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**

**165 , 43 (8) = 432, 23 (5)**

**Conversion of the integer part: 165(8)=432(5)**

**Calculations in base 8!!!**

|  |  |  |
| --- | --- | --- |
| 165 (8) | 5 (8)  / | 27  16  / 45    / 2 | 27 (8)| 5 (8)  / | 4  3  /    / | 4| 5  / | 0  4  / |

**Calculations:**

**16(8)=1\*8+6=14, 14/5=2 , 14%5=4**

**45(8)=4\*8+5=32+5=37, 37/5=7, 37%5=2**

**27(8)=2\*8+7=16+7=23, 23/5=4, 23%5=3**

**Conversion of the fractional part 0,43(8)=0,23(5)**

**Calculations in base 8**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **c** | **2** |  | **1** | **0** |  | **3** |  | **4** | **0** |  |  |  |  |  |  |
|  | **0** | **,** | **4** | **3** | **\*** | **0** | **,** | **5** | **7** | **\*** |  |  |  | **\*** |  |
|  |  |  |  | **5** |  |  |  |  | **5** |  |  |  |  |  |  |
|  | **2** | **,** | **5** | **7** |  | **3** | **,** | **5** | **3** |  |  |  |  |  |  |

**Calculations:**

**0(8)+3(8)\*5(8) =0+3\*5= 15, 15/8=1 , 15%8 = 7**

**1(8)+4(8)\*5(8) = 1+4\*5 = 21, 21/8=2, 21%8 = 5**

**0(8)+5(8)\*7(8) = 35, 35/8 = 4, 35%8 = 3**

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

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

**91 , A1 (16) = 265 , 42(7)**

**Conversion of the integer part: 91(16)=265(7)**

**Calculations in base 16**

|  |  |  |
| --- | --- | --- |
| 91(16) | 7(16)  7 14(16)  / |  21  /  5 | 14(16) | 7(16)  / | 2 (16)  6 / | 2(16) | 7(16)  / | 0(16)  2  / |

**Calculations:**

**9/7 = 1 ; 9 % 7 = 2**

**21(16)=2\*16+1 = 33 ; 33/7=4 ; 33%7=5**

**14(16)=1\*16+4 = 20 ; 20/7 = 2 ; 20%7 = 6**

**Conversion of the fractional part: 0,A1(16)=0,42(7)**

**Calculations in base 16!!**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **c** | **4** |  | **0** | **0** |  | **2** | **3** | **0** |  |  |  |  |  |  |  |
|  | **0** | **,** | **A** | **1** | **\*** | **0** | **,6** | **7** |  | **\*** | **0,** | **0,** |  | **\*** |  |
|  |  |  |  | **7** |  |  |  | **7** |  |  |  |  |  |  |  |
|  | **4** | **,** | **6** | **7** |  | **2** | **,D** | **1** |  |  |  |  |  |  |  |

**Calculations:**

**0(16)+1(16)\*7(16)=7, 7/16=0, 7%16=7**

**0(16)+A(16)\*7(16)=0+70=70, 70/16=4, 70%16=6**

**0(16)+7(16)\*7(16)=49, 49/16=3, 49%16=1**

**3(16)+6(16)\*7(16)=45, 45/16=2, 45%16=13=D**