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Date of Performance:	
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Experiment No.:	04
Aim:	Error Detection and Correction Mechanism

AIM: Error Detection and Correction Mechanism

A. HAMMING CODE

CODE:

```
#include <stdio.h>
void main()
{
    int data[10];
    int dataatrec[10], c, c1, c2, c3, i;
    printf("Enter 4 bits of data one by one\n");
    scanf("%d", &data[0]);
    scanf("%d", &data[1]);
    scanf("%d", &data[2]);
    scanf("%d", &data[4]);
    // Calculation of even parity
    data[6] = data[0] ^ data[2] ^ data[4];
    data[5] = data[0] ^ data[1] ^ data[4];
    data[3] = data[0] ^ data[1] ^ data[2];
    printf("\nEncoded data is\n");
    for (i = 0; i < 7; i++)
        printf("%d", data[i]);
    printf("\n\nEnter received data bits one by one\n");
    for (i = 0; i < 7; i++)
        scanf("%d", &dataatrec[i]);
    c1 = dataatrec[6] ^ dataatrec[4] ^ dataatrec[2] ^ dataatrec[0];
    c2 = dataatrec[5] ^ dataatrec[4] ^ dataatrec[1] ^ dataatrec[0];
    c3 = dataatrec[3] ^ dataatrec[2] ^ dataatrec[1] ^ dataatrec[0];
    c = c3 * 4 + c2 * 2 + c1;

    if (c == 0)
    {
```

```
        printf("\nNo error while transmission of data\n");
    }
    else
    {
        printf("\nError on position %d", c);
        printf("\nData sent : ");
        for (i = 0; i < 7; i++)
            printf("%d", data[i]);
        printf("\nData received : ");
        for (i = 0; i < 7; i++)
            printf("%d", dataatrec[i]);
        printf("\nCorrect message is\n");
        if (dataatrec[7 - c] == 0)
            dataatrec[7 - c] = 1;
        else
            dataatrec[7 - c] = 0;
        for (i = 0; i < 7; i++)
        {
            printf("%d", dataatrec[i]);
        }
    }
}
```

OUTPUT:

```
cpptools-1.15.4-win32-x64\debugAdapters\bin\WindowsDebugLauncher.exe' '--stdin=Microsoft-MIEngine-I
n-4ttzbfvz.1xx' '--stdout=Microsoft-MIEngine-Out-fozdixs4.njn' '--stderr=Microsoft-MIEngine-Error-0
b5sp0oy.3tf' '--pid=Microsoft-MIEngine-Pid-11fgscgb.wvo' '--dbgExe=C:\msys64\mingw64\bin\gdb.exe' '
--interpreter=mi'
Enter 4 bits of data one by one
1
1
0
1

Encoded data is
1100110

Enter received data bits one by one
1
0
0
1
1
0
1

Error on position 1
Data sent : 1100110
Data received : 1001101
Correct message is
1001100
PS C:\Users\Jadhav\Desktop\BTech\4th sem\CN\Code>
```

B. CRC

CODE:

```
#include <stdio.h>

#include <string.h>
#define N strlen(gen_poly)
char data[28];
char check_value[28];
char gen_poly[10];
int data_length, i, j;
void XOR()
{
    for (j = 1; j < N; j++)
        check_value[j] = ((check_value[j] == gen_poly[j]) ? '0' : '1');
}
void receiver()
{
    printf("Enter the received data: ");
    scanf("%s", data);
    printf("\n-----------------------------\n");
    printf("Data received: %s", data);
    crc();
    for (i = 0; (i < N - 1) && (check_value[i] != '1'); i++);
    if (i < N - 1)
        printf("\nError detected\n\n");
    else
        printf("\nNo error detected\n\n");
}

void crc()
{
    for (i = 0; i < N; i++)
        check_value[i] = data[i];
    do
    {
        if (check_value[0] == '1')
            XOR();
        for (j = 0; j < N - 1; j++)
            check_value[j] = check_value[j + 1];
        check_value[j] = data[i++];
    } while (i <= data_length + N - 1);
}

int main()
```

```
{
    printf("\nEnter data to be transmitted: ");
    scanf("%s", data);
    printf("\n Enter the Generating polynomial: ");
    scanf("%s", gen_poly);
    data_length = strlen(data);
    for (i = data_length; i < data_length + N - 1; i++)
        data[i] = '0';
    printf("\n----------------------------------------");
    printf("\n Data padded with n-1 zeros : %s", data);
    printf("\n----------------------------------------");
    crc();
    printf("\nCRC or Check value is : %s", check_value);
    for (i = data_length; i < data_length + N - 1; i++)
        data[i] = check_value[i - data_length];
    printf("\n----------------------------------------");
    printf("\n Final data to be sent : %s", data);
    printf("\n----------------------------------------\n");
    receiver();
    return 0;
}
```

OUTPUT:

```
Enter data to be transmitted: 1001101

 Enter the Generating polynomial: 1011

----------------------------------------
 Data padded with n-1 zeros : 1001101000
----------------------------------------
CRC or Check value is : 101
----------------------------------------
 Final data to be sent : 1001101101
----------------------------------------
Enter the received data: 1001100

-----------------------------
Data received: 1001100
Error detected

PS C:\Users\Jadhav\Desktop\BTech\4th sem\CN\Code>
```