

EXPERIMENT-4

Write a program for Hamming Code generation for error detection and correction.

Program

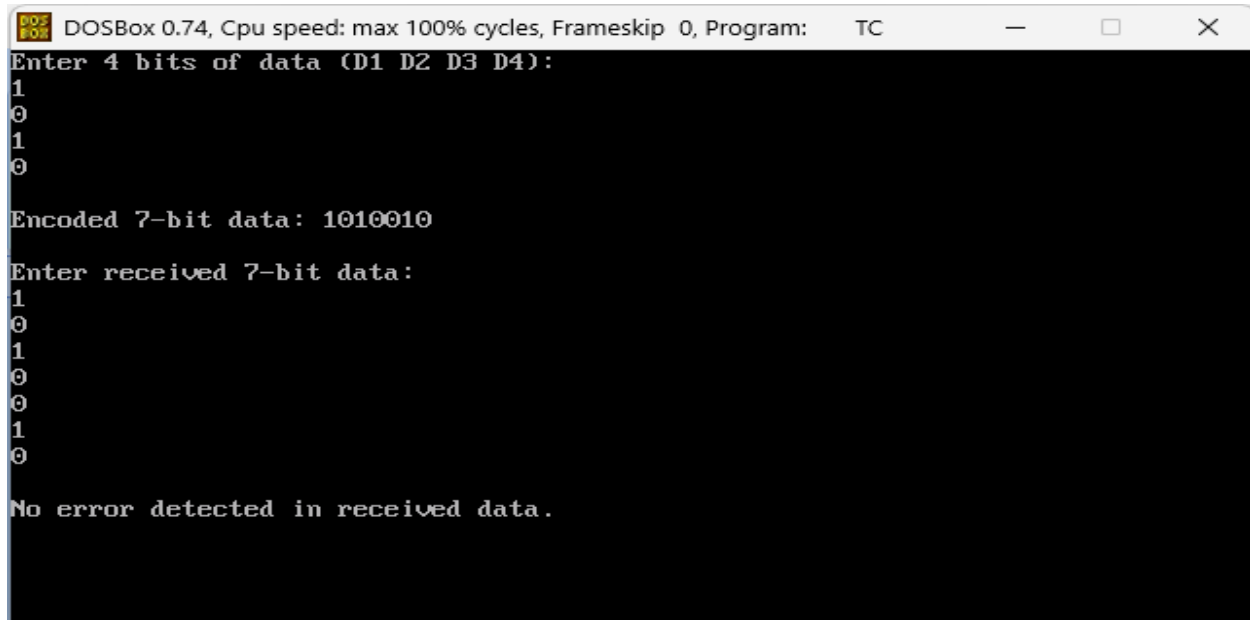
```
#include <stdio.h>
void main()
{
    int data[8];          // data[1] to data[7]
    int received[8];
    int r, r1, r2, r4, i;
    clrscr();
    printf("Enter 4 bits of data (D1 D2 D3 D4):\n");
    scanf("%d", &data[7]); // D1
    scanf("%d", &data[6]); // D2
    scanf("%d", &data[5]); // D3
    scanf("%d", &data[3]); // D4
    // Calculate parity bits (even parity)
    data[1] = data[3] ^ data[5] ^ data[7]; // P1
    data[2] = data[3] ^ data[6] ^ data[7]; // P2
    data[4] = data[5] ^ data[6] ^ data[7]; // P4
    printf("\nEncoded 7-bit data: ");
    for (i = 7; i >= 1; i--)
        printf("%d", data[i]);
    // Receiving data
    printf("\n\nEnter received 7-bit data:\n");
    for (i = 7; i >= 1; i--)
        scanf("%d", &received[i]);
    // Syndrome bits
    r1 = received[1] ^ received[3] ^ received[5] ^ received[7];
    r2 = received[2] ^ received[3] ^ received[6] ^ received[7];
    r4 = received[4] ^ received[5] ^ received[6] ^ received[7];
    r = r4 * 4 + r2 * 2 + r1 * 1;
    if (r == 0)
    {
        printf("\nNo error detected in received data.\n");
    }
    else
    {
        printf("\nError detected at position: %d\n", r);
        printf("Received data : ");
        for (i = 7; i >= 1; i--)
            printf("%d", received[i]);
        // Correct the error
    }
}
```

```

        received[r] = received[r] ^ 1;
        printf("\nCorrected data: ");
        for (i = 7; i >= 1; i--)
            printf("%d", received[i]);
        printf("\n");
    }
    getch();
}

```

Output 1:



```

DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter 4 bits of data (D1 D2 D3 D4):
1
0
1
0

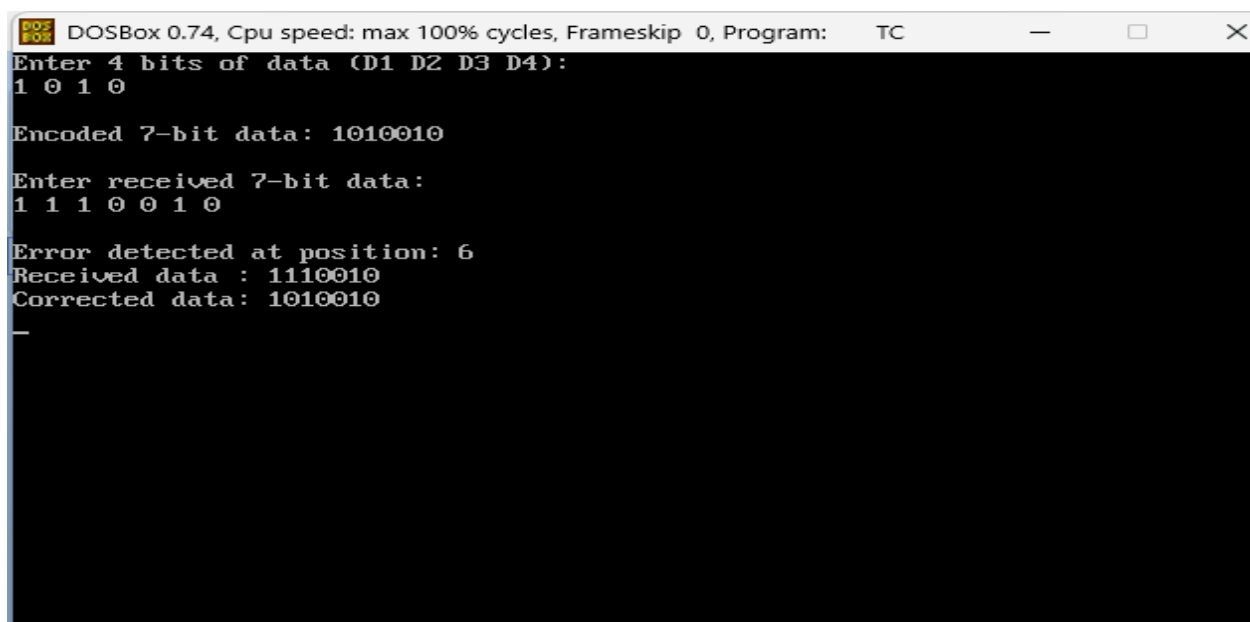
Encoded 7-bit data: 1010010

Enter received 7-bit data:
1
0
1
0
0
1
0

No error detected in received data.

```

Output 2:



```

DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter 4 bits of data (D1 D2 D3 D4):
1 0 1 0

Encoded 7-bit data: 1010010

Enter received 7-bit data:
1 1 1 0 0 1 0

Error detected at position: 6
Received data : 1110010
Corrected data: 1010010

```