CN LAB RECORD

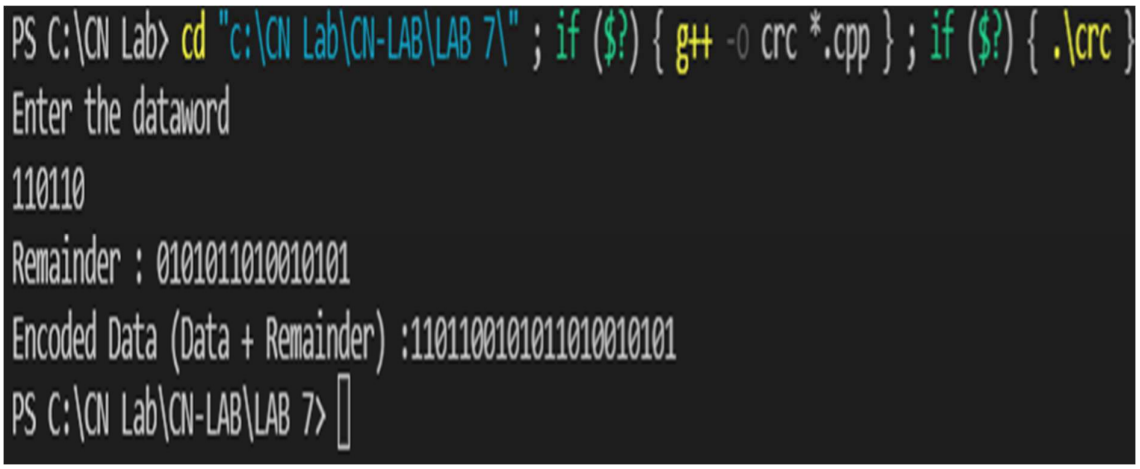
LAB 1: Write a program for error detecting code using CRC-CCITT (16-bits).

CODE:

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

string xor1(string a, string b)
{
     string result = "";

     int n = b.length();

     for(int i = 1; i < n; i++)
     {
          if (a[i] == b[i])
               result += "0";
          else
               result += "1";
     }
     return result;
}

string mod2div(string divident, string divisor)
{
     int pick = divisor.length();

     string tmp = divident.substr(0, pick);

     int n = divident.length();

     while (pick < n)
     {
          if (tmp[0] == '1')
               tmp = xor1(divisor, tmp) + divident[pick];
          else
               tmp = xor1(std::string(pick, '0'), tmp) +
                    divident[pick];

          pick += 1;
```

```
    }

    if (tmp[0] == '1')
        tmp = xor1(divisor, tmp);
    else
        tmp = xor1(std::string(pick, '0'), tmp);

    return tmp;
}

void encodeData(string data, string key)
{
    int l_key = key.length();

    string appended_data = (data +
                            std::string(
                                l_key - 1, '0'));

    string remainder = mod2div(appended_data, key);
    string codeword = data + remainder;
    cout << "Remainder : "
        << remainder << "\n";
    cout << "Encoded Data (Data + Remainder) :"
        << codeword << "\n";
}

int main()
{
    string dataword;
    cout<<"Enter the dataword"<<endl;
    getline(cin,dataword);
    string key = "10001000000100001";

    encodeData(dataword, key);

    return 0;
}
```

OUTPUT:


PS C:\CN Lab> cd "c:\CN Lab\CN-LAB\LAB 7\" ; if ($?) { g++ -o crc *.cpp } ; if ($?) { .\crc }
Enter the dataword
110110
Remainder : 0101011010010101
Encoded Data (Data + Remainder) :1101100101011010010101
PS C:\CN Lab\CN-LAB\LAB 7>

LAB 2: Write a program for distance vector algorithm to find suitable path for transmission.

CODE:

```
#include<stdio.h>
#define inf 999
struct routing{
    int dist[10];
    int hop[10];
};
struct routing nodes[10];

void init(int n){
    int i, j;
    for(i=0; i<n; i++){
        for(j=0;j<n;j++){
            if(i!=j){
                nodes[i].dist[j] = inf;
                nodes[i].hop[j] = -20;
            }
            else{
                nodes[i].dist[j] = 0;
                nodes[i].hop[j] = -20;
            }

        }
    }
}

void update(int i,int j,int k){
    nodes[i].hop[j] = k;
    nodes[i].dist[j] = nodes[i].dist[k] + nodes[k].dist[j];
}

void dvr(int n){
    int i,j,k;
    for(i=0;i<n;i++)
        for(j=0;j<n;j++)
        for(k=0;k<n;k++)
        if(nodes[i].dist[j]>(nodes[i].dist[k] + nodes[k].dist[j]))
        update(i,j,k);
}

int main(){
```

```
    int i, j, n;
    printf("Enter the number of nodes\n");
    scanf("%d",&n);
    init(n);
    printf("Enter the distance vector\n");
    for(i=0;i<n;i++){
            printf("Enter for node %d\n",i);
        for(j=0;j<n;j++){
            scanf("%d",&nodes[i].dist[j]);
        }
    }
    dvr(n);
    printf("\nUpdated distance vector table\n");
    for(i=0;i<n;i++){
        printf("Updated node %c table\n",65+i);
        printf("To\t cost\t hop\n");
        for(j=0;j<n;j++){
            printf("%c\t %d\t %c\n",65+j,nodes[i].dist[j],
65+nodes[i].hop[j]);
        }
    }

    return 0;
}
```

OUTPUT:

```
PS C:\CN Lab\CN-LAB\LAB 8> cd "c:\CN Lab\CN-LAB\LAB 8\" ; if ($?) { g++ -o distance_vector *.cpp } ; if ($?) { .\distance_vector }
Enter the number of nodes
5
Enter the distance vector
Enter for node 0
0
5
2
3
999
Enter for node 1
5
0
4
999
3
Enter for node 2
2
4
0
999
4
Enter for node 3
3
999
999
0
999
Enter for node 4
999
3
4
999
0
```

```
Updated distance vector table
Updated node A table
To      cost    hop
A       0       -
B       5       -
C       2       -
D       3       -
E       6       C
Updated node B table
To      cost    hop
A       5       -
B       0       -
C       4       -
D       8       A
E       3       -
Updated node C table
To      cost    hop
A       2       -
B       4       -
C       0       -
D       5       A
E       4       -
Updated node D table
To      cost    hop
A       3       -
B       8       A
C       5       A
D       0       -
E       9       A
Updated node E table
To      cost    hop
A       6       C
B       3       -
C       4       -
D       9       A
E       0       -
```

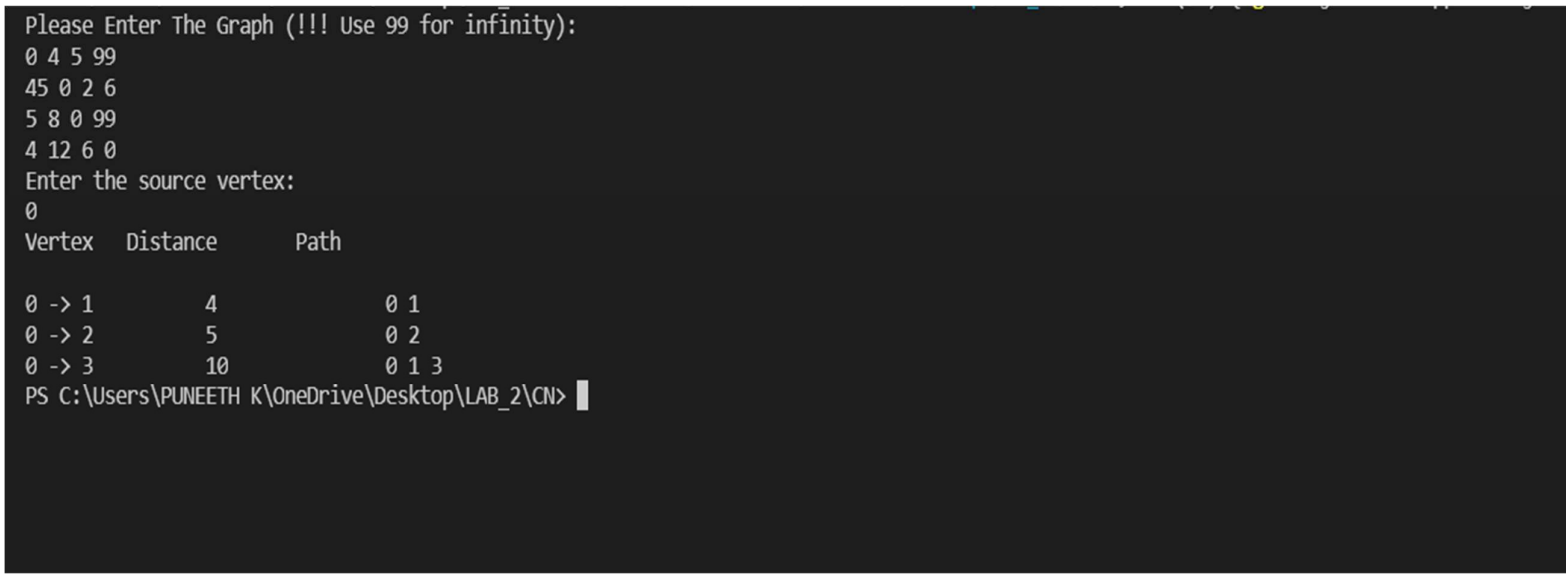
LAB 3: Implement Dijkstra's algorithm to compute the shortest path for a given topology.

CODE:

