```
#PROGRAM-1

set ns [new Simulator]
set nf [open lab1.nam w]
$ns namtrace-all $nf
set tf [open lab1.tr w]
$ns trace-all $tf
proc finish {} {
global ns nf tf
$ns flush-trace
close $nf
close $tf
exec nam lab1.nam &
exit 0
}
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
$ns duplex-link $n0 $n2 200Mb 10ms DropTail
$ns duplex-link $n1 $n2 100Mb 5ms DropTail
$ns duplex-link $n2 $n3 1Mb 1000ms DropTail
$ns queue-limit $n0 $n2 10
$ns queue-limit $n1 $n2 10
set udp0 [new Agent/UDP]
$ns attach-agent $n0 $udp0
set cbr0 [new Application/Traffic/CBR]
$cbr0 set packetSize_ 500
$cbr0 set interval_ 0.005
$cbr0 attach-agent $udp0
set udp1 [new Agent/UDP]
$ns attach-agent $n1 $udp1
set cbr1 [new Application/Traffic/CBR]
$cbr1 attach-agent $udp1
set udp2 [new Agent/UDP]
$ns attach-agent $n2 $udp2
set cbr2 [new Application/Traffic/CBR]
$cbr2 attach-agent $udp2
set null0 [new Agent/Null]
$ns attach-agent $n3 $null0
$ns connect $udp0 $null0
$ns connect $udp1 $null0
$ns at 0.1 "$cbr0 start"
$ns at 0.2 "$cbr1 start"
$ns at 1.0 "finish"
$ns run


#awk

BEGIN
{
C=0;
}
{
If ($1=="d")
{
c++;
printf("%s\t%s\n",$5,$11);
}
}
END{
printf("The number of packets dropped =%d\n",c);
}
```

```
#PROGRAM-2

set ns [new Simulator]
set tf [open prg2.tr w]
$ns trace-all $tf
set topo [new Topography]
$topo load_flatgrid 1000 1000
set nf [open prg2.nam w]
$ns namtrace-all-wireless $nf 1000 1000
$ns node-config -adhocRouting DSDV \
-llType LL \
-macType Mac/802_11 \
-ifqType Queue/DropTail \
-ifqLen 50 \
-phyType Phy/WirelessPhy \
-channelType Channel/WirelessChannel \
-propType Propagation/TwoRayGround \
-antType Antenna/OmniAntenna \
-topoInstance $topo \
-agentTrace ON \
-routerTrace ON
create-god 3
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
$n0 label "tcp0"
$n1 label "sink1/tcp1"
$n2 label "sink2"
$n0 set X_ 50
$n0 set Y_ 50
$n0 set Z_ 0
$n1 set X_ 100
$n1 set Y_ 100
$n1 set Z_ 0
$n2 set X_ 600
$n2 set Y_ 600
$n2 set Z_ 0
$ns at 0.1 "$n0 setdest 50 50 15"
$ns at 0.1 "$n1 setdest 100 100 25"
$ns at 0.1 "$n2 setdest 600 600 25"
set tcp0 [new Agent/TCP]
$ns attach-agent $n0 $tcp0
set ftp0 [new Application/FTP]
$ftp0 attach-agent $tcp0
set sink1 [new Agent/TCPSink]
$ns attach-agent $n1 $sink1
$ns connect $tcp0 $sink1
set tcp1 [new Agent/TCP]
$ns attach-agent $n1 $tcp1
set ftp1 [new Application/FTP]
$ftp1 attach-agent $tcp1
set sink2 [new Agent/TCPSink]
$ns attach-agent $n2 $sink2
$ns connect $tcp1 $sink2
$ns at 5 "$ftp0 start"
$ns at 5 "$ftp1 start"
$ns at 100 "$n1 setdest 550 550 15"
$ns at 190 "$n1 setdest 70 70 15"
proc finish { } {
global ns nf tf
$ns flush-trace
```

```
exec nam prg2.nam &
close $tf
exit 0
}
$ns at 250 "finish"
$ns run

#awk

BEGIN{
count1=0
count2=0
pack1=0
pack2=0
time1=0
time2=0
}
{ if($1= ="r"&& $3= ="_1_" && $4= ="AGT")
{ count1++
pack1=pack1+$8
time1=$2 }
if($1= ="r" && $3= ="_2_" && $4= ="AGT")
{ count2++
pack2=pack2+$8
time2=$2 }
}
END{
printf("The Throughput from n0 to n1: %f Mbps \n”,
((count1*pack1*8)/(time1*1000000)));
printf("The Throughput from n1 to n2: %f Mbps",
((count2*pack2*8)/(time2*1000000)));
}



#PROGRAM-3

import java.io.*;
class Crc
