MODERN OPERATING SYSTEM AND COMPUTER NETWORK

ASSIGNMENT -3

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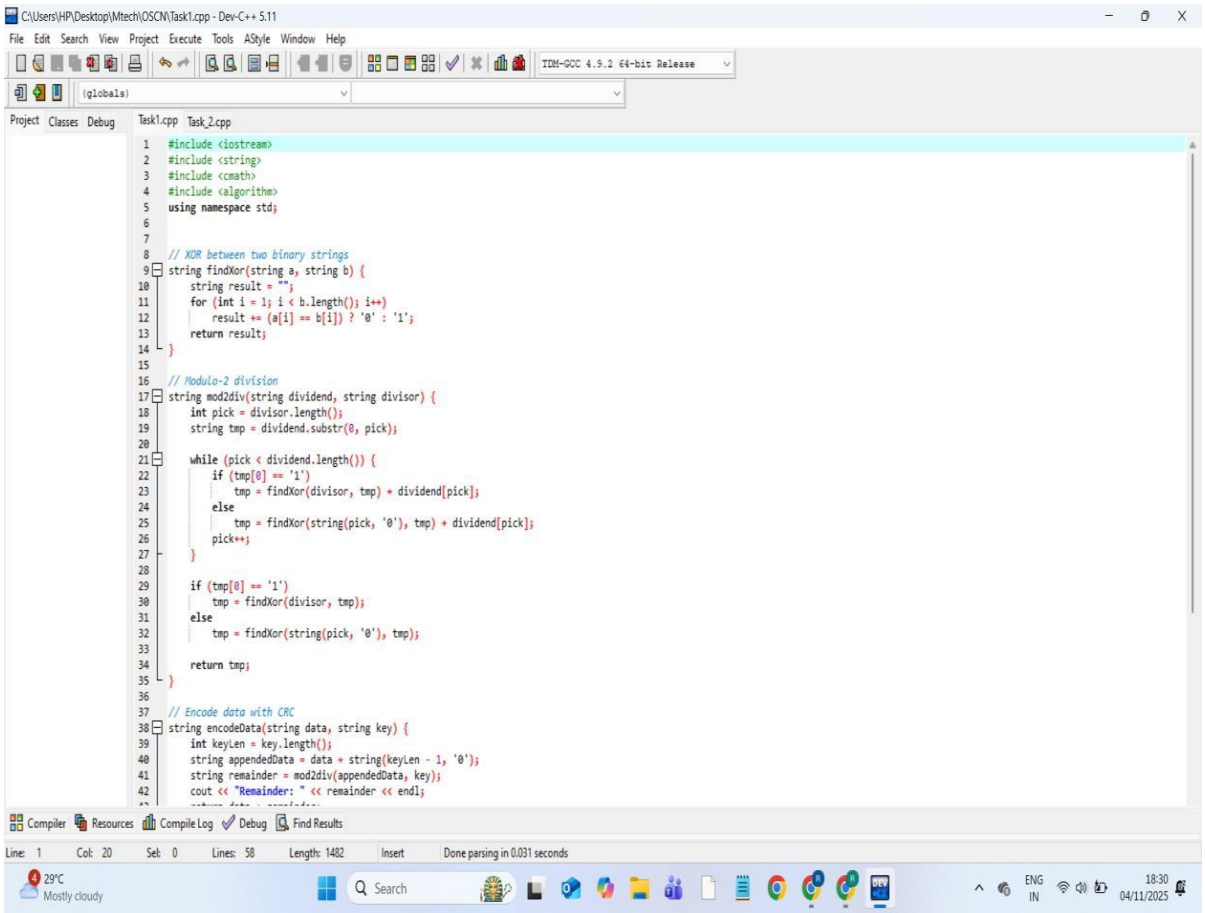
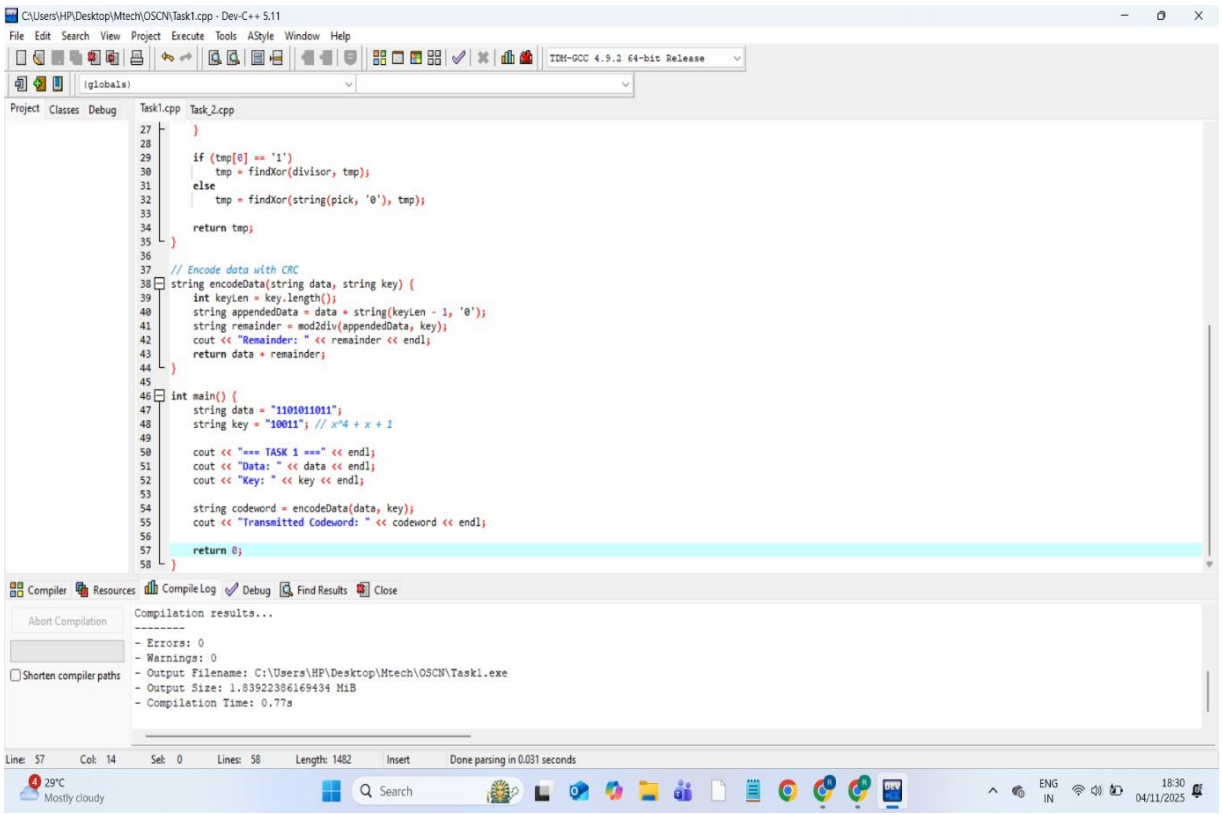
Task:1

