VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB RECORD

Computer Network Lab (23CS5PCCON)

Submitted by

Tanish M V(1BM22CS302)

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING

(Autonomous Institution under VTU)

BENGALURU-560019

Academic Year 2024-25 (odd)

B.M.S. College of Engineering

Bull Temple Road, Bangalore 560019

(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled " Computer Network (23CS5PCCON)" carried out by **Tanish M V(1BM22CS302),** who is a bonafide student of **B.M.S. College of Engineering.** It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements of the above-mentioned subject and the work prescribed for the said degree.

Dr. Shashikala Associate Professor Department of CSE, BMSCE	Dr. Kavitha Sooda Professor & HOD Department of CSE, BMSCE

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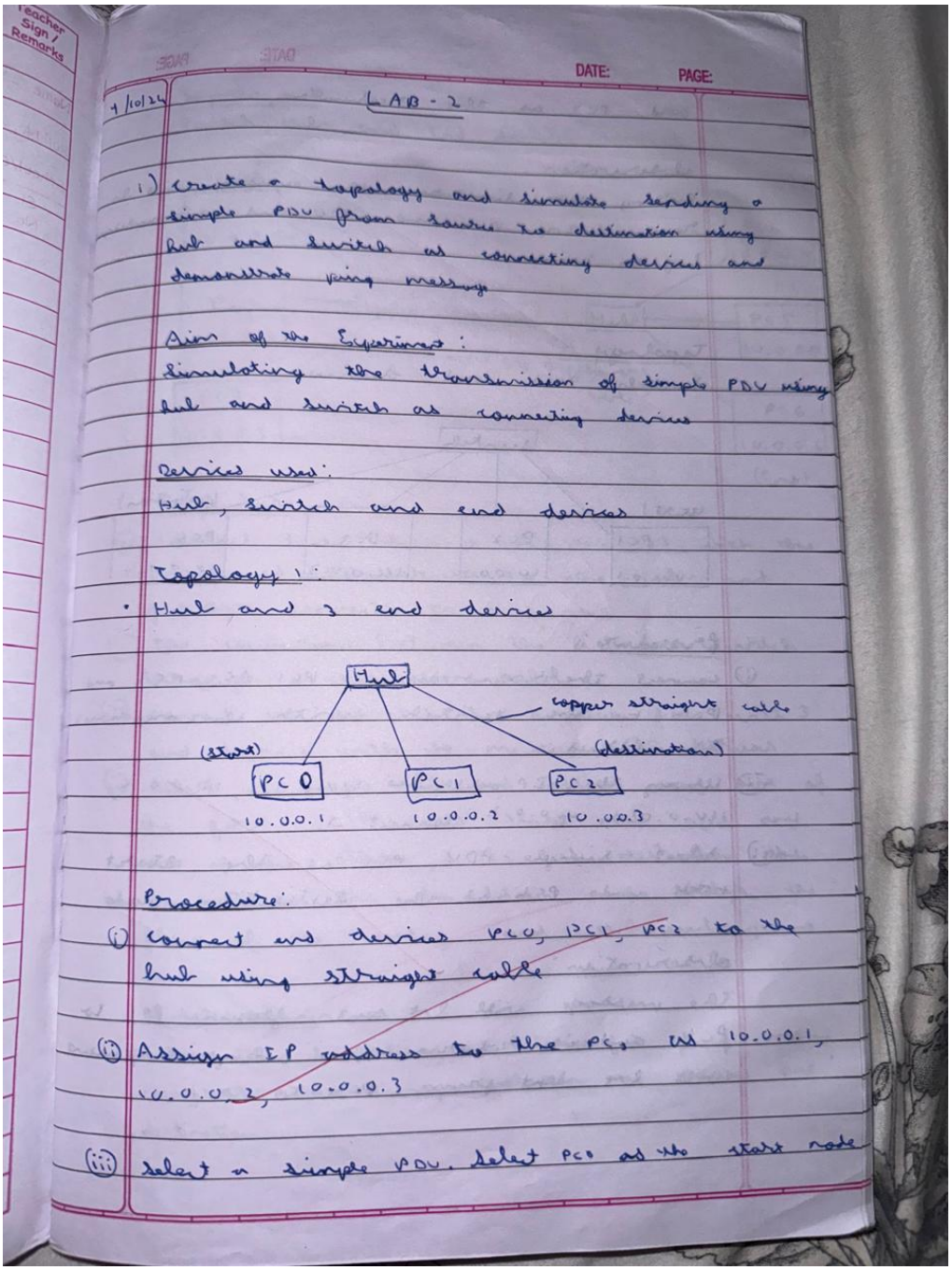
Github Link:

https://github.com/Tanishmv/CN_Lab

Program 1

Aim: Create a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices and demonstrate ping messages.