```
#include<bits/stdc++.h>

#include <limits.h>
#include <stdio.h>

using namespace std;

#define V 9


int minDistance(int dist[], bool sptSet[])
{

    int min = INT_MAX, min_index;

    for (int v = 0; v < V; v++)
        if (sptSet[v] == false && dist[v] <= min)
            min = dist[v], min_index = v;

    return min_index;
}


void printSolution(int dist[])
{
    printf("Vertex \t\t Distance from Source\n");
    for (int i = 0; i < V; i++)
        printf("%d \t\t %d\n", i, dist[i]);
}


void dijkstra(int graph[V][V], int src)
{
    int dist[V];
    bool sptSet[V];
    for (int i = 0; i < V; i++)
        dist[i] = INT_MAX, sptSet[i] = false;

    dist[src] = 0;


    for (int count = 0; count < V - 1; count++) {
        int u = minDistance(dist, sptSet);
```

```
        sptSet[u] = true;

        for (int v = 0; v < V; v++)
            if (!sptSet[v] && graph[u][v] && dist[u] != INT_MAX
                && dist[u] + graph[u][v] < dist[v])
                dist[v] = dist[u] + graph[u][v];
    }


    printSolution(dist);
}


int main()
{

    int graph[V][V] ;
    cout<<"Enter the graph "<<endl;
    for(int i = 0; i<V; i++)
    {
        for(int j = 0; j<V; j++)
            cin>>graph[i][j];
    }

    dijkstra(graph, 0);