{
public static void main(String args[]) throws IOException
{
BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
int[ ] data;
int[ ]div;
int[ ]divisor;
int[ ]rem;
int[ ] crc;
int data_bits, divisor_bits, tot_length;
System.out.println("Enter number of data bits : ");
data_bits=Integer.parseInt(br.readLine());
data=new int[data_bits];
System.out.println("Enter data bits : ");
for(int i=0; i<data_bits; i++)
data[i]=Integer.parseInt(br.readLine());
System.out.println("Enter number of bits in divisor : ");
divisor_bits=Integer.parseInt(br.readLine());
divisor=new int[divisor_bits];
System.out.println("Enter Divisor bits : ");
for(int i=0; i<divisor_bits; i++)
divisor[i]=Integer.parseInt(br.readLine());
/* System.out.print("Data bits are : ");
for(int i=0; i< data_bits; i++)
System.out.print(data[i]);
System.out.println();
System.out.print("divisor bits are : ");
for(int i=0; i< divisor_bits; i++)
System.out.print(divisor[i]);
System.out.println();
*/ tot_length=data_bits+divisor_bits-1;
div=new int[tot_length];
rem=new int[tot_length];
crc=new int[tot_length];
/*------------------ CRC GENERATION-----------------------*/
for(int i=0;i<data.length;i++)
div[i]=data[i];
System.out.print("Dividend (after appending 0's) are : ");

for(int i=0; i< div.length; i++)
System.out.print(div[i]);
System.out.println();
for(int j=0; j<div.length; j++){
rem[j] = div[j];
}
rem=divide(div, divisor, rem);
for(int i=0;i<div.length;i++) //append dividend and ramainder
{
crc[i]=(div[i]^rem[i]);
}
System.out.println();
System.out.println("CRC code : ");
for(int i=0;i<crc.length;i++)
System.out.print(crc[i]);
/*-------------------ERROR DETECTION---------------------*/
System.out.println();
System.out.println("Enter CRC code of "+tot_length+" bits : ");
for(int i=0; i<crc.length; i++)
crc[i]=Integer.parseInt(br.readLine());
/* System.out.print("crc bits are : ");
for(int i=0; i< crc.length; i++)
System.out.print(crc[i]);
System.out.println();
*/
for(int j=0; j<crc.length; j++){
rem[j] = crc[j];
}
rem=divide(crc, divisor, rem);
for(int i=0; i< rem.length; i++)
{
if(rem[i]!=0)
{
System.out.println("Error");
break;
}
if(i==rem.length-1)
System.out.println("No Error");
}
System.out.println("THANK YOU.... :)");
}
static int[] divide(int div[],int divisor[], int rem[])
{
int cur=0;
while(true)
{
for(int i=0;i<divisor.length;i++)
rem[cur+i]=(rem[cur+i]^divisor[i]);
while(rem[cur]==0 && cur!=rem.length-1)
```

```
cur++;
if((rem.length-cur)<divisor.length)
break;
}
return rem;
}
}
```

```
#PROGRAM-4

set ns [ new Simulator ]
set nf [ open lab4.nam w ]
$ns namtrace-all $nf
set tf [ open lab4.tr w ]
$ns trace-all $tf
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]
set n5 [$ns node]
$ns duplex-link $n0 $n4 1005Mb 1ms DropTail
$ns duplex-link $n1 $n4 50Mb 1ms DropTail
$ns duplex-link $n2 $n4 2000Mb 1ms DropTail
$ns duplex-link $n3 $n4 200Mb 1ms DropTail
$ns duplex-link $n4 $n5 1Mb 1ms DropTail
set p1 [new Agent/Ping]
$ns attach-agent $n0 $p1
$p1 set packetSize_ 50000
$p1 set interval_ 0.0001
set p2 [new Agent/Ping]
$ns attach-agent $n1 $p2
set p3 [new Agent/Ping]
$ns attach-agent $n2 $p3