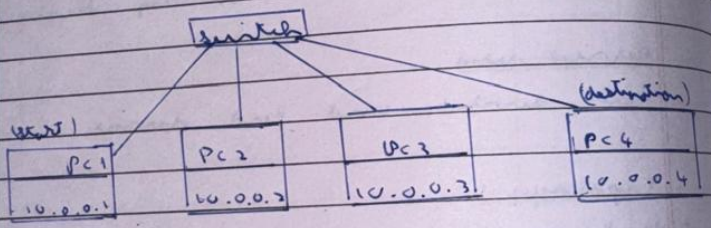
Topology , Procedure and Observation:



and PC2 as the destination

Observation:
During the simulation, the message will be received by PC2 and PC4 and acknowledged by the same.

Topology 2:
Switch and end device



Procedure:
(i) connect the 4 end devices PC1, PC2, PC3 and PC4 to the switch with the mentioned IP address.
(ii) Using the IP addresses 10.0.0.1, 10.0.0.2, 10.0.0.3, 10.0.0.4 connect it
(iii) Select simple PDU, PC1 as the start node and PC4 as the destination node

Observation:
The message will be sent from PC1 to PC4 and in return the acknowledgement will be sent from PC4 to PC1

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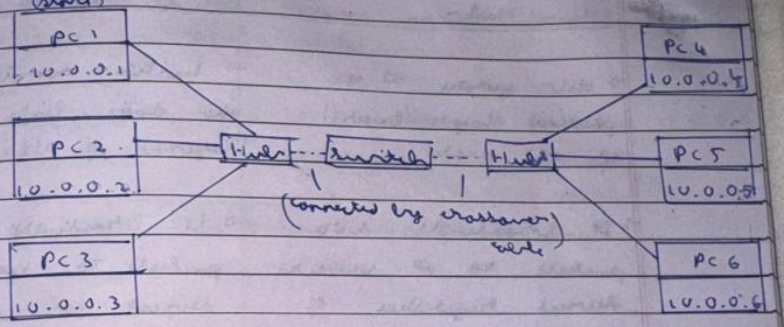
Topology 3:

Switch, Hub and End devices



Procedure

(i) connect 3 end devices PC1, PC2, PC3 with the mentioned IP addresses to the Hub and further connected to a Switch

