

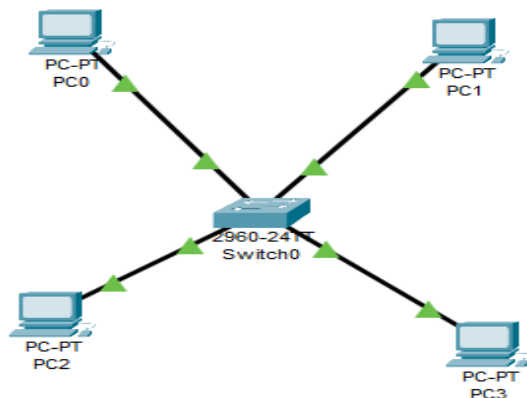
1 a) Write a program to implement the Data link layer framing method **character stuffing**.

```
import java.util.*;
public class Char
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter number of Characters : ");
        int n = sc.nextInt();
        String in[] = new String[n];
        for (int i = 0; i < n; i++)
        {
            in[i] = sc.next();
        }
        for (int i = 0; i < n; i++)
        {
            if (in[i].equals("DLE"))
            {
                in[i] = "DLE DLE";
            }
        }
        System.out.print("Transmitted Message is  "+"DLE STX ");
        for (int i = 0; i < n; i++)
        {
            System.out.print(in[i] + " ");
        }
        System.out.print("DLE ETX");
        sc.close();
        int i = 0;
        System.out.println("\nOriginal Message : " + in[i]);
    }
}
```

OUTPUT

```
Enter number of Characters : 1
DOODLE
Transmitted Message is  DLE STX DOODLE DLE ETX
Original Message : DOODLE
```

b) Configure **star topology** using cisco packet tracer.



2 a) Write a program to implement the Data link layer framing method **bit stuffing**.

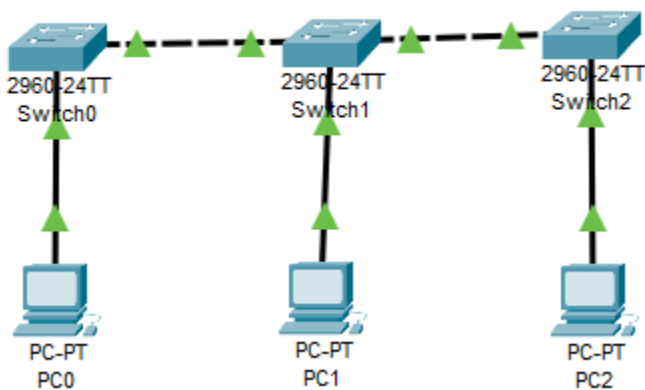
```
import java.util.*;
public class Bit
{
    public static void main(String[] args)
    {
        int i, count=0;
        Scanner str=new Scanner(System.in);
        System.out.println("Enter bits : ");
        String s1=str.nextLine();

        for(i=0;i<s1.length();i++)
        {
            if(s1.charAt(i)=='1')
                count++;
            if(s1.charAt(i)=='0')
                count=0;
            System.out.print(s1.charAt(i));
            if(count==5)
            {
                System.out.print("0");
                count=0;
                str.close();
            }
        }
    }
}
```

OUTPUT

Enter bits : 101111111
1011111011

b) Configure **bus topology** using cisco packet tracer.



3) a) Write a program to simulate **Stop and wait protocol**.
mysender.java

```
import java.io.*;
import java.net.*;
public class mysender {
    public static void main(String args[])
    {
        try {
            ServerSocket ss = new ServerSocket(113);
            Socket s = ss.accept();
            DataInputStream dis = new DataInputStream(s.getInputStream());
            DataOutputStream dos = new DataOutputStream(s.getOutputStream());
            int p = Integer.parseInt(dis.readUTF());
            // int receive window = 1;
            for (int i = 0; i < p; i++)
            {
                String Str[] = new String[p];
                Str[i] = (String) dis.readUTF();
                System.out.println("Frame" + i + " is " + Str[i]);
                // System.out.println("Ack sent");
                dos.writeUTF("ACK");
            }
            ss.close();
        } catch (Exception e) { System.out.print(e); }
    }
}
```