Problem-01:

A bit stream 1101011011 is transmitted using the standard CRC method. The generator polynomial is x 4 +x+1. What is the actual bit string transmitted?

CODE AND COMPILATION RESULTS:





```
    }

    if (tmp[0] == '1')
        tmp = findXor(divisor, tmp);
    else
        tmp = findXor(string(pick, '0'), tmp);

    return tmp;
}

// Encode data with CRC
string encodeData(string data, string key) {
    int keyLen = key.length();
    string appendedData = data + string(keyLen - 1, '0');
    string remainder = mod2div(appendedData, key);
    cout << "Remainder: " << remainder << endl;
    return data + remainder;
}

int main() {
    string data = "1101011011";
    string key = "10011"; // x^4 + x + 1

    cout << "=== TASK 1 ===" << endl;
    cout << "Data: " << data << endl;
    cout << "Key: " << key << endl;

    string codeword = encodeData(data, key);
    cout << "Transmitted Codeword: " << codeword << endl;

    return 0;
}
```

```
Compilation results...
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- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\HP\Desktop\Mtech\OSCN\Task1.exe
- Output Size: 1.83922386169434 MiB
- Compilation Time: 0.77s
```
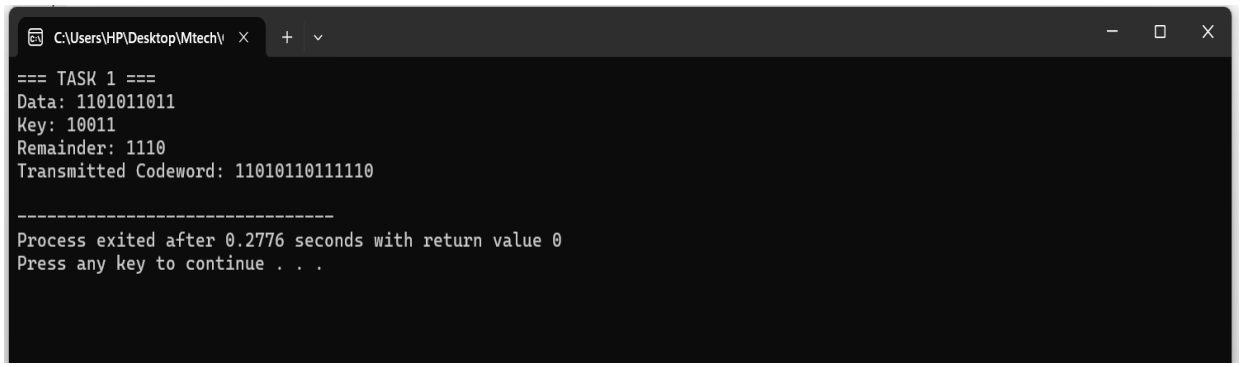