(ii) the connection between the hub and switch through a cross over cable

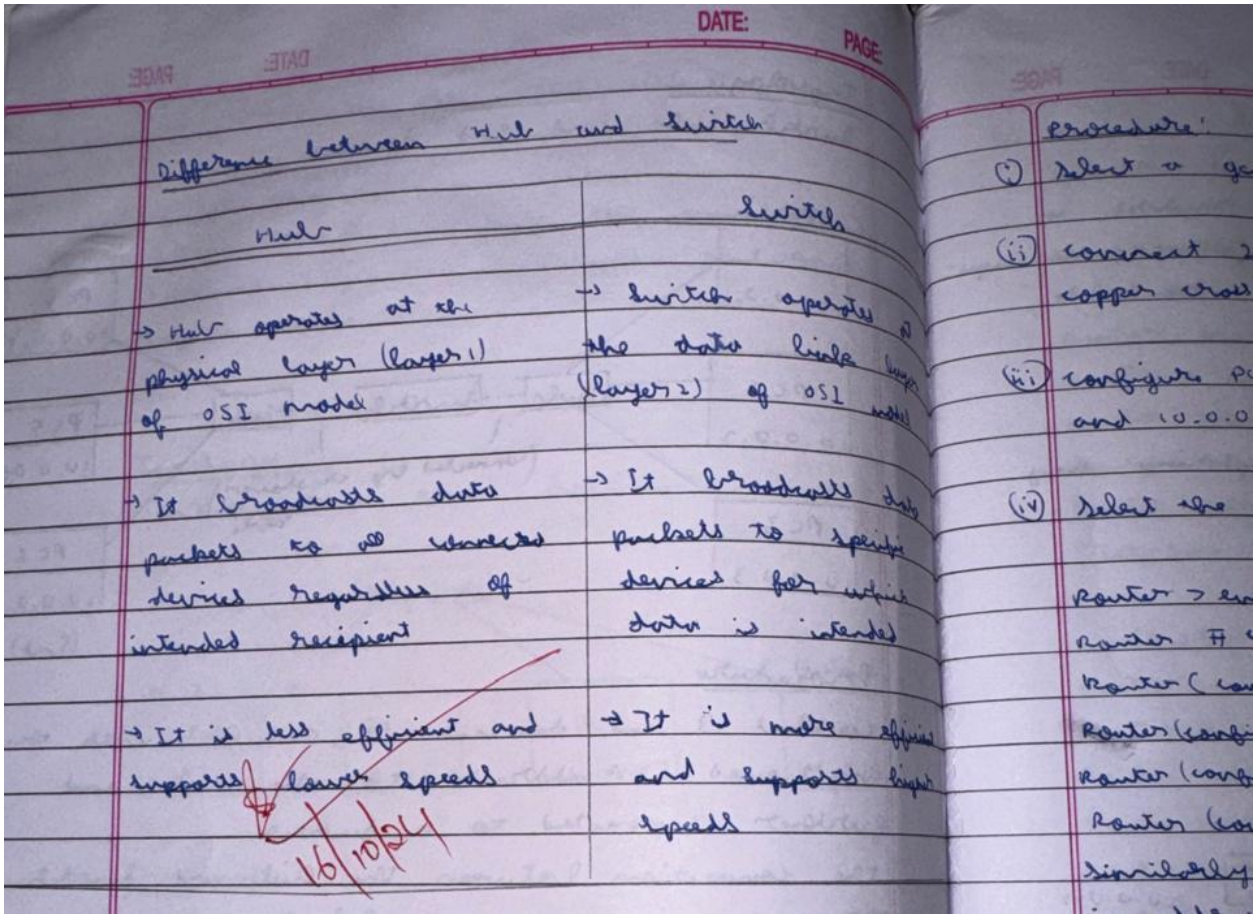
(iii) connect the switch to another hub with 3 end devices with the mentioned IP address

(iv) Select a simple PDU and assign any one of the first 3 PCs as start node and any one of the other 3 PCs as destination node

(v) Demonstrate the simulation and analyse the flow of the message and acknowledgement

Observation:

During the simulation, a successful ping message confirms connectivity between the source and destination



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Difference between Hub and Switch

Hub	Switch
→ Hub operates at the physical layer (layer 1) of OSI model	→ Switch operates at the data link layer (layer 2) of OSI model
→ It broadcasts data packets to all connected devices regardless of intended recipient	→ It broadcasts data packets to specific devices for which data is intended
→ It is less efficient and supports lower speeds	→ It is more efficient and supports higher speeds

16/10/24

procedure:

(i) Select a

(ii) connect

copper cross

(iii) configure

and 10.0.0

(iv) Select the

Router > en

Router #

Router (co

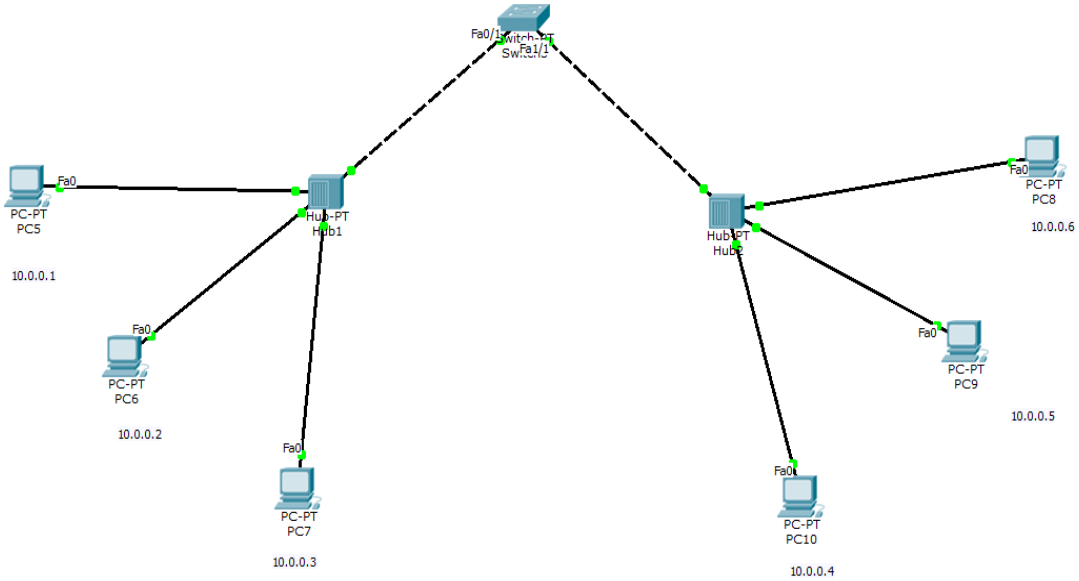
Router (config

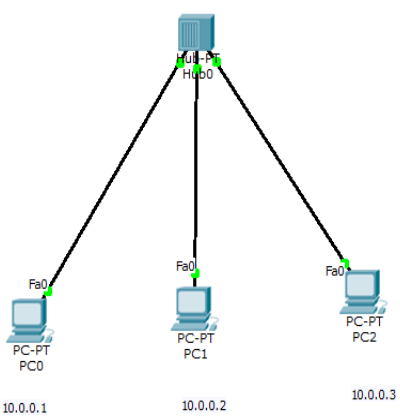
Router (conf

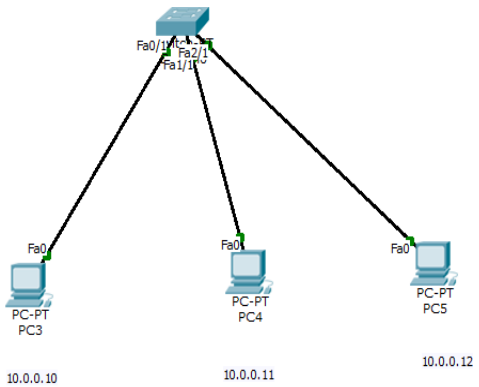
Router (co

similarly

Screen Shots:



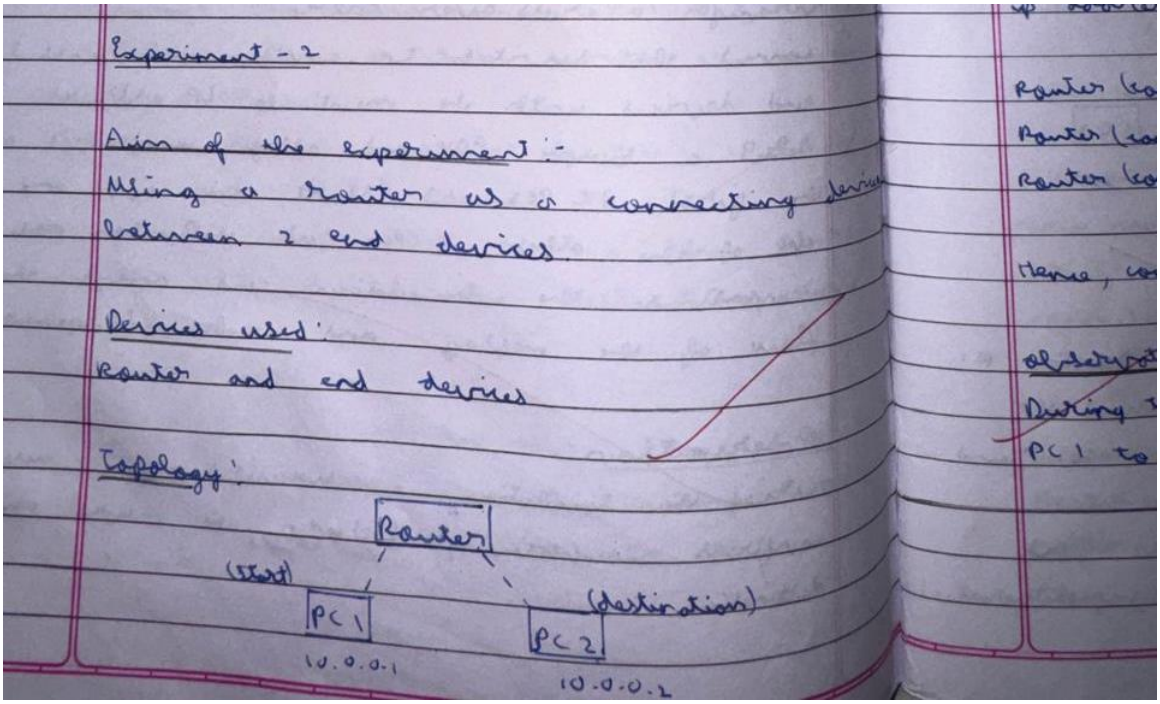




Program 2

Aim: Configure IP address to routers in packet tracer. Explore the following messages: ping responses, destination unreachable, request timed out, reply.

Topology , Procedure and Observation:



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Procedure:

(i) Select a generic router R1

(ii) connect 2 end devices to the router using copper cross over cables

(iii) configure PC1 and PC2 with IP addresses 10.0.0.1 and 10.0.0.2

(iv) Select the router and go to the CLI:

Router > enable
Router # config terminal
Router (config) # interface fastEthernet 0/0
Router (config-if) # ip address 10.0.0.1 255.0.0.0
Router (config-if) # no shutdown
Router (config-if) # exit
Similarly do the same for PC2 but set the ip address as 10.0.0.2 this time in the CLI:

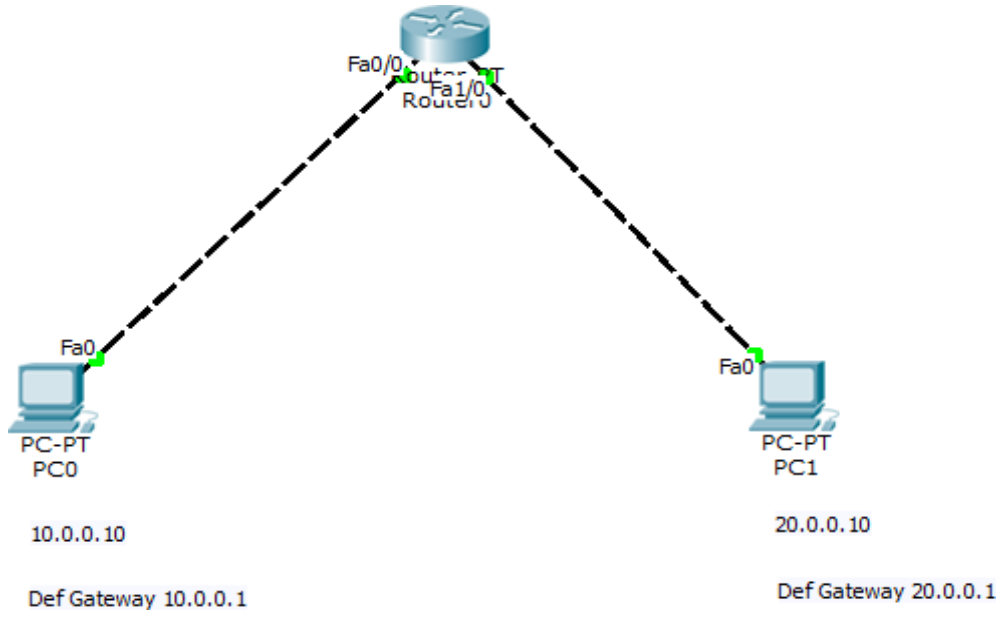
Router (config) # interface fastEthernet 1/0
Router (config-if) # ip address 10.0.0.2 255.0.0.0
Router (config-if) # no shutdown