Myreceiver.java

```
import java.io.*;
import java.net.*;
import java.util.*;
public class myreceiver {
    public static void main(String args[])
    {
        try {
            Socket s = new Socket("localhost", 113);
            DataOutputStream dout = new DataOutputStream(s.getOutputStream());
            DataInputStream di = new DataInputStream(s.getInputStream());
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the number of frames to be sent");
            int n = sc.nextInt();
            String k = Integer.toString(n);
            dout.writeUTF(k);
            String ack[] = new String[n];
            int sendwindow = 0;
            System.out.println("Enter sendwindow size");
            sendwindow = sc.nextInt();
            for (int i = 0, j = 0; i < n / sendwindow; i++) {
                while (j < sendwindow) {
                    System.out.println("enter frame" + j);
                    String fr = sc.next();
                    dout.writeUTF(fr);
```

```

        ack[i]=(String)di.readUTF();
        System.out.println(ack[i]);
        j++;
    }
    j=0;
}
dout.flush();
dout.close();
s.close();
sc.close();
}catch(Exception e) {System.out.println(e);}
}
}

```

OUTPUT

```

Microsoft Windows [Version 10.0.17134.1156]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Student>cd..
C:\Users>cd..
C:\>cd D:\
D:\>cd CN WEEKS
D:\CN WEEKS>javac mysender.java
D:\CN WEEKS>java mysender
Frame0 is 8
Frame1 is 7
Frame2 is 5
D:\CN WEEKS>

Microsoft Windows [Version 10.0.17134.1156]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Student>cd..
C:\Users>cd..
C:\>cd D:\
D:\>cd CN WEEKS
D:\>cd CN WEEKS
D:\CN WEEKS>javac myreceiver.java
D:\CN WEEKS>java myreceiver
Enter the number of frames to be sent
3
Enter sendwindow size
1
enter frame0
8
ACK
enter frame0
7
ACK
enter frame0
5
ACK
D:\CN WEEKS>

```

(b) Write a java program to implement RSA Algorithm.

RSA.java

```

import java.io.DataInputStream;
import java.io.IOException;
import java.math.BigInteger;
import java.util.Random;

public class RSA
{

```

```

private BigInteger p;
private BigInteger q;
private BigInteger N;
private BigInteger phi;
private BigInteger e;
private BigInteger d;
private int bitlength = 1024;
private Random r;

public RSA()
{
    r = new Random();
    p = BigInteger.probablePrime(bitlength, r);
    q = BigInteger.probablePrime(bitlength, r);
    N = p.multiply(q);
    phi = p.subtract(BigInteger.ONE).multiply(q.subtract(BigInteger.ONE));
    e = BigInteger.probablePrime(bitlength / 2, r);

    while (phi.gcd(e).compareTo(BigInteger.ONE) > 0 && e.compareTo(phi) < 0)
    {
        e.add(BigInteger.ONE);
    }
    d = e.modInverse(phi);
}

public RSA(BigInteger e, BigInteger d, BigInteger N)
{
    this.e = e;
    this.d = d;
    this.N = N;
}

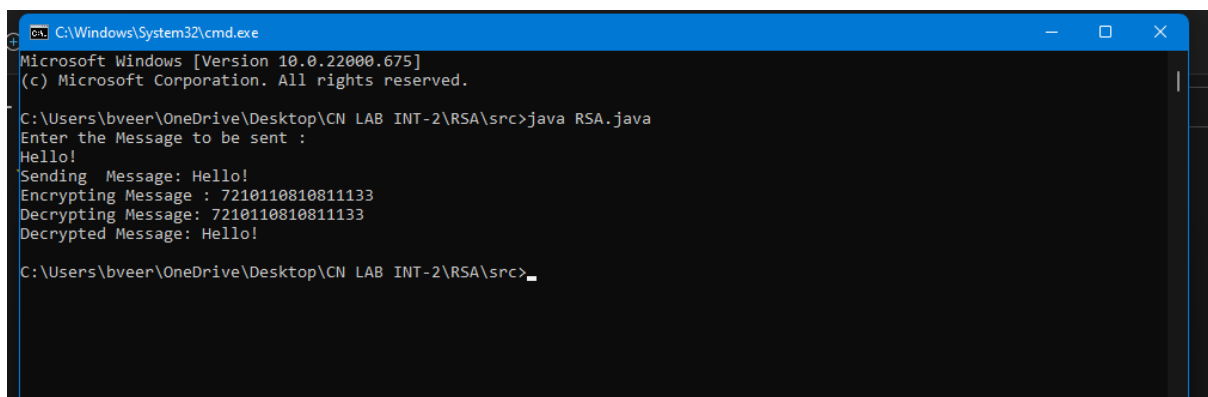
@SuppressWarnings("deprecation")
public static void main(String[] args) throws IOException
{
    RSA rsa = new RSA();
    DataInputStream in = new DataInputStream(System.in);
    String teststring;
    System.out.println("Enter the Message to be sent :");
    teststring = in.readLine();
    System.out.println("Sending Message: " + teststring);
    System.out.println("Encrypting Message : "+
        bytesToString(teststring.getBytes()));
    // encrypt
    byte[] encrypted = rsa.encrypt(teststring.getBytes());
    // decrypt
    byte[] decrypted = rsa.decrypt(encrypted);
    System.out.println("Decrypting Message: " + bytesToString(decrypted));
    System.out.println("Decrypted Message: " + new String(decrypted));
}

private static String bytesToString(byte[] encrypted)
{
    String test = "";
    for (byte b : encrypted)
    {
        test += Byte.toString(b);
    }
    return test;
}