OUTPUT:



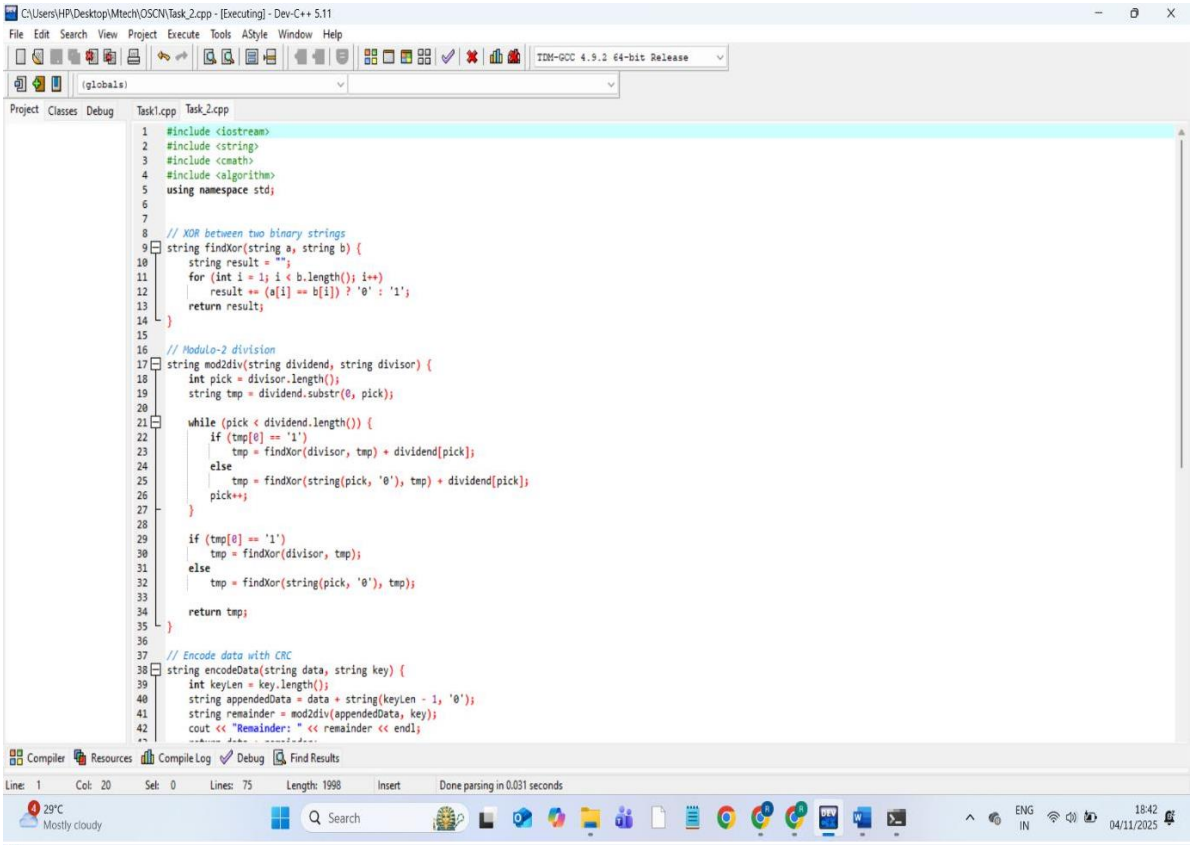
```
=== TASK 1 ===
Data: 1101011011
Key: 10011
Remainder: 1110
Transmitted Codeword: 11010110111110

--------------------------------
Process exited after 0.2776 seconds with return value 0
Press any key to continue . . .
```