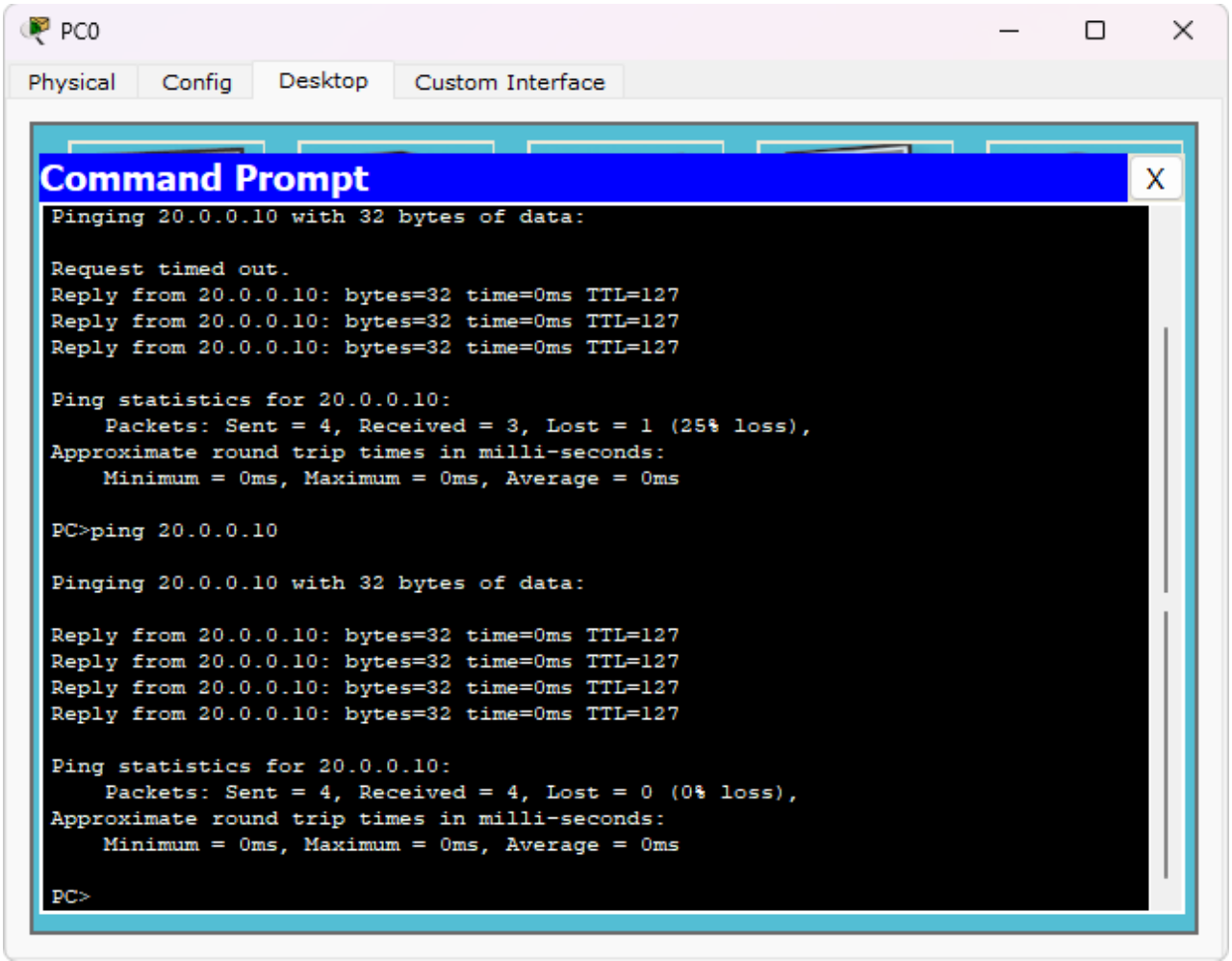
Hence, connection between router and PC is established

Observations:

During the simulation, the message is sent from PC1 to PC2 and acknowledgement is sent back.

