QUESTION #1

Transform 389\(_{(10)}\) to the binary format (in binary number) and the hex-decimal format. Show all intermediate work.

**Note:** \(X\(_{(10)}\)\) means ‘\(X\)’ is in the decimal, \(X\(_{(16)}\)\) means ‘\(X\)’ is in the hexa-decimal, and \(X\(_{(2)}\)\) means ‘\(X\)’ is in the binary.

**Binary:**

\[389\(_{(10)}\) = 256\(_{(10)}\) + 128\(_{(10)}\) + 4\(_{(10)}\) + 1\(_{(10)}\) = 2^8 + 2^7 + 2^2 + 2^0\]

\[= 110000101\(_{(2)}\)\]

**Hexa-Decimal:**

\[389\(_{(10)}\) = 256\(_{(10)}\) + 128\(_{(10)}\) + 5\(_{(10)}\) = (256 \times 1) + (16 \times 8) + (1 \times 5)\]

\[= (16^2 \times 1\(_{(16)}\)) + (16^1 \times 8\(_{(16)}\)) + (16^0 \times 5\(_{(16)}\))\]

\[= 185\(_{(16)}\)\]

QUESTION #2

Transform A2D\(_{(16)}\) to the decimal format (in decimal number) and the binary format (binary number). Show all intermediate work.

**Decimal:**

\[A2D\(_{(16)}\) = (16^2 \times A\(_{(10)}\)) + (16^1 \times 2\(_{(10)}\)) + (16^0 \times D\(_{(10)}\))\]

\[= (256\(_{(10)}\) \times 10\(_{(10)}\)) + (16\(_{(10)}\) \times 2\(_{(10)}\)) + (1\(_{(10)}\) \times 13\(_{(10)}\))\]

\[= 2560\(_{(10)}\) + 32\(_{(10)}\) + 13\(_{(10)}\)\]

\[= 2605\(_{(10)}\)\]

**Binary:**

\[2605\(_{(10)}\) = 2048\(_{(10)}\) + 512\(_{(10)}\) + 32\(_{(10)}\) + 8\(_{(10)}\) + 4\(_{(10)}\) + 1\(_{(10)}\)\]
\[ 2^{11} + 2^9 + 2^5 + 2^3 + 2^2 + 2^0 \]
\[ = 101001001101_{(2)} \]

**QUESTION #3**

Transform 1010101001\(_{(2)}\) to the decimal format (in decimal number) and the hex-decimal format. Show all intermediate work.

**Decimal:**

\[ 1010101001_{(2)} = 2^{10} + 2^8 + 2^7 + 2^5 + 2^3 + 2^0 \]
\[ = 1024_{(10)} + 256_{(10)} + 128_{(10)} + 32_{(10)} + 8_{(10)} + 1_{(10)} \]
\[ = 1449_{(10)} \]

**Hexa-Decimal:**

\[ 1449_{(10)} = (256 \times 5) + (16 \times 10) + (1 \times 9) \]
\[ = (16^2 \times 5_{(16)}) + (16^1 \times D_{(16)}) + (16^0 \times 9_{(16)}) \]
\[ = 5D9_{(16)} \]

**QUESTION #4**

How many digits are needed for 1,024\(_{(10)}\) in binary and hex-decimal numbers? Show all intermediate work.

**Binary:** 1024\(_{(10)}\) = 10000000000\(_{(2)}\)
(11 digits)

**Hexa-Decimal:** 1024\(_{(10)}\) = (256 \times 4) + (16 \times 0) + (1 \times 0)
\[ = 400_{(16)} \]
(3 digits)