Name: Muhammad Fahad ID: 0014(BM)

Mohammad Ali Jinnah University Introduction to Computing. Section BM

Workbook - Number Systems

1. Convert the following, where possible

a. (1010111)2 → (?)10

Solution

= 1 x 26 + 0 x 25+1 x 24+0 x 23 +1 x 22 +1 x 21+1 x 20

= 1 x 64 + 0 x 32 + 1 x 16 + 0 x 8 + 1 x 4 + 1 x 2 + 1 x 1

= 64+0+16+0+4+2+1

**87**

Ans

b. (001011)2 → (?)8

Solution

= 0 x 25 + 0 x 24+1 x 23 + 0 x 22 +1 x 21 +1 x 20

= 0 x 32 + 0 x 16 + 1 x 8 + 0 x 4 + 1 x 2 + 1 x 1

= 0 + 0 + 8 + 0 + 2 + 1

**13**

Ans

c. (11111101)2 → (?)16

Solution

= 1111 = 8+4+2+1 = 15 = F

= 1101 = 8+4+0+1 = 13 = D

**FD**

Ans

d. (49F) 16 → (?)10

Solution

= 4 x 162 +9 x 161 +15 x 160 {F = 15}

= 4 x 256 + 9 x 16 + 15 x 1

= 1024 + 144 + 15

**1183**

Ans

e. (2E8)16 → (?)8

Solution

**First hex → binary**

= 2 = 0 + 2 + 0 = 10

= E = 14 = 8 + 4 + 2 + 0 = 1110

= 8 = 8 + 0 + 0 + 0 = 1000

= 1011101000

**Then binary → octal**

=  **(1011101000)2 → (?)8**

= 001 = 0 + 0 + 1 = 1

= 011 = 0 + 2 + 1 = 3

= 101 = 4 + 0 + 1 = 5

= 000 = 0+0+0 = 0

**1350**

Ans

F. (99A) 16 → (?)2

Solution

= 9 = 8 + 0 + 0 + 1 = 1001

= 9 = 8 + 0 + 0 + 1 = 1001

= A = 10 = 8 + 0 + 2 + 0 = 1010

**100110011010**

Ans

g. (298)8 → (?)2

Solution

= Not possible

h. (C65A) 16 → (?)8

Solution

**First hex → binary**

= C = 12 = 8 + 4 + 0 + 0 =1100

= 6 = 0 + 4 + 2 + 0 = 0110

= 5 = 0 + 4 + 0 + 1 = 0101

= A = 10 = 8 + 0 + 2 + 0 = 1010

= 1100011001011010

**Then binary → octal**

= 001 = 0 + 0 + 1 = 1

= 100 = 4 + 0 + 0 = 4

= 011 = 0 + 2 + 1 = 3

= 001 = 0 + 0 + 1 = 1

= 011 = 0 + 2 + 1 = 3

= 010 = 0 + 2 + 0 = 2

**143132** Ans

I. (359)10 → (?)8

Solution

|  |  |  |  |
| --- | --- | --- | --- |
| **Division By 8** | **Quotient** | **Remainder** | **Decimal** |
| 359 / 8 | 352 | 7 | 7 |
| 352/ 8 | 44 | 4 | 4 |
| 44/ 8 | 5 | 5 | 5 |

= **547** Ans

j. (729F) 16 → (?)8

Solution

= **First hex → binary**

= 7 = 0 + 4 + 2 + 1 = 111

= 2 = 0 + 0 + 2 + 0 = 0010

= 9 = 8 + 0 + 0 + 1 = 1001

= F = 15 = 8 + 4 + 2 + 1 = 1111

= 111001010011111

**Then binary→ octal**

= 111 = 4 + 2 + 1 = 7

= 001 = 0 + 0 + 1 = 1

= 010 = 0 + 2 + 0 = 2

= 011 = 0 + 2 + 1 = 3

= 111 = 4 + 2 + 1 = 7

**71237** Ans

k. (6371)8 → (?)10

Solution

= (6×83) + (3×82) + (7×81) + (1×80)   
= 3072+192+56+1  
= **3321** Ans

l. (CB56)16 → (?)2

Solution

= C = 12 = 8 + 4 + 0 + 0 = 1100

= B = 11 = 8 + 0 + 2 + 1 = 1011

= 5 = 0 + 4 + 0 + 1 = 0101

= 6 = 0 + 4 + 2 + 0 = 0110

**= 0110010110111100** Ans

m. (5497)10 → (?)2

Solution

|  |  |  |  |
| --- | --- | --- | --- |
| **Division By 2** | **Quotient** | **Remainder** | **Binary** |
| 5497 / 2 | 2748 | 1 | 1 |
| 2820 / 2 | 1374 | 0 | 0 |
| 1410 / 2 | 687 | 0 | 0 |
| 705 / 2 | 343 | 1 | 1 |
| 352 / 2 | 171 | 1 | 1 |
| 176 / 2 | 85 | 1 | 1 |
| 88 / 2 | 42 | 1 | 1 |
| 22 / 2 | 21 | 1 | 1 |
| 11 / 2 | 10 | 1 | 1 |
| 5 / 2 | 5 | 1 | 1 |
| 2 | 1 | 0 | 0 |

**= 1010101111001** Ans

n. (1210)2 → (?)10

Solution

**= Not possible**

o. (752)8 → (?)2

Solution

= 7 = 4 + 2 + 1 = 111

= 5 = 4 + 0 + 1 = 101

= 2 = 0 + 2 + 0 = 010

**= 010101111** Ans

p. (5641)8 → (?)16

Solution

|  |  |  |  |
| --- | --- | --- | --- |
| **Division By 2** | **Quotient** | **Remainder** | **Binary** |
| 5641 / 2 | 2820 | 1 | 1 |
| 2820 / 2 | 1410 | 0 | 0 |
| 1410 / 2 | 705 | 0 | 0 |
| 705 / 2 | 352 | 0 | 0 |
| 352 / 2 | 176 | 1 | 1 |
| 176 / 2 | 88 | 0 | 0 |
| 88 / 2 | 44 | 0 | 0 |
| 22 / 2 | 11 | 0 | 0 |
| 11 / 2 | 5 | 1 | 1 |
| 5 / 2 | 2 | 1 | 1 |
| 2 | 1 | 0 | 0 |

= 101110100001

= 1011 = 8 + 0 + 2 + 1 = 11 = B

= 1010 = 8 + 0 + 4 + 0 = 12 = C

= 0001 = 0 + 0 + 0 + 1 = 1

**= BC1** Ans

q. (111100101010)2 → (?)16

Solution

= 1010 = 8 + 0 + 2 + 0 = 10 = A

= 0010 = 0 + 0 + 2 + 0 = 2

= 1111 = 8 + 4 + 2 + 1 = 15 = F

**= F2A** Ans

r. (1010111)2 → (?)10

Solution

= (1 × 2⁶) + (0 × 2⁵) + (1 × 2⁴) + (0 × 2³) + (1 × 2²) + (1 × 2¹) + (1 × 2⁰)

= 1 x 64 + 0 + 1 x 16 + 0 + 1 x 4 + 1 x 2 + 1 x 1

**= 87** Ans

s. (568)10 → (?)16

Solution

= 568 / 16 - 8

= 35 / 16 - 3

= 2

**= 238** Ans

t. (2543)10 → (?)8

Solution

= 2543 / 8 - 7

= 317 / 8 - 5

= 39 / 8 - 7

= 4

**= 4757** Ans