```

```
// Encrypt message
public byte[] encrypt(byte[] message)
{
    return (new BigInteger(message)).modPow(e, N).toByteArray();
}
// Decrypt message
public byte[] decrypt(byte[] message)
{
    return (new BigInteger(message)).modPow(d, N).toByteArray();
}
}
```

OUTPUT



```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.22000.675]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\RSA\src>java RSA.java
Enter the Message to be sent :
Hello!
Sending Message: Hello!
Encrypting Message : 7210110810811133
Decrypting Message: 7210110810811133
Decrypted Message: Hello!

C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\RSA\src>
```

- 4) a) Explain about different types of basic network commands and implement them.

Basic network commands and network configuration commands:

C:>ping

Ping is the primary TCP/IP command used to troubleshoot connectivity, reachability, and name resolution. This command is to test both computer name and IP address of the computer.

C:>ipconfig

The ipconfig command displays information about the host computer TCP/IP configuration.

C:>ipconfig /all

This command displays detailed configuration information about TCP/IP connection including Router, Gateway, DNS, DHCP, and type of Ethernet.

C:>ipconfig /release

This command allows you to drop the IP lease from the DHCP server.

C:>ipconfig /renew

This command is a quick problem solver for connection issues, using renew all your IP addresses are currently borrowing from DHCP server.

C:>nbtstat -a

This command helps solve problems with NetBIOS name resolution.

Nbt stands for NetBIOS over TCP/IP.

C:>arp -a

It is short for address resolution protocol, it will show the IP address of your computer along with MAC address of router.

C:>hostname:

This is the simplest of all TCP/IP commands. It simply displays the name of your computer.

C:\>ipconfig /flushdns:

This command is only needed if you are having trouble with network DNS configuration. The best time to use is after network configuration.

C:\>netdiag:

Netdiag is a network testing utility that performs a variety of network diagnostic tests, allowing to pinpoint problems in network.

C:\>netstat:

Netstat displays a variety of statistics about a computer's active TCP/IP connections, it is used when having trouble with applications such as HTTP and FTP.

C:\>nslookup:

nslookup is used for diagnosing DNS problems. If you can access a resource by specifying an IP address.

C:\>pathping:

Pathping is unique to windows and is basically a combination of Ping and Tracert commands.

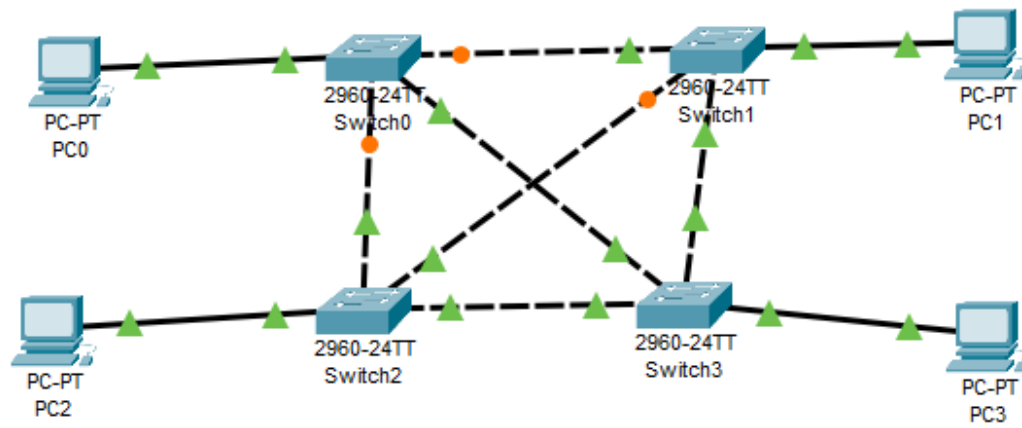
C:\>route:

The route command displays the computer's routing table. Whenever having trouble accessing other computers on network, we can use the route command to make sure the entries in routing table are correct.

C:\>tracert:

The tracert command displays a list of all routers that a packet has to go through to get from the computer where tracert is run to any other computer on the internet.

b) Configure **mesh topology** using cisco packet tracer.



