

Task:2

Problem-02:

A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1 .

1. What is the actual bit string transmitted?
2. Suppose the third bit from the left is inverted during transmission. How will receiver detect this error?

```
#include <bits/stdc++.h>
using namespace std;

string findXor(string a, string b) {
    string result = "";
    for (int i = 1; i < b.length(); i++)
        result += (a[i] == b[i]) ? '0' : '1';
    return result;
}

string mod2div(string dividend, string divisor) {
    int pick = divisor.length();
    string tmp = dividend.substr(0, pick);
    while (pick < dividend.length()) {
        if (tmp[0] == '1')
            tmp = findXor(divisor, tmp) + dividend[pick];
        else
            tmp = findXor(string(pick, '0'), tmp) + dividend[pick];
        pick++;
    }
    if (tmp[0] == '1')
        tmp = findXor(divisor, tmp);
    else
        tmp = findXor(string(pick, '0'), tmp);
    return tmp;
}

string encodeData(string data, string key) {
    int n = key.length();
    string appended = data + string(n - 1, '0');
    string remainder = mod2div(appended, key);
    return data + remainder;
}

int receiver(string code, string key) {
    string remainder = mod2div(code, key);
    return remainder.find('1') == string::npos;
}

int main() {
```

```

string data = "10011101";
string key = "1001"; // x^3 + 1

cout << "Sender Side:\n";
string code = encodeData(data, key);
cout << "Data: " << data << "\n";
cout << "Key: " << key << "\n";
cout << "Transmitted (Encoded) Data: " << code << "\n\n";

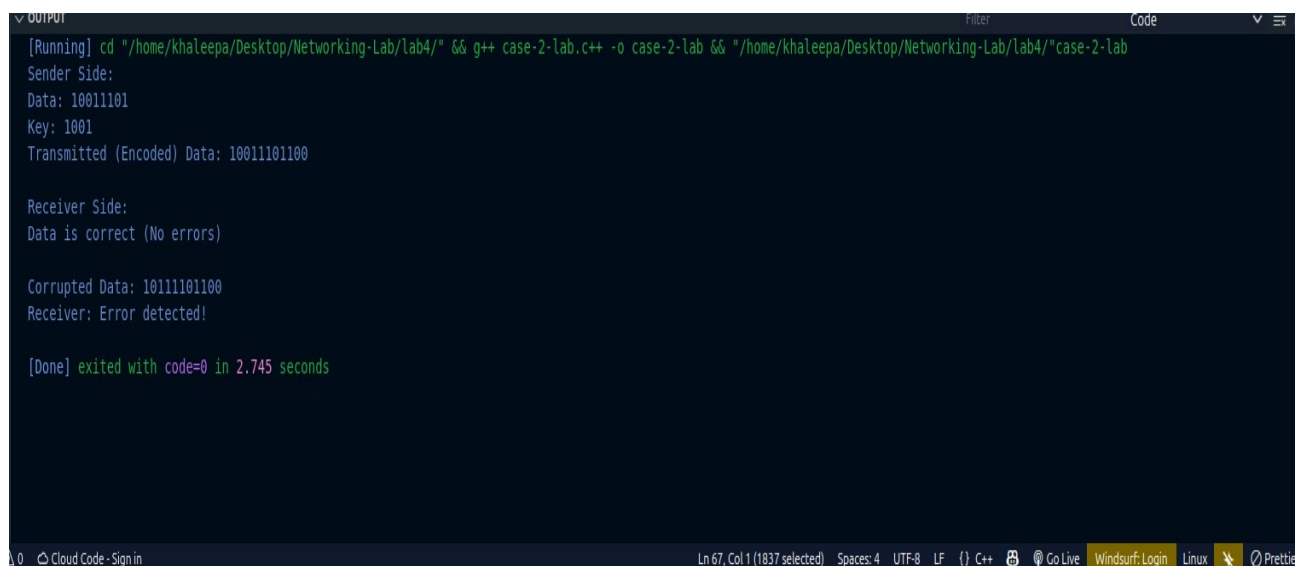
cout << "Receiver Side:\n";
if (receiver(code, key))
cout << "Data is correct (No errors)\n";
else
cout << "Data is incorrect (Error detected)\n";

// Simulate bit error (flip 3rd bit)
string corrupted = code;
corrupted[2] = (corrupted[2] == '1') ? '0' : '1';
cout << "\nCorrupted Data: " << corrupted << "\n";
if (receiver(corrupted, key))
cout << "Receiver: No error detected\n";
else
cout << "Receiver: Error detected!\n";

return 0;
}

```

Output



```

[Running] cd "/home/khaleepa/Desktop/Networking-Lab/lab4/" && g++ case-2-lab.cpp -o case-2-lab && "/home/khaleepa/Desktop/Networking-Lab/lab4/"case-2-lab
Sender Side:
Data: 10011101
Key: 1001
Transmitted (Encoded) Data: 10011101100

Receiver Side:
Data is correct (No errors)

Corrupted Data: 10111101100
Receiver: Error detected!

[Done] exited with code=0 in 2.745 seconds

```