CN LAB RECORD
(CYCLE 2)

MUSKAN GUPTA

1BM19CS091

5-B

LAB-1

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

```
#include <iostream>
#include <string.h>
using namespace std;
int crc(char *ip, char *op, char *poly, int mode)
{
 strcpy(op, ip);
 if (mode) {
 for (int i = 1; i < strlen(poly); i++)
 strcat(op, "0");
 }
 /* Perform XOR on the msg with the selected polynomial */
 for (int i = 0; i < strlen(ip); i++) {
 if (op[i] == '1') {
 for (int j = 0; j < strlen(poly); j++) {
 if (op[i + j] == poly[j])
 op[i + j] = '0';
 else
 op[i + j] = '1';
 }
 }
 }
 /* check for errors. return 0 if error detected */
 for (int i = 0; i < strlen(op); i++)
 if (op[i] == '1')
 return 0;
 return 1;
}
int main()
{
 char ip[50], op[50], recv[50];
 char poly[] = "10001000000100001";
 cout << "Enter the input message in binary"<< endl;
 cin >> ip;
 crc(ip, op, poly, 1);
 cout << "The transmitted message is: " << ip << op + strlen(ip) << endl;
 cout << "Enter the recevied message in binary" << endl;
 cin >> recv;
 if (crc(recv, op, poly, 0))
 cout << "No error in data" << endl;
 else
 cout << "Error in data transmission has occurred" << endl;
 return 0;
}
```

Output

```
PS C:\Users\muska\OneDrive\Desktop\C programs> g++ crc.cpp
PS C:\Users\muska\OneDrive\Desktop\C programs> .\a.exe
Enter the input message in binary
11111
The transmitted message is: 11111110001111011110
Enter the recevied message in binary

11111
No error in data
PS C:\Users\muska\OneDrive\Desktop\C programs> .\a.exe
Enter the input message in binary
11111
The transmitted message is: 11111110001111011110
Enter the recevied message in binary
1111
Error in data transmission has occurred
PS C:\Users\muska\OneDrive\Desktop\C programs>
```

LAB-2

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

```
#include <bits/stdc++.h>
using namespace std;
#define MAX 10
int n;
class router {
char adj_new[MAX], adj_old[MAX];
int table_new[MAX], table_old[MAX];
public:
router( ){
for(int i=0;i<MAX;i++) table_old[i]=table_new[i]=99;
}
void copy( ){
for(int i=0;i<n;i++) {
adj_old[i] =adj_new[i];
table_old[i]=table_new[i];
}
}
int equal( ) {
for(int i=0;i<n;i++)
if(table_old[i]!=table_new[i]||adj_new[i]!=adj_old[i])return 0;
return 1;
}
void input(int j) {
cout<<"Enter 1 if the corresponding router is adjacent to router"
<<(char)('A'+j)<<" else enter 99: "<<endl<<" ";
for(int i=0;i<n;i++)
if(i!=j) cout<<(char)('A'+i)<<" ";
cout<<"\nEnter matrix:";
for(int i=0;i<n;i++) {
if(i==j)
table_new[i]=0;
else
cin>>table_new[i];
adj_new[i]= (char)('A'+i);
}
cout<<endl;
}
void display(){
cout<<"\nDestination Router: ";
for(int i=0;i<n;i++) cout<<(char)('A'+i)<<" ";
cout<<"\nOutgoing Line: ";
for(int i=0;i<n;i++) cout<<adj_new[i]<<" ";
cout<<"\nHop Count: ";
for(int i=0;i<n;i++) cout<<table_new[i]<<" ";
}
void build(int j) {
for(int i=0;i<n;i++)
for(int k=0;(i!=j)&&(k<n);k++)
if(table_old[i]!=99)
```

```
if((table_new[i]+table_new[k])<table_new[k]) {
table_new[k]=table_new[i]+table_new[k];
adj_new[k]=(char)('A'+i);
}
}
} r[MAX];
void build_table( ) {
int i=0, j=0;
while(i!=n) {
for(i=j;i<n;i++) {
r[i].copy();
r[i].build(i);
}
for(i=0;i<n;i++)
if(!r[i].equal()) {
j=i;
break;
}
}
}
int main() {
cout<<"Enter the number the routers(<"<<MAX<<"): "; cin>>n;
for(int i=0;i<n;i++) r[i].input(i);
build_table();
for(int i=0;i<n;i++) {
cout<<"Router Table entries for router "<<(char)('A'+i)<<":-";
r[i].display();
cout<<endl<<endl;
}
}
```