    return 0;
}
```

OUTPUT:

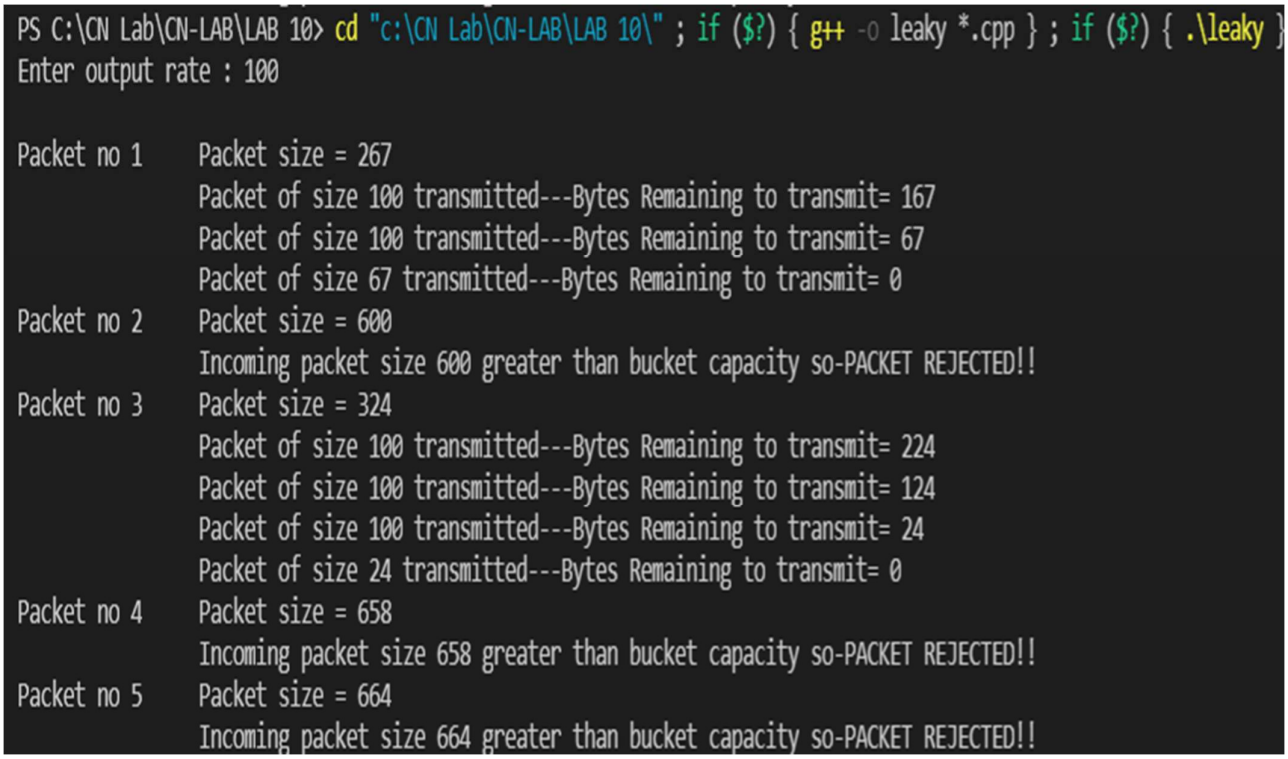

Please Enter The Graph (!!! Use 99 for infinity):
0 4 5 99
45 0 2 6
5 8 0 99
4 12 6 0
Enter the source vertex:
0
Vertex Distance Path
0 -> 1 4 0 1
0 -> 2 5 0 2
0 -> 3 10 0 1 3
PS C:\Users\PUNEETH K\OneDrive\Desktop\LAB_2\CN>

LAB 4: Write a program for congestion control using Leaky bucket algorithm.

CODE:

```
#include<bits/stdc++.h>
#include<unistd.h>
using namespace std;
#define bucketSize 500

