Hamming code

The Hamming code 101101101 is received .Correct it if any errors in the odd parity

length of Hamming = 9 bit $\Rightarrow 4+5 = 9$ bits

Parity bits $= 2^0, 2^1, 2^2, 2^3 \Rightarrow P_1, P_2, P_4, P_8$ - - -

Bit positions	9	8	7	6	5	4	3	2	1
Binary Designations	D_9	P_8	D_7	D_6	D_5	P_4	D_3	P_2	P_1
Binary Representation	1001	1000	0111	0110	0101	0100	0011	0010	0001
Received data	1	0	1	1	0	1	1	0	(1)
Correct Hamming code	1	0	1	1	0	1	1	0	0 ✓

Parity bit $P_1 = 1,3,5,7,9 \Rightarrow 1\,1\,0\,1\,1 \Rightarrow$ even $\Rightarrow P_1 = 1$ (LSB)

Parity bit $P_2 = 2,3,6,7 \Rightarrow 0\,1\,1\,1 \Rightarrow$ odd $\Rightarrow P_2 = 0$

Parity bit $P_4 = 4,5,6,7 \Rightarrow 1\,0\,1\,1 \Rightarrow$ odd $\Rightarrow P_4 = 0$

Parity bit $P_8 = 8,9 \Rightarrow 0\,1 \Rightarrow$ odd $\Rightarrow P_8 = 0$ (MSB)

$P_8\,P_4\,P_2\,P_1 \Rightarrow (0001)_2 \Rightarrow (1)_{10} \rightarrow$ first ✓

The Hamming code 1100111 is received .Correct it if any errors in the even parity .

Hamming code length = 7 bits

Bit positions	7	6	5	4	3	2	1
Binary Designations	D_7	D_6	D_5	P_4	D_3	P_2	P_1
Binary Representation	111	110	101	100	011	010	001
Received data	1	1	0	0	1	1	1
Correct Hamming code	1	1	0	0	1	1	0

$P_1 \Rightarrow 1, 3, 5, 7 \Rightarrow 1101 \Rightarrow$ odd $\Rightarrow$ To make even $P_1 = 1$

$P_2 \Rightarrow 2, 3, 6, 7 \Rightarrow 1111 =$ even $\Rightarrow P_2 = 0$

$P_4 = 4, 5, 6, 7 \Rightarrow 0011 \Rightarrow$ even $\Rightarrow P_4 = 0$

$P_4\ P_2\ P_1$

$0\ 0\ 1 \Rightarrow (1)_{10} \Rightarrow$ 1st position