Output

```
Enter the number the routers(<10): 3
Enter 1 if the corresponding router is adjacent to routerA else enter 99:
 B C
Enter matrix:1 99

Enter 1 if the corresponding router is adjacent to routerB else enter 99:
 A C
Enter matrix:1 1

Enter 1 if the corresponding router is adjacent to routerC else enter 99:
 A B
Enter matrix:99 1

Router Table entries for router A:-
Destination Router: A B C
Outgoing Line: A B C
Hop Count: 0 1 99

Router Table entries for router B:-
Destination Router: A B C
Outgoing Line: A B C
Hop Count: 1 0 1

Router Table entries for router C:-
Destination Router: A B C
Outgoing Line: A B C
Hop Count: 99 1 0

PS C:\Users\muska\OneDrive\Desktop\C programs>
```

LAB-3

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

```
#include<bits/stdc++.h>
using namespace std;
#define V 3

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

 int min = 9999, 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 printPath(int parent[], int j)
{
 if (parent[j] == - 1)
 return;

 printPath(parent, parent[j]);

 cout<<j<<" ";
}

void printSolution(int dist[], int n, int parent[])
{
 int src = 0;
 cout<<"Vertex\t Distance\tPath"<<endl;
 for (int i = 1; i < V; i++)
 {
 cout<<"\n"<<src<<" -> "<<i<<" \t \t"<<dist[i]<<"\t\t"<<src<<" ";
 printPath(parent, i);
 }
}
void dijkstra(int graph[V][V], int src)
{
 int dist[V];
 bool sptSet[V];
 int parent[V];
 for (int i = 0; i < V; i++)
 {
 parent[0] = -1;
 dist[i] = 9999;
 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] + graph[u][v] < dist[v])
 {
 parent[v] = u;
 dist[v] = dist[u] + graph[u][v];
 }
 }
 printSolution(dist, V, parent);
}
int main()
{
 int graph[V][V];
 cout<<"Please Enter The Graph (!!! Use 99 for infinity): "<<endl;
 for(int i = 0; i<V; i++)
 {
 for(int j = 0; j<V; j++)
 cin>>graph[i][j];
 }
 cout<<"Enter the source vertex: "<<endl;
 int src;
 cin>>src;

 dijkstra(graph, src);
 cout<<endl;
 return 0;
}
```

Output

```
PS C:\Users\muska\OneDrive\Desktop\C programs> g++ dijkstras.cpp
PS C:\Users\muska\OneDrive\Desktop\C programs> .\a.exe
Please Enter The Graph (!!! Use 99 for infinity):
0 3 4
3 0 99
4 99 0
Enter the source vertex:
0
Vertex   Distance       Path

0 -> 1          3               0 1
0 -> 2          4               0 2
PS C:\Users\muska\OneDrive\Desktop\C programs>
```

LAB-4

Write a program for congestion control using leaky bucket algorithm.

```
#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\tBucket overflow";
 else{
 sleep(5);
 while(a > b){
 cout<<"\n\t\t"<<b<<" bytes outputted.";
 a-=b;
 sleep(5);
 }
 if(a > 0)
 cout<<"\n\t\tLast "<<a<<" bytes sent\t";
 cout<<"\n\t\tBucket output successful";
 }
}
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:\Users\muska\OneDrive\Desktop\C programs> g++ bucket.cpp
PS C:\Users\muska\OneDrive\Desktop\C programs> .\a.exe
Enter output rate : 100

Packet no 1     Packet size = 267
                100 bytes outputted.
                100 bytes outputted.
                Last 67 bytes sent
                Bucket output successful
Packet no 2     Packet size = 600
                Bucket overflow
Packet no 3     Packet size = 324
                100 bytes outputted.
                100 bytes outputted.
                100 bytes outputted.
                Last 24 bytes sent
                Bucket output successful
Packet no 4     Packet size = 658
                Bucket overflow
Packet no 5     Packet size = 664
                Bucket overflow
PS C:\Users\muska\OneDrive\Desktop\C programs>
```

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.

ServerTCP.py

```
from socket import *
serverName="127.0.0.1
" serverPort=12000
serverSocket=socket(AF_INET,SOCK_STR
EAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
   print("the server is ready to recieve")
   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()
```