5) Write a program to implement on a data set of characters using the three **Cyclic Redundancy Check**.

```
import java.util.*;
class crc1{public static void main(String args[]) {
Scanner scan = new Scanner(System.in);
int n;
System.out.println("Enter the size of the data:");
n = scan.nextInt();
int data[] = new int[n];
System.out.println("Enter the data, bit by bit:");
for(int i=0 ; i<n ; i++) {
System.out.println("Enter bit number " + (n-i) + ":");
data[i] = scan.nextInt();
}
System.out.println("Enter the size of the divisor:");
n = scan.nextInt();
int divisor[] = new int[n];
System.out.println("Enter the divisor, bit by bit:");
for(int i=0 ; i<n ; i++) {
System.out.println("Enter bit number " + (n-i) + ":");
divisor[i] = scan.nextInt();
}
int remainder[] = divide(data, divisor);
for(int i=0 ; i<remainder.length-1 ; i++) {
System.out.print(remainder[i]);
}
System.out.println("\nThe CRC code generated is:");
for(int i=0 ; i<data.length ; i++) {
System.out.print(data[i]);
}
for(int i=0 ; i<remainder.length-1 ; i++) {
System.out.print(remainder[i]);
}
System.out.println();
int sent_data[] = new int[data.length + remainder.length - 1];
System.out.println("Enter the data to be sent:");
for(int i=0 ; i<sent_data.length ; i++) {
System.out.println("Enter bit number " + (sent_data.length-i)
+ ":");
sent_data[i] = scan.nextInt();
}
receive(sent_data, divisor);
}
static int[] divide(int old_data[], int divisor[]) {
int remainder[] , i;
int data[] = new int[old_data.length + divisor.length];
System.arraycopy(old_data, 0, data, 0, old_data.length);
remainder = new int[divisor.length];
System.arraycopy(data, 0, remainder, 0, divisor.length);
for(i=0 ; i<old_data.length ; i++) {
System.out.println((i+1) + ".) First data bit is : "
+ remainder[0]);
System.out.print("Remainder : ");
if(remainder[0] == 1) {
for(int j=1 ; j<divisor.length ; j++) {
```

```

remainder[j-1] = exor(remainder[j], divisor[j]);
System.out.print(remainder[j-1]);
}
}
else {
for(int j=1 ; j<divisor.length ; j++) {
remainder[j-1] = exor(remainder[j], 0);
System.out.print(remainder[j-1]);
}
}
remainder[divisor.length-1] = data[i+divisor.length];
System.out.println(remainder[divisor.length-1]);
}
return remainder;
}
static int exor(int a, int b) {
if(a == b) {
return 0;
}
return 1;
}
static void receive(int data[], int divisor[]) {
int remainder[] = divide(data, divisor);
for(int i=0 ; i<remainder.length ; i++) {
if(remainder[i] != 0) {
System.out.println("There is an error in received data...");
return;
}
}
System.out.println("Data was received without any error.");
}
}

```

OUTPUT

Enter the size of the data:4
Enter the data, bit by bit

Enter bit number 4:1
Enter bit number 3:0
Enter bit number 2:1
Enter bit number 1:1

Enter the size of the divisor:4
Enter the divisor, bit by bit
Enter bit number 4:1
Enter bit number 3:0
Enter bit number 2:0
Enter bit number 1:1

1.) First data bit is : 1
Remainder : 0100
2.) First data bit is : 0
Remainder : 1000
3.) First data bit is : 1
Remainder : 0010
4.) First data bit is : 0

Remainder : 0100
010

The CRC code generated is:1011010

Enter the data to be sent
Enter bit number 7:1
Enter bit number 6:0
Enter bit number 5:1
Enter bit number 4:1
Enter bit number 3:0
Enter bit number 2:1
Enter bit number 1:0

1.) First data bit is : 1
Remainder : 0100
2.) First data bit is : 0
Remainder : 1001
3.) First data bit is : 1
Remainder : 0000
4.) First data bit is : 0
Remainder : 0000
5.) First data bit is : 0
Remainder : 0000
6.) First data bit is : 0
Remainder : 0000
7.) First data bit is : 0

Remainder : 0000
Data was received without any error.

6) Write a program to implement **Client - Server communication** for chat using Transmission Control Protocol **(TCP)**.

