reverse order, are the digits of the new representation in base *h.*

**Fractional part**: **successive multiplications** by the destination base (***h***) are performed

* the fractional part is multiplied by ***b*** obtaining a number with an integer part and a fractional one;
* we continue with the multiplication of this new fractional part,...
* the process of the successive multiplications continues until one of the following conditions is satisfied:

a) the fractional part becomes 0;

b) an established number of digits of the fractional part were calculated;

c) periodicity is obtained.

* the integer parts, in the order of obtaining them during the multiplications process, are the digits of the fractional part in the destination representation.

**Example 6: with a precision of 2 digits at the fractional part in the destination representation**

**105 , 26 (8) =234 , 13 (5)**

**Conversion of the integer part: 105(8)=234(5)**

**Calculations in base 8**

|  |  |  |
| --- | --- | --- |
| 105(8)| 5(8)  / | 015  10  / 35    / 4 | 15(8) | 5 (8)  / | 2  3  /    / | 2(8) | 5(8)  / | 0  / 2 |

**Calculations:**

**10(8)=1\*8+0=8,8%5=3,8/5=1**

**35(8)=3\*8+5=29,29%5=4,29/5=5**

**15(8)=1\*8+5=13,13%5=3,13/5=2**

**Conversion of the fractional part: 0,26(8)=0,13(5)**

**Calculations in base 8**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **c** | **1** |  | **3** | **0** |  |  |  |  | **3** | **0** |  |  |  |  |  |  |  |
|  | **0** | **,** | **2** | **6** | **\*** |  | **0** | **,** | **5** | **6** | **\*** |  |  |  | **\*** |  |  |
|  |  |  |  | **5** |  |  |  |  |  | **5** |  |  |  |  |  |  |  |
|  | **1** | **,** | **5** | **6** |  |  | **3** | **,** | **4** | **6** |  |  |  |  |  |  |  |

**Calculations:**

**6(8)\*5(8)+0(8)=6(10)\*5(10)=30(10), 30/8=3, 30%8=6**

**2(8)\*5(8)+3(8)=13, 13/8=1,13%8=5**

**5(8)\*5(8)+3= 28,28/8=3,28%8=4**

**Example 7: with a precision of 2 digits at the fractional part in the destination representation**

**7B , D5  (16) = 234 , 55 (7)**

**Conversion of the integer part 7B(16)=**

**Calculations in base 16**

|  |  |  |
| --- | --- | --- |
| 7B(16) | 7(16)  / B | 1 1  4  /    / | 11(16) | 7 (16)  / | 2  3  /    / | 2 | 7(16)  / | 0  2  /    /    /  r |

**Calculations:**

**11(16)= 1\*16 + 1 = 17, 17/7= 2, 17%7=3**

**Conversion of the fractional part 0,D5(16)=0,55(7)**

**Calculations in base 16**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **c** | **5** |  | **2** | **0** |  | **5** |  | **1** | **0** |  |  |  |  |  |  |
|  | **0** | **,** | **D** | **5** | **\*** | **0** | **,** | **D** | **3** | **\*** |  |  |  | **\*** |  |
|  |  |  |  | **7** |  |  |  |  | **7** |  |  |  |  |  |  |
|  | **5** | **,** | **D** | **3** |  | **5** | **,** | **C** | **5** |  |  |  |  |  |  |

**Calculations:**

**5(16)\*7(16)+0=35 ; 35 div 16 = 2 ; 35 mod 16 = 3**

**D(16)\* 7(16)+2(16) = 13\*7+2 = 93 ; 93 div 16 = 5; 93 mod 16 = 13 = D(16)**

**3(16)\*7(16)+0= 21; 21 div 16 = 1; 21 mod 16=5**

**D(16)\* 7(16)+1(16) = 92;**