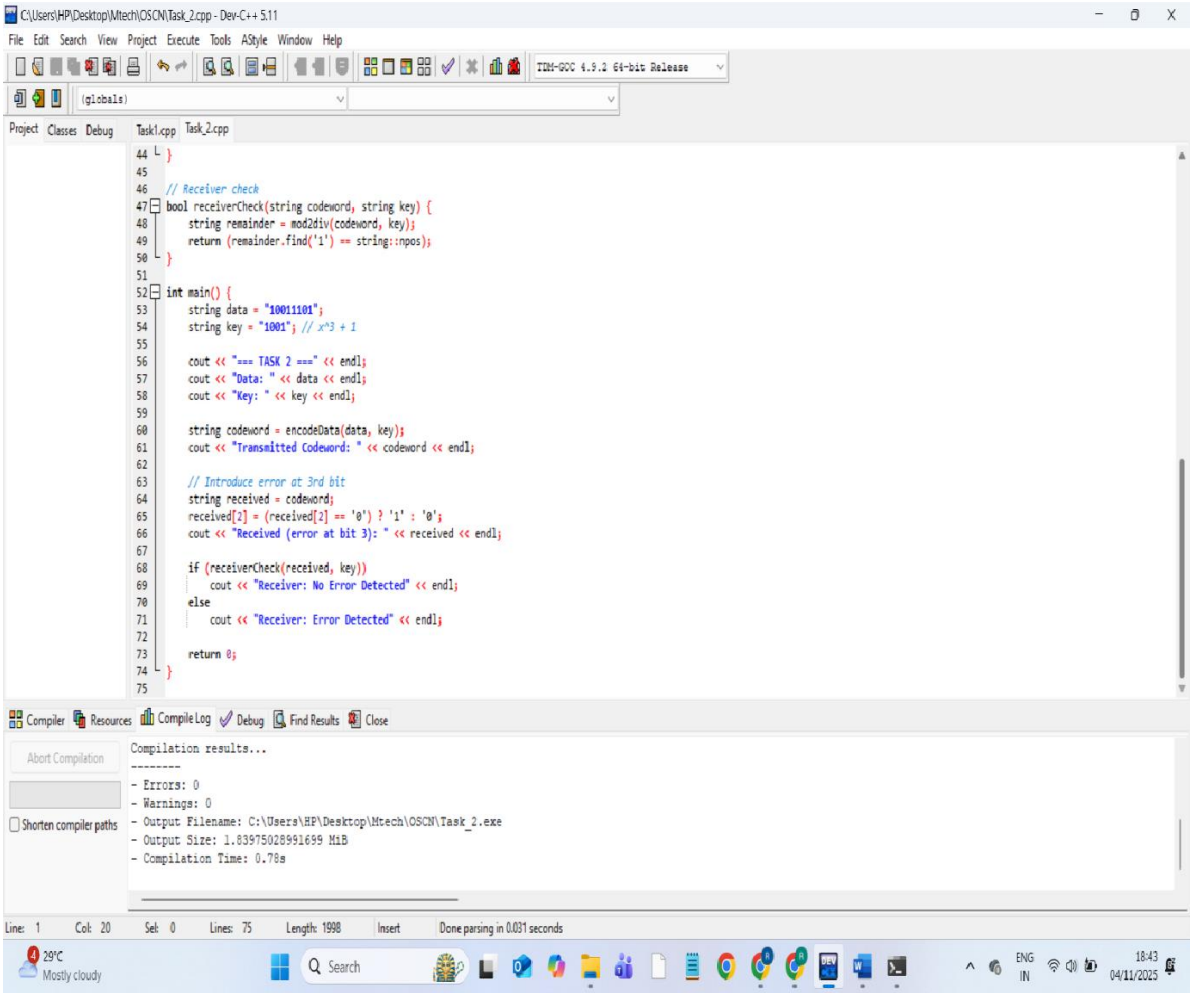
Task:2

Problem-02:

A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x3+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?