Server.java

```
import java.net.*;
import java.io.*;
public class Server {
    public static void main(String[] args) throws Exception {
        System.out.println("server is connected");
        ServerSocket ss=new ServerSocket(3333);
        System.out.println("Server is waiting for client request");
        Socket s=ss.accept();
        System.out.println("Client is connected, start chatting");

        DataInputStream din=new DataInputStream(s.getInputStream());
        DataOutputStream dout=new DataOutputStream(s.getOutputStream());
        BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
        String str="", str2="";
        while(!str.equals("stop"))
        {
            str=din.readUTF();
            System.out.println("Client Says : "+str);
            str2=br.readLine();
            dout.writeUTF(str2);
            dout.flush();
        }
        din.close();
        ss.close();
    }
}
```

Client.java

```
import java.net.*;
import java.io.*;
public class Client {
    public static void main(String[] args) throws Exception {
        try {
            Socket s=new Socket("localhost",3333);
            System.out.println("Start Chatting...");
            DataInputStream din=new DataInputStream(s.getInputStream());
            DataOutputStream dout=new DataOutputStream(s.getOutputStream());
            BufferedReader br=new BufferedReader(new InputStreamReader(System.in));

            String str="", str2="";
            while(!str.equals("stop"))
            {
                str=br.readLine();
                dout.writeUTF(str);
                dout.flush();
                str2=din.readUTF();
                System.out.println("Server says: "+str2);
            }
            dout.close();
        }
    }
}
```



```

        s.close();
    }
    catch (ConnectException) {
        System.out.println("Server is offline");
    }
}
}

```

OUTPUT

```

C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.22000.675]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\TCP\src>java Server.java
server is connected
Server is waiting for client request
Client is connected, start chatting
Client Says : Hi!
How are you?
Client Says : Good, what about you?
Great
Client Says : ok bye!!
stop
Client Says : stop
stop
C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\TCP\src>_

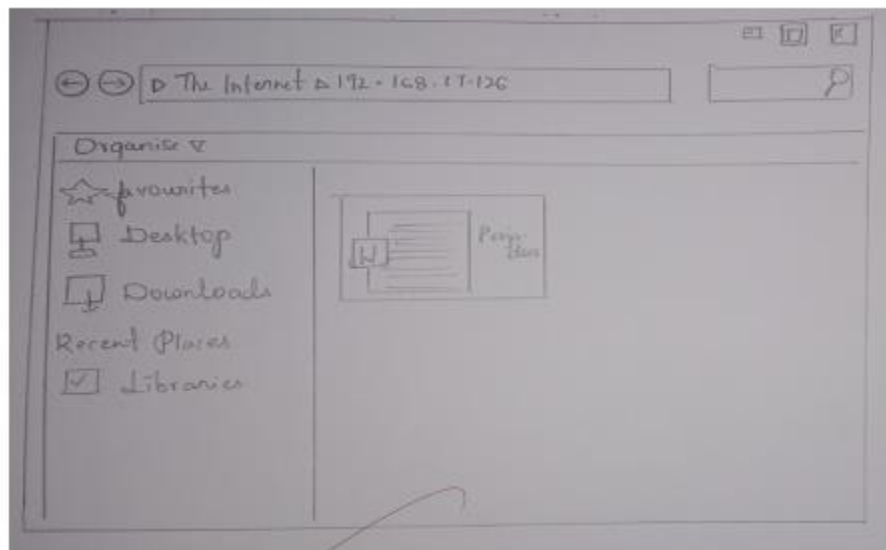
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.22000.675]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\TCP\src>java Client.java
Start Chatting...
Hi!
Server says: How are you?
Good, what about you?
Server says: Great
ok bye!!
Server says: stop
stop
Server says: stop
C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\TCP\src>_

```

7) (a) Configure **FTP Server** on a Windows machine using a FTP client.

- 1) Type in cmd ip config to find the ip address of the system
- 2) Create a folder in desktop and store files that you would want to share
- 3) To configure the FTP server go to the control panel, click on programs -> programs and features.
- 4) Click on turn windows features on /off
- 5) Check mark IIS (internet and information services)
- 6) Expand IIS and check mark ftp server
- 7) Expand ftp server check mark ftp extensibility and ftp services
- 8) Make sure web management tools and World Wide Web services are checked.
- 9) Click ok .10) Click on control panel home
- 11) Click on administrative tools (if windows 10 or 11, search for administrative tools).
- 12) Click on IIS MANAGER
- 13) Under connections look for the root (folder name) (available on top right)
- 14) Expand root 15) Expand sites
- 16) Right click on sites and select add ftp site
- 17) Name the ftp site
- 18) Browse the physical path for the folder created in step 2.
- 19) Click on next
- 20) Select the ip address of your computer. And select no ssl under ssl and click on next.
- 21) Select basic authentication
- 22) Select authorization as specific users and type in Gcet (username)
- 23) Check in required permissions.
- 24) Click on finish 25) FTP site is configured.
- 26) Go to MyComputer, type in <ftp://ip> address and click enter2
- 7) Provide user credentials and access the files available in the ftp server. This access is internally with in a network
- 28) To access this ftp outside a network we need to enable port no 21 at the router



(b) Explain about different types of **basic network commands** and implement them.

