EX: Find the sum of the following hexadecimal numbers and express the answer in binary and Binary Coded Decimal (BCD).

A3 + 7F

SOL'N: Hexadecimal is base 16. A = 10 and F = 15 decimal. Convert to decimal:

$$A3 + 7F = A \cdot 16 + 3 \cdot 1 \; + \; 7 \cdot 16 + F \cdot 1 = 10 \cdot 16 + 3 \cdot 1 \; + \; 7 \cdot 16 + 15 \cdot 1$$

or

$$A3 + 7F = 160 + 3 + 112 + 15 = 290 \text{ decimal}$$

For BCD we encode each digit with four bits of binary:

290 = 0010 1001 0000 BCD

For binary, we divide by two repeatedly and write down remainders (r).

$$\frac{290}{2} = 145r0$$
$$\frac{145}{2} = 72r1$$
$$\frac{72}{2} = 36r0$$
$$\frac{36}{2} = 18r0$$
$$\frac{18}{2} = 9r0$$
$$\frac{9}{2} = 4r1$$
$$\frac{4}{2} = 2r0$$
$$\frac{2}{2} = 1r0$$
$$\frac{1}{2} = 0r1$$

We read off remainders from bottom to top

1 0010 0010 binary