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CN LAB 9

<u>AIM:</u> IMPLEMENTATION OF CRC ALGORITHM

OBSERVATION:

	Date: Page.
	Implementation of cre Algorithm (Polynomical)
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	Enter divisor: 1011
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	Enter received date > 110101
	Received Dota is Valid (No exercise detected)
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PROGRAM:

```
#include <iostream>
#include <string>
using namespace std;
// Function to perform XOR operation
string xorOperation(string dividend, string divisor) {
  string result = "";
  for (int i = 1; i < divisor.length(); i++) {
     result += (dividend[i] == divisor[i] ? '0' : '1');
  }
  return result;
// Function to perform binary division
string divideData(string data, string divisor) {
  string temp = data.substr(0, divisor.length());
  for (int i = divisor.length(); i <= data.length(); i++) {
     if (temp[0] == '1') {
       temp = xorOperation(temp, divisor);
     } else {
       temp = xorOperation(temp, string(divisor.length(), '0'));
     if (i < data.length()) {
       temp += data[i];
  return temp.substr(1); // Return the remainder
}
// Sender side: Generate transmitted data
string sender(string dataword, string divisor) {
  string paddedData = dataword + string(divisor.length() - 1, '0'); // Append zeros equal to
(degree of divisor - 1)
  string remainder = divideData(paddedData, divisor);
                                                                  // Calculate CRC
  return dataword + remainder;
                                                         // Concatenate dataword and CRC
remainder
```

```
}
// Receiver side: Verify received data
bool receiver(string receivedData, string divisor) {
  string remainder = divideData(receivedData, divisor);
  return remainder.find('1') == string::npos; // If remainder is all zeros, data is valid
}
int main() {
  string dataword, divisor;
  // Input dataword and divisor in binary form
  cout << "Enter the dataword (binary polynomial, e.g., 1101 for x^3 + x^2 + 1): ";
  cin >> dataword;
  cout << "Enter the divisor (binary polynomial, e.g., 1011 for x^3 + x + 1): ";
  cin >> divisor;
  // Sender Side
  string transmittedData = sender(dataword, divisor);
  cout << "\nTransmitted Data (Dataword + CRC): " << transmittedData << endl;
  // Receiver Side
  cout << "Enter the received data (binary polynomial): ";
  string receivedData;
  cin >> receivedData;
  if (receiver(receivedData, divisor)) {
     cout << "Received data is valid (No error detected)." << endl;
  } else {
     cout << "Received data contains errors." << endl;
  }
  return 0;
}
```

OUTPUT:

CASE 1 -> NO ERROR

Enter the dataword (binary polynomial, e.g., 1101 for $x^3 + x^2 + 1$): 1101 Enter the divisor (binary polynomial, e.g., 1011 for $x^3 + x + 1$): 1011

Transmitted Data (Dataword + CRC): 110101 Enter the received data (binary polynomial): 110101 Received data is valid (No error detected).

```
=== Code Execution Successful ===
=== Session Ended. Please Run the code again ===
```

CASE 2 -> ERROR

Enter the dataword (binary polynomial, e.g., 1101 for $x^3 + x^2 + 1$): 1101 Enter the divisor (binary polynomial, e.g., 1011 for $x^3 + x + 1$): 1011

Transmitted Data (Dataword + CRC): 110101 Enter the received data (binary polynomial): 110100 Received data contains errors.

=== Code Execution Successful ===