void bucketInput(int a,int b)
{
     if(a > bucketSize)
          cout<<"\n\t\tIncoming packet size "<<a<<" greater than bucket
capacity so-PACKET REJECTED!!";
     else{
          sleep(5);
          while(a > b){
               cout<<"\n\t\t"<<"Packet of size "<<b<<" transmitted"<<"---Bytes
Remaining to transmit= "<<a-b;
               a-=b;
               sleep(5);
          }
          if(a > 0)
               cout<<"\n\t\t"<<"Packet of size "<<a<<" transmitted"<<"---Bytes
Remaining to transmit= "<<0;
     }
}
int main()
{
     int op,pktSize;
     cout<<"Enter output rate : ";
     cin>>op;
     for(int i=1;i<=5;i++)
     {
          sleep(rand()%10);
          pktSize=rand()%700;
          cout<<"\nPacket no "<<i<<"\tPacket size = "<<pktSize;
          bucketInput(pktSize,op);
     }
     cout<<endl;
     return 0;
}
```

OUTPUT:


PS C:\CN Lab\CN-LAB\LAB 10> cd "c:\CN Lab\CN-LAB\LAB 10\" ; if ($?) { g++ -o leaky *.cpp } ; if ($?) { .\leaky }
Enter output rate : 100
Packet no 1 Packet size = 267
Packet of size 100 transmitted---Bytes Remaining to transmit= 167
Packet of size 100 transmitted---Bytes Remaining to transmit= 67
Packet of size 67 transmitted---Bytes Remaining to transmit= 0
Packet no 2 Packet size = 600
Incoming packet size 600 greater than bucket capacity so-PACKET REJECTED!!
Packet no 3 Packet size = 324
Packet of size 100 transmitted---Bytes Remaining to transmit= 224
Packet of size 100 transmitted---Bytes Remaining to transmit= 124
Packet of size 100 transmitted---Bytes Remaining to transmit= 24
Packet of size 24 transmitted---Bytes Remaining to transmit= 0
Packet no 4 Packet size = 658
Incoming packet size 658 greater than bucket capacity so-PACKET REJECTED!!
Packet no 5 Packet size = 664
Incoming packet size 664 greater than bucket capacity so-PACKET REJECTED!!

LAB 5: Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

CODE:

ServerTCP.py

```
from socket import *
serverName="127.0.0.1"
serverPort = 12000
serverSocket = socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
    print ("The server is ready to receive")
    connectionSocket, addr = serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()
    file=open(sentence,"r")
    l=file.read(1024)
    connectionSocket.send(l.encode())
    print ('\nSent contents of ' + sentence)
    file.close()
    connectionSocket.close()
```

ClientTCP.py

```
from socket import *
serverName = '127.0.0.1'
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName,serverPort))
sentence = input("\nEnter file name: ")

clientSocket.send(sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print ('\nFrom Server:\n')
print(filecontents)
clientSocket.close()
```

OUTPUT:

```
Nithin'@NITHS MINGW64 /c/CN Lab/CN-LAB/LAB 11 (main)
$ py clienttcp.py

Enter file name: dummy.txt

From Server:

Hi!! This is a demo file
```

```
Nithin'@NITHS MINGW64 /c/CN Lab/CN-LAB/LAB 11 (main)
$ py servertcp.py
The server is ready to receive

Sent contents of dummy.txt
The server is ready to receive
```

LAB 6: Using UDP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

CODE:

ServerUDP.py

```
from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverPort))
print ("The server is ready to receive")
while 1:
     sentence, clientAddress = serverSocket.recvfrom(2048)
     sentence = sentence.decode("utf-8")
     file=open(sentence,"r")
     l=file.read(2048)

     serverSocket.sendto(bytes(l,"utf-8"),clientAddress)

     print ('\nSent contents of ', end = ' ')
     print (sentence)
    #  for i in sentence:
        #  print (str(i), end = '')
     file.close()
```

ClientUDP.py

```
from socket import *
serverName = "127.0.0.1"
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)

sentence = input("\nEnter file name:  ")

clientSocket.sendto(bytes(sentence,"utf-8"),(serverName, serverPort))

filecontents,serverAddress = clientSocket.recvfrom(2048)
print ('\nReply from Server:\n')
print (filecontents.decode("utf-8"))
# for i in filecontents:
    # print(str(i), end = '')
clientSocket.close()
```

```
clientSocket.close()
```

OUTPUT

```
Nithin'@NITHS MINGW64 /c/CN Lab/CN-LAB/LAB 12 (main)
$ py clientudp.py

Enter file name:  dummy.txt

Reply from Server:

Hi!! This is a demo file for udp
```

```
Nithin'@NITHS MINGW64 /c/CN Lab/CN-LAB/LAB 12 (main)
$ py serverudp.py
The server is ready to receive

Sent contents of  dummy.txt

Sent contents of  dummy.txt
```