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This command displays detailed configuration information about TCP/IP connection including Router, Gateway, DNS, DHCP, and type of Ethernet.

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This command allows you to drop the IP lease from the DHCP server.

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This command is a quick problem solver for connection issues, using renew all your IP addresses are currently borrowing from DHCP server.

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This command helps solve problems with NetBIOS name resolution.

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It is short for address resolution protocol, it will show the IP address of your computer along with MAC address of router.

C:>hostname:

This is the simplest of all TCP/IP commands. It simply displays the name of your computer.

C:\>ipconfig /flushdns:

This command is only needed if you are having trouble with network DNS configuration. The best time to use is after network configuration.

C:\>netdiag:

Netdiag is a network testing utility that performs a variety of network diagnostic tests, allowing to pinpoint problems in network.

C:\>netstat:

Netstat displays a variety of statistics about a computer's active TCP/IP connections, it is used when having trouble with applications such as HTTP and FTP.

C:\>nslookup:

nslookup is used for diagnosing DNS problems. If you can access a resource by specifying an IP address.

C:\>pathping:

Pathping is unique to windows and is basically a combination of Ping and Tracert commands.

C:\>route:

The route command displays the computer's routing table. Whenever having trouble accessing other computers on network, we can use the route command to make sure the entries in routing table are correct.

C:\>tracert:

The tracert command displays a list of all routers that a packet has to go through to get from the computer where tracert is run to any other computer on the internet.

8) (a) Write a program to simulate Carrier Sense Multiple Access/Collision Detection (CSMA/CD).

Server.java

```
import java.io.*;
import java.net.*;
public class Server
{
    public static void main(String[] args)
    {
        try
        {
            System.out.println("===== Client 2 =====");
            ServerSocket ss = new ServerSocket(3000);
            System.out.println("Waiting for connection");

            Socket con = ss.accept();
            System.out.println("Connected");
            ObjectInputStream in = new ObjectInputStream(con.getInputStream());
            System.out.println((String) in.readObject());

            in.close();
            ss.close();
        }
        catch (Exception e)
        {
            System.out.println(e);
        }
    }
}
```

Client1.java

```
import java.io.*;
import java.net.*;
public class client1
{
    public static void main(String[] args)
    {
        try
        {
            System.out.println("===== Client 1 =====");
            client1 cli = new client1();
            int Tp = 2000;
            int R = 0;
            int Tb = 0;

            for (int i = 1; i <= 15; i++)
            {
                System.out.println("attempt : " + i);
                if (cli.send() == "sent")
                {
                    break;
                }
            }
        }
    }
}
```



```

    }
    else
    {
        R = 2^i-1;
        System.out.println("Selected Random number :"+R);
        Tb = R*Tp;
        System.out.println("waiting for next attempt in seconds): "+Tb);
        Thread.sleep(Tb);
    }
}
}
catch (InterruptedException)
{
    System.out.println(e);
}
}
String send()
{
    String str=null;
    try
    {
        Socket soc = new Socket("localhost",3000);
        ObjectOutputStream = new ObjectOutputStream(soc.getOutputStream());
        String msg = "CNLAB";
        out.writeObject(msg);
        System.out.println("Message sent : "+msg);
        str = "sent";
        soc.close();
    }
    catch(Exception e)
    {
        str = "collision occured";
        String msg = null;
        System.out.println("Message sent : "+msg);
    }
    return str;
}
}
}

```

OUTPUT

```

C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.22000.675]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\CSMA-CD\src>java Server.java
Waiting for connection
Connected
CNLAB
C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\CSMA-CD\src>

C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.22000.675]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\CSMA-CD\src>java client1.java
Client 1
attempt : 1
Message sent : CNLAB
C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\CSMA-CD\src>

```

(b) Write a program to implement the Data link layer framing method **bit stuffing**.

```
import java.util.*;
public class Bit
{
    public static void main(String[] args)
    {
        int i, count=0;
        Scanner str=new Scanner(System.in);
        System.out.println("Enter bits : ");
        String s1=str.nextLine();

        for(i=0;i<s1.length();i++)
        {
            if(s1.charAt(i)=='1')
                count++;
            if(s1.charAt(i)=='0')
                count=0;
            System.out.print(s1.charAt(i));
            if(count==5)
            {
                System.out.print("0");
                count=0;
                str.close();
            }
        }
    }
}
```

OUTPUT

```
Enter bits :101111111
1011111011
```

9) (a) Write a java program to implement RSA Algorithm.