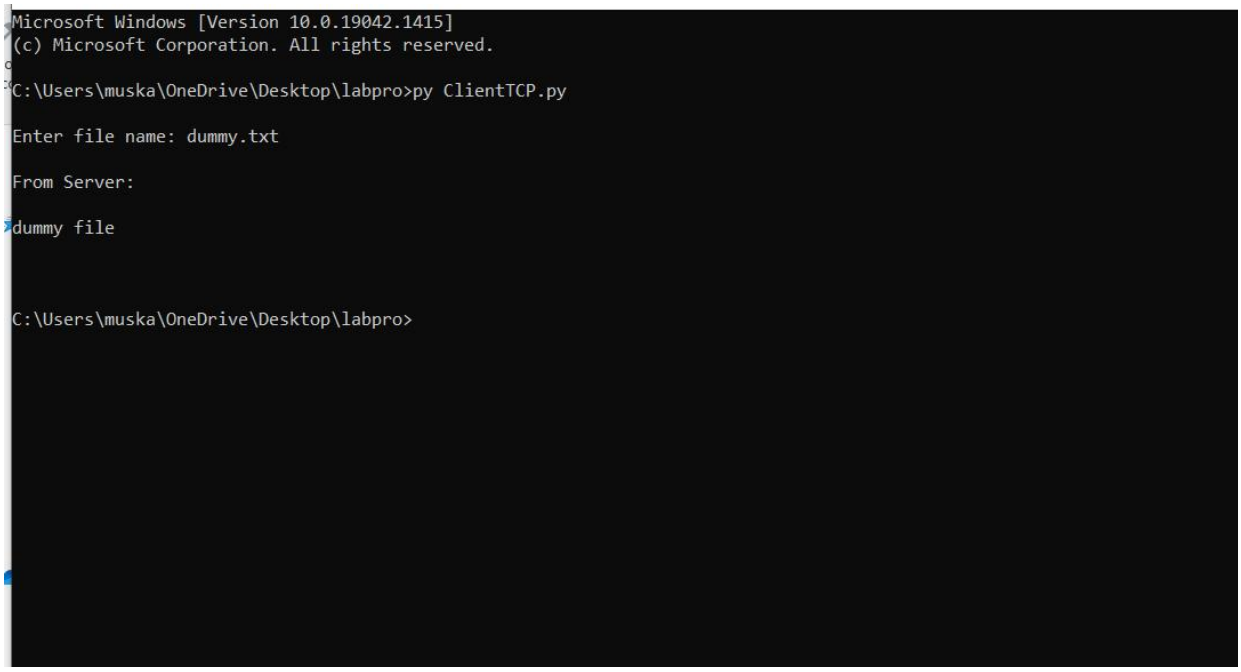
clientTCP.py

```
from socket import *
serverName='127.0.0.1
' serverPort=12000
clientSocket=socket(AF_INET,SOCK_STRE
AM)
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

ServerTCP.py

clientTCP.ipynb



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.

ServerUDP.py

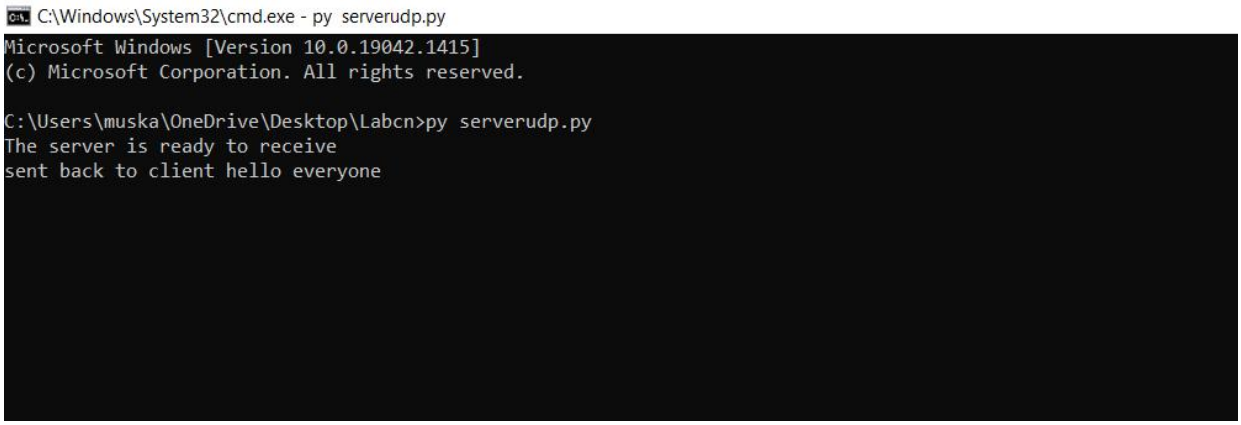
```
from socket import
* serverPort=12000
serverSocket=socket(AF_INET,SOCK_DG
RAM)
serverSocket.bind(("127.0.0.1",serverPort))
print("the server is ready to recieve")
while 1:
   sentence,clientAddress=serverSocket.recvfrom(204
   8) sentence=sentence.decode("utf-8")
   file=open(sentence,"r")
   l=file.read(2048)

   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 the 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

serverUDP.py



clientUDP.py