$p3 set packetSize_ 30000
$p3 set interval_ 0.00001
set p4 [new Agent/Ping]
$ns attach-agent $n3 $p4
set p5 [new Agent/Ping]
$ns attach-agent $n5 $p5
$ns queue-limit $n0 $n4 5
$ns queue-limit $n2 $n4 3
$ns queue-limit $n4 $n5 2
Agent/Ping instproc recv {from rtt} {
$self instvar node_
puts "node [$node_ id]received answer from $from with round trip time $rtt msec"
}
$ns connect $p1 $p5
$ns connect $p3 $p4
proc finish { } {
global ns nf tf
$ns flush-trace
close $nf
close $tf
exec nam lab2.nam &
exit 0
}
$ns at 0.1 "$p1 send"
$ns at 0.2 "$p1 send"
$ns at 0.3 "$p1 send"
$ns at 0.4 "$p1 send"
$ns at 0.5 "$p1 send"
```

```
$ns at 0.6 "$p1 send"
$ns at 0.7 "$p1 send"
$ns at 0.8 "$p1 send"
$ns at 0.9 "$p1 send"
$ns at 1.0 "$p1 send"
$ns at 1.1 "$p1 send"
$ns at 1.2 "$p1 send"
$ns at 1.3 "$p1 send"
$ns at 1.4 "$p1 send"
$ns at 1.5 "$p1 send"
$ns at 1.6 "$p1 send"
$ns at 1.7 "$p1 send"
$ns at 1.8 "$p1 send"
$ns at 1.9 "$p1 send"
$ns at 2.0 "$p1 send"
$ns at 2.1 "$p1 send"
$ns at 2.2 "$p1 send"
$ns at 2.3 "$p1 send"
$ns at 2.4 "$p1 send"
$ns at 2.5 "$p1 send"
$ns at 2.6 "$p1 send"
$ns at 2.7 "$p1 send"
$ns at 2.8 "$p1 send"
$ns at 2.9 "$p1 send"
$ns at 0.1 "$p3 send"
$ns at 0.2 "$p3 send"
$ns at 0.3 "$p3 send"
$ns at 0.4 "$p3 send"
$ns at 0.5 "$p3 send"
$ns at 0.6 "$p3 send"
$ns at 0.7 "$p3 send"
$ns at 0.8 "$p3 send"
$ns at 0.9 "$p3 send"
$ns at 1.0 "$p3 send"
$ns at 1.1 "$p3 send"
$ns at 1.2 "$p3 send"
$ns at 1.3 "$p3 send"
$ns at 1.4 "$p3 send"
$ns at 1.5 "$p3 send"
$ns at 1.6 "$p3 send"
$ns at 1.7 "$p3 send"
$ns at 1.8 "$p3 send"
$ns at 1.9 "$p3 send"
$ns at 2.0 "$p3 send"
$ns at 2.1 "$p3 send"
$ns at 2.2 "$p3 send"
$ns at 2.3 "$p3 send"
$ns at 2.4 "$p3 send"
$ns at 2.5 "$p3 send"
$ns at 2.6 "$p3 send"
$ns at 2.7 "$p3 send"
$ns at 2.8 "$p3 send"
$ns at 2.9 "$p3 send"
$ns at 3.0 "finish"
$ns run

#awk

BEGIN{
drop=0;
}
{
if($1=="d" )
{
```

```
drop++;
}
}
END{
printf("Total number of %s packets dropped due to congestion =%d\n",$5, drop);
}
```

#PROGRAM-5

```
import java.util.Scanner;
public class BellmanFord
{
private int D[];
private int num_ver;
public static final int MAX_VALUE = 999;
public BellmanFord(int num_ver)
{
 this.num_ver = num_ver;
 D = new int[num_ver + 1];
}
public void BellmanFordEvaluation(int source, int A[][])
{
for (int node = 1; node <= num_ver; node++)
{
D[node] = MAX_VALUE;
}
D[source] = 0;
for (int node = 1; node <= num_ver - 1; node++)
{
for (int sn = 1; sn <= num_ver; sn++)
{
for (int dn = 1; dn <= num_ver; dn++)
{
if (A[sn][dn] != MAX_VALUE)
{
if (D[dn] > D[sn]+ A[sn][dn])
D[dn] = D[sn] + A[sn][dn];
}
}
}
}
for (int sn = 1; sn <= num_ver; sn++)
{
for (int dn = 1; dn <= num_ver; dn++)
{
if (A[sn][dn] != MAX_VALUE)
{
if (D[dn] > D[sn]+ A[sn][dn])
System.out.println("The Graph contains negative egde cycle");
}
}
}
for (int vertex = 1; vertex <= num_ver; vertex++)
{
System.out.println("distance of source " + source + " to "+ vertex + " is " +
D[vertex]);
}
}
public static void main(String[ ] args)
{
 int num_ver = 0;
 int source;
Scanner scanner = new Scanner(System.in);
 System.out.println("Enter the number of vertices");
