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a) Entry into S-boxes : 2A0B3A140815

- In Binary : 0010 1010 0000 1011 0011 1010 0001 0100 1101 1000 0001 0101
- Dividing it into 8 blocks of 6-bit :

001010 100000 101100 111010 000101 001101 100000 010101

- Now each 6-bit block is given to the corresponding S-Box to convert it into 4-bit block. Each S-Box has 4 rows & 16 columns. Value at row i, col j gives 4-bit block.

To get row i, col j for a 6-bit block 'abcdef', row i = decimal value(af), col j = decimal Value(bcde)

1) 001010 → row = 00 = 0
col = 0101 = 5 → S1 [0][5] = 215 → 1111

2) 100000 → row = 10 = 2
col = 0000 = 0 → S2 [2][0] = 0 → 0000

3) 101100 → row = 10 = 2
col = 0110 = 6 → S3 [2][6] = 3 → 0011

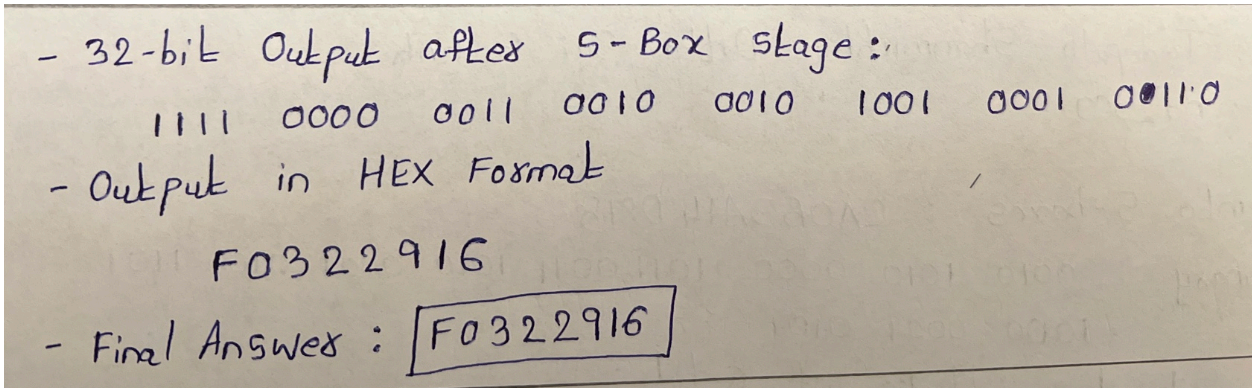
4) 111010 → row = 10 = 2
col = 1101 = 13 → S4 [2][13] = 2 → 0010