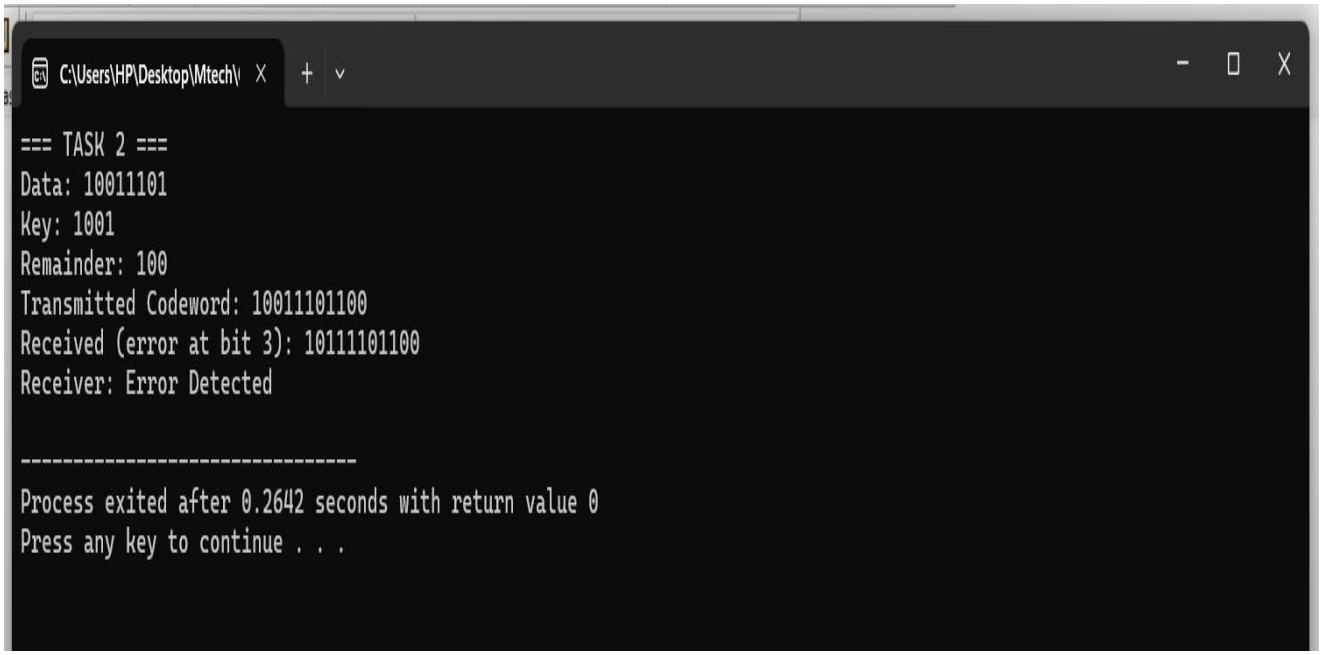
CODE AND COMPILATION RESULTS:


C:\Users\HP\Desktop\Mtech\OSCN\Task_2.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
Task1.cpp Task_2.cpp
#include <iostream>
#include <string>
#include <cmath>
#include <algorithm>
using namespace std;
// XOR between two binary strings
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;
}
// Modulo-2 division
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;
}
// Encode data with CRC
string encodeData(string data, string key) {
int keyLen = key.length();
string appendedData = data + string(keyLen - 1, '0');
string remainder = mod2div(appendedData, key);
cout << "Remainder: " << remainder << endl;
Compiler Resources Compile Log Debug Find Results
Line: 1 Col: 20 Sel: 0 Lines: 75 Length: 1998 Insert Done parsing in 0.031 seconds
29°C Mostly cloudy
Search
ENG IN
18:42 04/11/2025


C:\Users\HP\Desktop\Mtech\OSCN\Task_2.cpp - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
Task1.cpp Task_2.cpp
}
// Receiver check
bool receiverCheck(string codeword, string key) {
string remainder = mod2div(codeword, key);
return (remainder.find('1') == string::npos);
}
int main() {
string data = "10011101";
string key = "1001"; // x^3 + 1
cout << "=== TASK 2 ===" << endl;
cout << "Data: " << data << endl;
cout << "Key: " << key << endl;
string codeword = encodeData(data, key);
cout << "Transmitted Codeword: " << codeword << endl;
// Introduce error at 3rd bit
string received = codeword;
received[2] = (received[2] == '0') ? '1' : '0';
cout << "Received (error at bit 3): " << received << endl;
if (receiverCheck(received, key))
cout << "Receiver: No Error Detected" << endl;
else
cout << "Receiver: Error Detected" << endl;
return 0;
}
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Compilation results...

- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\HP\Desktop\Mtech\OSCN\Task_2.exe
- Output Size: 1.83975028991699 MiB
- Compilation Time: 0.78s
Line: 1 Col: 20 Sel: 0 Lines: 75 Length: 1998 Insert Done parsing in 0.031 seconds
29°C Mostly cloudy
Search
ENG IN
18:43 04/11/2025

OUTPUT:


C:\Users\HP\Desktop\Mtech\
=== TASK 2 ===
Data: 10011101
Key: 1001
Remainder: 100
Transmitted Codeword: 10011101100
Received (error at bit 3): 10111101100
Receiver: Error Detected

Process exited after 0.2642 seconds with return value 0
Press any key to continue . . .