 num_ver = scanner.nextInt();
 int A[][] = new int[num_ver + 1][num_ver + 1];
 System.out.println("Enter the adjacency matrix");
 for (int sn = 1; sn <= num_ver; sn++)
 {
 for (int dn = 1; dn <= num_ver; dn++)
 {
 A[sn][dn] = scanner.nextInt();
 if (sn == dn)
 {
 A[sn][dn] = 0;
 continue;
 }
if (A[sn][dn] == 0)
 {
 A[sn][dn] = MAX_VALUE;
 }
 }
 }
 System.out.println("Enter the source vertex");
 source = scanner.nextInt();
 BellmanFord b = new BellmanFord (num_ver);
b.BellmanFordEvaluation(source, A);
 scanner.close();
 }
 }
```

```
#PROGRAM-6

set ns [new Simulator]
set tf [open lab3.tr w]
$ns trace-all $tf
set nf [open lab3.nam w]
$ns namtrace-all $nf
set n0 [$ns node]
$n0 color "magenta"
$n0 label "src1"
set n1 [$ns node]
set n2 [$ns node]
$n2 color "magenta"
$n2 label "src2"
set n3 [$ns node]
$n3 color "blue"
$n3 label "dest2"
set n4 [$ns node]
set n5 [$ns node]
$n5 color "blue"
$n5 label "dest1"

$ns make-lan "$n0 $n1 $n2 $n3 $n4" 100Mb 100ms LL Queue/DropTail Mac/802_3
$ns duplex-link $n4 $n5 1Mb 1ms DropTail

set tcp0 [new Agent/TCP]
$ns attach-agent $n0 $tcp0
set ftp0 [new Application/FTP]
$ftp0 attach-agent $tcp0
$ftp0 set packetSize_ 500
$ftp0 set interval_ 0.0001

set sink5 [new Agent/TCPSink]
```

```
$ns attach-agent $n5 $sink5
$ns connect $tcp0 $sink5

set tcp2 [new Agent/TCP]
$ns attach-agent $n2 $tcp2
set ftp2 [new Application/FTP]
$ftp2 attach-agent $tcp2
$ftp2 set packetSize_ 600
$ftp2 set interval_ 0.001

set sink3 [new Agent/TCPSink]
$ns attach-agent $n3 $sink3
$ns connect $tcp2 $sink3

set file1 [open file1.tr w]
$tcp0 attach $file1
set file2 [open file2.tr w]
$tcp2 attach $file2

$tcp0 trace cwnd_
$tcp2 trace cwnd_

proc finish { } {
    global ns nf tf
    $ns flush-trace
    close $tf
    close $nf
    exec nam lab3.nam &
    exit 0
}

$ns at 0.1 "$ftp0 start"
$ns at 5 "$ftp0 stop"
$ns at 7 "$ftp0 start"
$ns at 0.2 "$ftp2 start"
$ns at 8 "$ftp2 stop"
$ns at 14 "$ftp0 stop"
$ns at 10 "$ftp2 start"
$ns at 15 "$ftp2 stop"
$ns at 16 "finish"

$ns run

#awk

BEGIN {
}
{
if($6 =="cwnd_")
printf("%f\t%f\t\n",$1,$7);
} END {
}

/*   TO GET GRAPH
awk –f lab3.awk file1.tr > a1
awk –f lab3.awk file2.tr > a2
xgraph a1 a2  */




#PROGRAM-7

import java.io.*;
import java.util.*;
class Queue
{
 int q[],f=0,r=0,size;
 void insert(int n)
 {
 Scanner in = new Scanner(System.in);
 q=new int[10];
 for(int i=0;i<n;i++)
 {
 System.out.print("\nEnter " + i + " element: ");
 int ele=in.nextInt();
 if(r+1>10)
 {
 System.out.println("\nQueue is full \nLost Packet: "+ele); break;
 }
 else
 {
 r++;
 q[i]=ele;
 }
 }
 }
void delete()
{
 Scanner in = new Scanner(System.in);
 Thread t=new Thread();
 if(r==0)
 System.out.print("\nQueue empty ");
 else
 {
 for(int i=f;i<r;i++)
 {
 try
 {
 t.sleep(1000);
 }
 catch(Exception e){}
 System.out.print("\nLeaked Packet: "+q[i]);
 f++;
 }
 }
 System.out.println();
 }
}
class Leaky extends Thread
{
 public static void main(String ar[]) throws Exception
 {
 Queue q=new Queue();
 Scanner src=new Scanner(System.in);
 System.out.println("\nEnter the packets to be sent:");
 int size=src.nextInt();
 q.insert(size);
 q.delete();
 }
 }
```