5) 000101 → row = 01 = 1
col = 0010 = 2 → S5 [1][2] = 2 → 0010

6) 001101 → row = 01 = 1
col = 0110 = 6 → S6 [1][6] = 9 → 1001

7) 100000 → row = 10 = 2
col = 0000 = 0 → S7 [2][0] = 1 → 0001

8) 010101 → row = 01 = 1
col = 1010 = 10 → S8 [1][10] = 6 → 0110



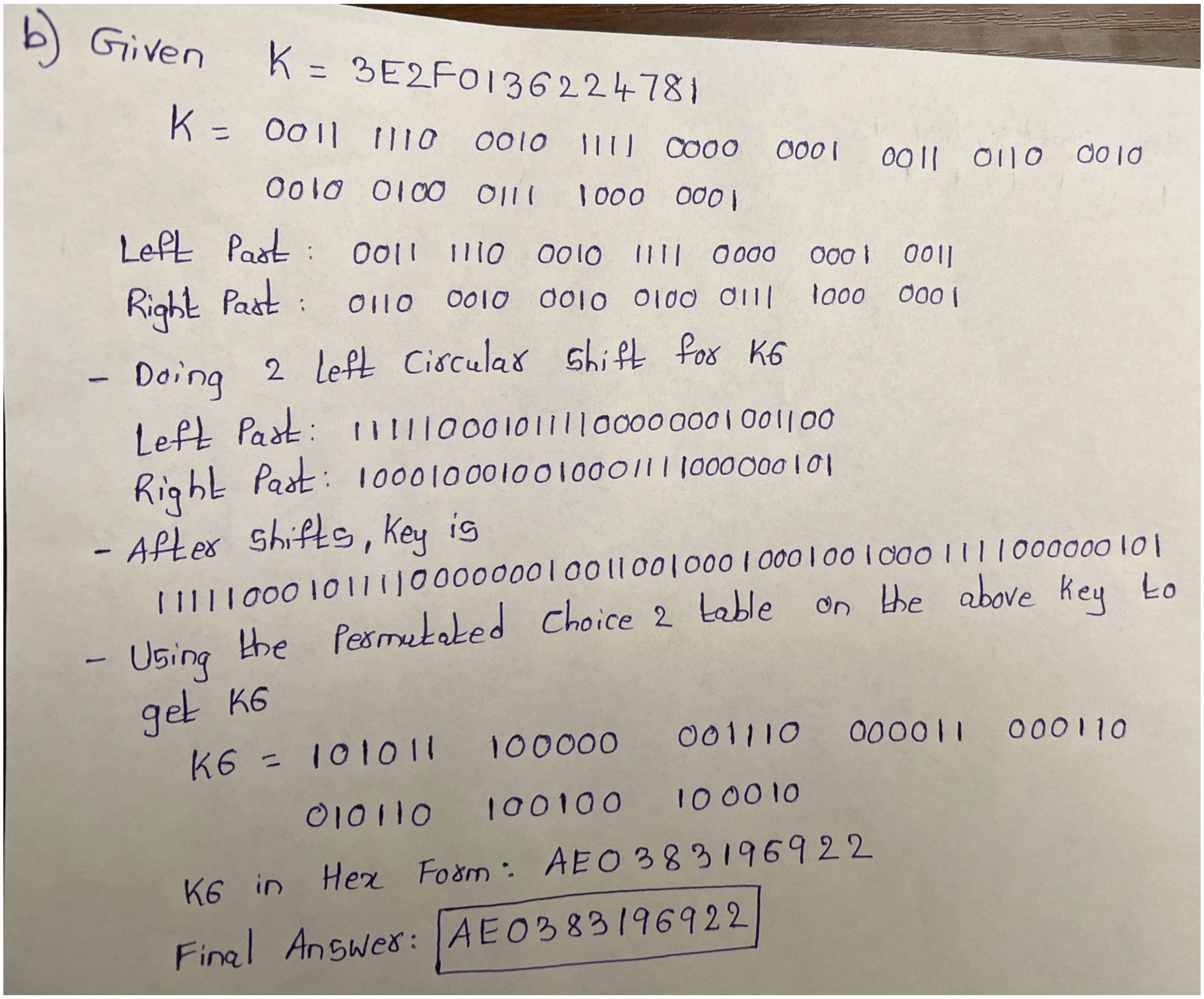
- 32-bit Output after S-Box stage:

  1111 0000 0011 0010 0010 1001 0001 00110

- Output in HEX Format

  F0322916

- Final Answer : $\boxed{F0322916}$



b) Given K = 3E2F0136224781

K = 0011 1110 0010 1111 0000 0001 0011 0110 0010
0010 0100 0111 1000 0001

Left Part : 0011 1110 0010 1111 0000 0001 0011
Right Part : 0110 0010 0010 0100 0111 1000 0001

- Doing 2 left Circular Shift for K6

  Left Part: 1111100010111110000000001001100
  Right Part: 1000100010010001111000000101

- After shifts, Key is
  111110001011111000000010011001000100010010001111000000101

- Using the Permutated Choice 2 table on the above key to get K6

  K6 = 101011 100000 001110 000011 000110
  010110 100100 100010

  K6 in Hex Form: AE0383196922

  Final Answer: $\boxed{AE0383196922}$