RSA.java

```
import java.io.DataInputStream;
import java.io.IOException;
import java.math.BigInteger;
import java.util.Random;

public class RSA
{
    private BigInteger p;
    private BigInteger q;
    private BigInteger N;
    private BigInteger phi;
    private BigInteger e;
    private BigInteger d;
    private int bitlength = 1024;
    private Random r;

    public RSA()
    {
        r = new Random();
        p = BigInteger.probablePrime(bitlength, r);
        q = BigInteger.probablePrime(bitlength, r);
        N = p.multiply(q);
        phi = p.subtract(BigInteger.ONE).multiply(q.subtract(BigInteger.ONE));
        e = BigInteger.probablePrime(bitlength / 2, r);

        while (phi.gcd(e).compareTo(BigInteger.ONE) > 0 && e.compareTo(phi) < 0)
        {
            e.add(BigInteger.ONE);
        }
        d = e.modInverse(phi);
    }

    public RSA(BigInteger e, BigInteger d, BigInteger N)
    {
        this.e = e;
        this.d = d;
        this.N = N;
    }

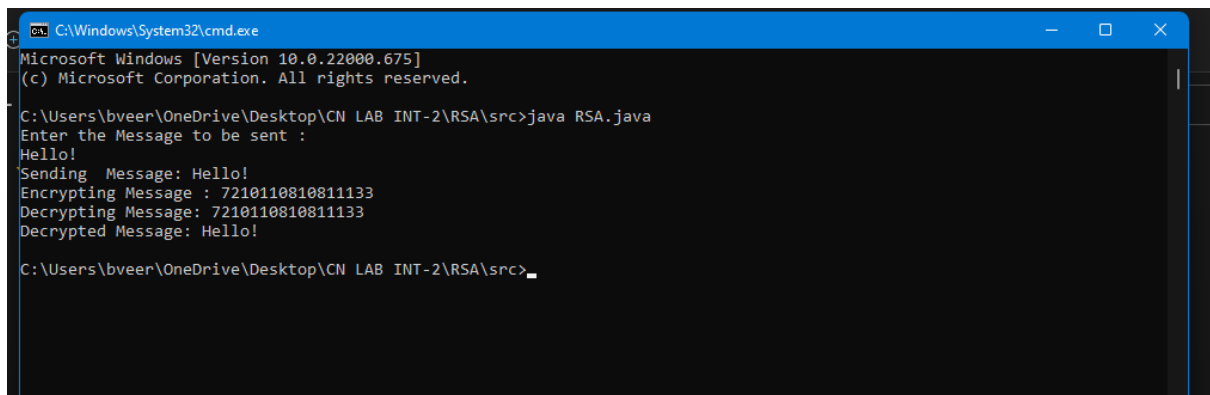
    @SuppressWarnings("deprecation")
    public static void main(String[] args) throws IOException
    {
        RSA rsa = new RSA();
        DataInputStream in = new DataInputStream(System.in);
        String teststring;
        System.out.println("Enter the Message to be sent :");
        teststring = in.readLine();
        System.out.println("Sending Message: " + teststring);
        System.out.println("Encrypting Message : "+
            bytesToString(teststring.getBytes()));
        // encrypt
        byte[] encrypted = rsa.encrypt(teststring.getBytes());
        // decrypt
        byte[] decrypted = rsa.decrypt(encrypted);
    }
}
```

```

System.out.println("Decrypting Message: " + bytesToString(decrypted));
System.out.println("Decrypted Message: " + new String(decrypted));
}
private static String bytesToString(byte[] encrypted)
{
    String test = "";
    for (byte b : encrypted)
    {
        test += Byte.toString(b);
    }
    return test;
}
// Encrypt message
public byte[] encrypt(byte[] message)
{
    return (new BigInteger(message)).modPow(e, N).toByteArray();
}
// Decrypt message
public byte[] decrypt(byte[] message)
{
    return (new BigInteger(message)).modPow(d, N).toByteArray();
}
}

```

OUTPUT



```

C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.22000.675]
(c) Microsoft Corporation. All rights reserved.

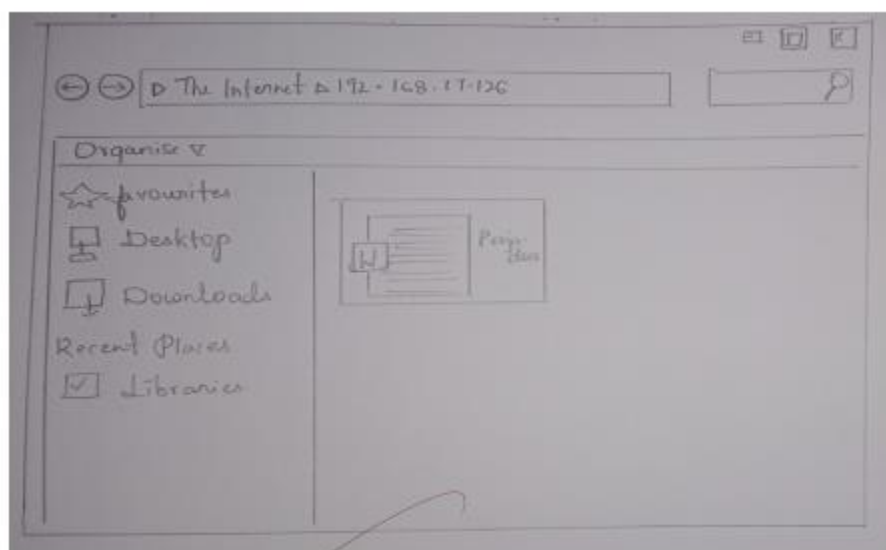
C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\RSA\src>java RSA.java
Enter the Message to be sent :
Hello!
Sending Message: Hello!
Encrypting Message : 7210110810811133
Decrypting Message: 7210110810811133
Decrypted Message: Hello!

C:\Users\bveer\OneDrive\Desktop\CN LAB INT-2\RSA\src>

```

(b) Configure **FTP Server** on a Windows machine using a FTP client.

- 1) Type in cmd ip config to find the ip address of the system
- 2) Create a folder in desktop and store files that you would want to share
- 3) To configure the FTP server go to the control panel, click on programs -> programs and features.
- 4) Click on turn windows features on /off
- 5) Check mark IIS (internet and information services)
- 6) Expand IIS and check mark ftp server
- 7) Expand ftp server check mark ftp extensibility and ftp services
- 8) Make sure web management tools and World Wide Web services are checked.
- 9) Click ok .10) Click on control panel home
- 11) Click on administrative tools (if windows 10 or 11, search for administrative tools).
- 12) Click on IIS MANAGER
- 13) Under connections look for the root (folder name) (available on top right)
- 14) Expand root 15) Expand sites
- 16) Right click on sites and select add ftp site
- 17) Name the ftp site
- 18) Browse the physical path for the folder created in step 2.
- 19) Click on next
- 20) Select the ip address of your computer. And select no ssl under ssl and click on next.
- 21) Select basic authentication
- 22) Select authorization as specific users and type in Gcet (username)
- 23) Check in required permissions.
- 24) Click on finish 25) FTP site is configured.
- 26) Go to MyComputer, type in <ftp://ip> address and click enter2
- 7) Provide user credentials and access the files available in the ftp server. This access is internally with in a network
- 28) To access this ftp outside a network we need to enable port no 21 at the router



10) (a) Write a program to simulate Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA).

Server.java

```
import java.net.*;
public class server
{
    public static void main(String[] args)
    {
        try
        {
            System.out.println("===== Client 2 =====");
            while(true)
            {
                ServerSocket ss = new ServerSocket(3000);
                System.out.println("Waiting for connection");
                ss.accept();
                ss.close();
                System.out.println("Connected");
            }
        }
        catch (Exception e)
        {
            System.out.println(e);
        }
    }
}
```

Client.java

```
import java.net.*;
public class client
{
    public static void main(String[] args)
    {
        try
        {
            System.out.println("===== Client 1 =====");
            client cli = new client();
            int R = 0;
            Boolean bln = false;

            for(int k=1; k<=15; k++)
            {
                System.out.println("Attempt : "+k);
                System.out.println("is Channel idle? ");

                int i = 0;
                while(true)
                {
                    System.out.print(i=i+1);
                    if(cli.isidle())
                    {

```


(b) Write a program to implement the Data link layer framing method **character stuffing**.

```
import java.util.*;
public class Char
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter number of Characters : ");
        int n = sc.nextInt();
        String in[] = new String[n];
        for (int i = 0; i < n; i++)
        {
            in[i] = sc.next();
        }
        for (int i = 0; i < n; i++)
        {
            if (in[i].equals("DLE"))
            {
                in[i] = "DLE DLE";
            }
        }
        System.out.print("Transmitted Message is  "+"DLE STX ");
        for (int i = 0; i < n; i++)
        {
            System.out.print(in[i] + " ");
        }
        System.out.print("DLE ETX");
        sc.close();
        int i = 0;
        System.out.println("\nOriginal Message : "+in[i]);
    }
}
```

OUTPUT

```
Enter number of Characters :1
DOODLE
Transmitted Message is  DLE STX DOODLE DLE ETX
Original Message : DOODLE
```