Screen Shots:

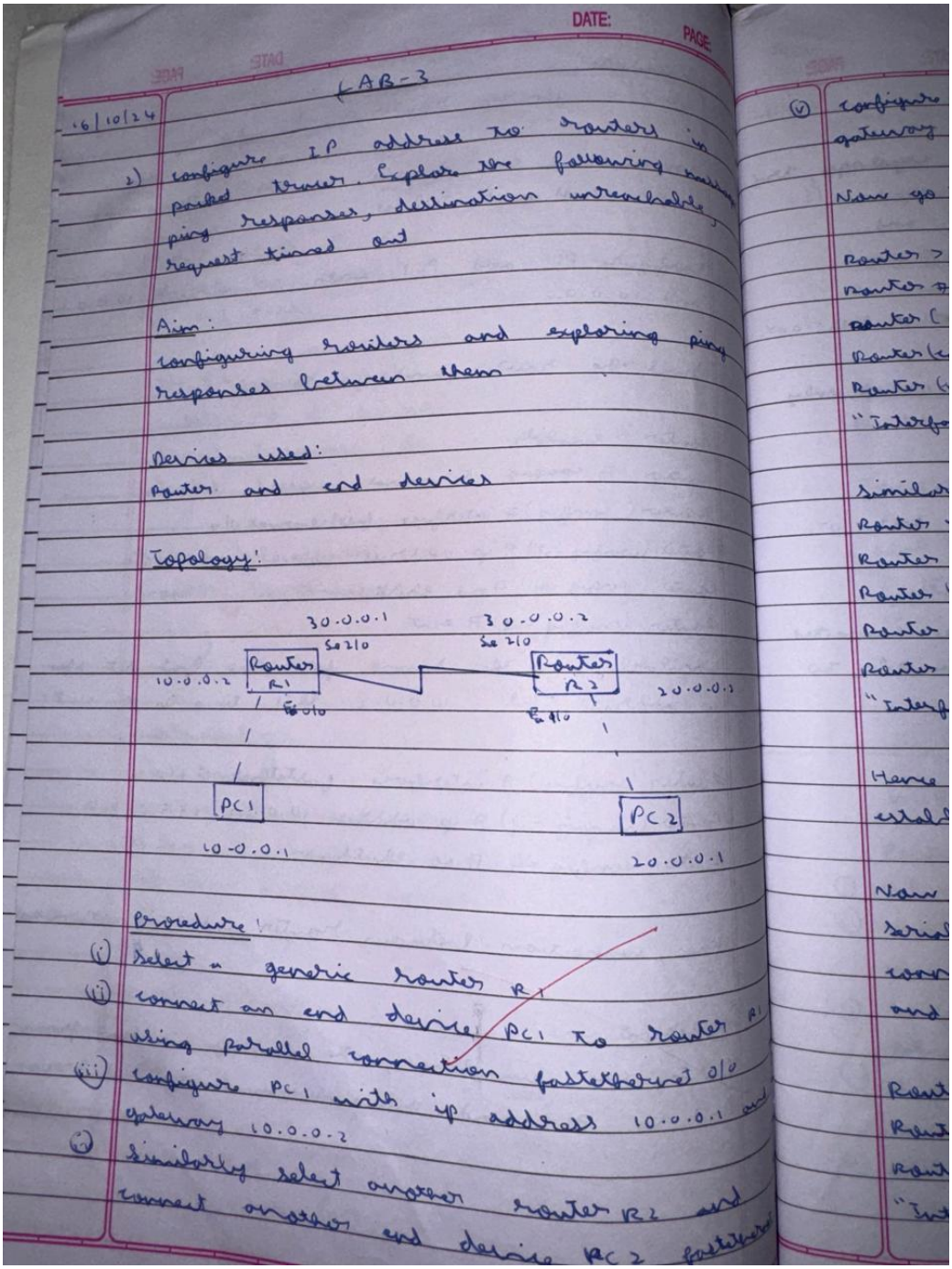


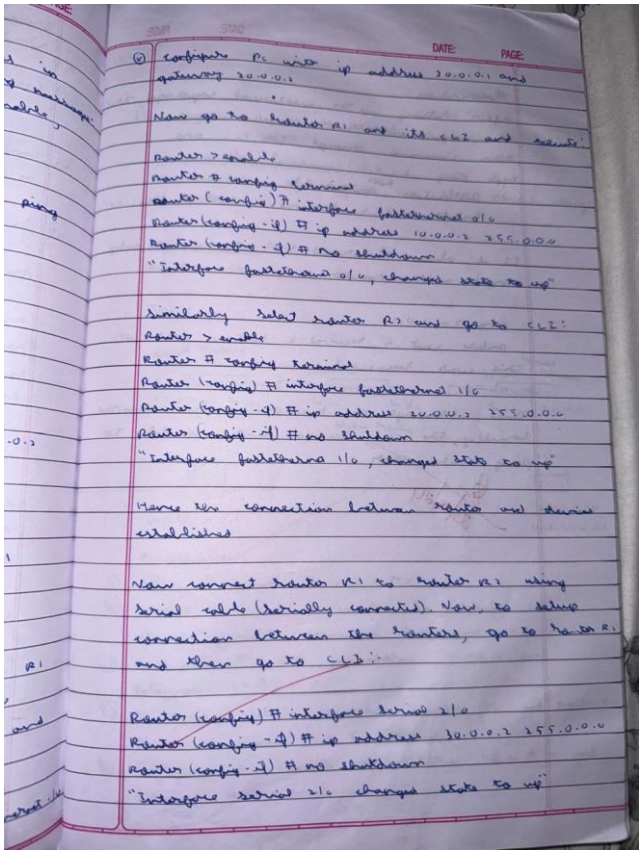


Program 3

Aim: Configure default route, static route to the Router(Part 1).

Topology , Procedure and Observation:





v) configure PC with ip address 10.0.0.1 and gateway 10.0.0.2

Now go to Router R1 and its CLI and execute:

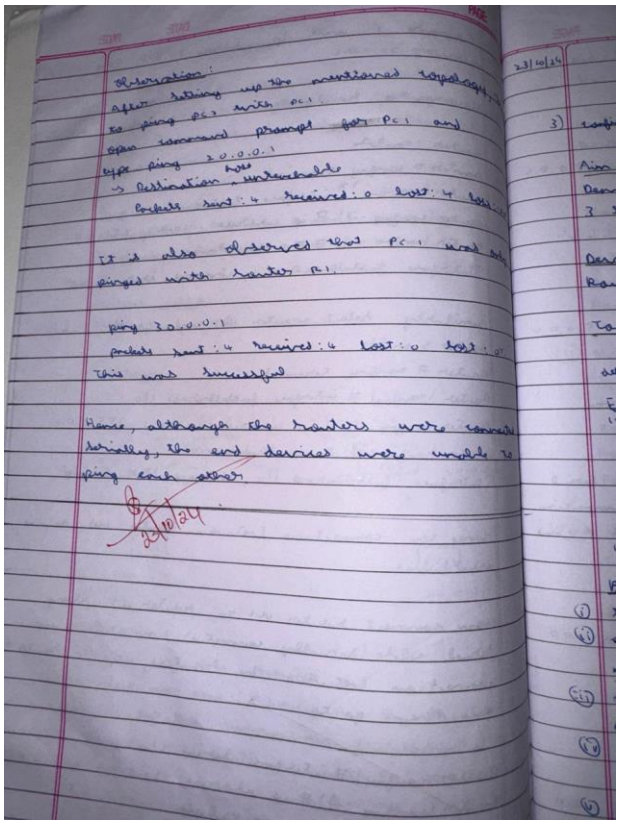
Router > enable
Router # config terminal
Router (config) # interface fastethernet 0/0
Router (config-if) # ip address 10.0.0.2 255.0.0.0
Router (config-if) # no shutdown
"Interface fastethernet 0/0, changed state to up"

Similarly, Now Router R1 and go to CLI:
Router > enable
Router # config terminal
Router (config) # interface fastethernet 1/0
Router (config-if) # ip address 20.0.0.2 255.0.0.0
Router (config-if) # no shutdown
"Interface fastethernet 1/0, changed state to up"

Here the connection between router and device established

Now connect Router R1 to Router R2 using serial cable (serially connects). Now, to setup connection between the routers, go to R2 and then go to CLI:

Router (config) # interface serial 2/0
Router (config-if) # ip address 30.0.0.2 255.0.0.0
Router (config-if) # no shutdown
"Interface serial 2/0 changed state to up"



Observation:
After setting up the mentioned topology, to ping PC1 with PC1
Open command prompt for PC1 and type ping 20.0.0.1
→ Destination host unreachable
Packets sent: 4 received: 0 lost: 4 loss:

It is also observed that PC1 was not pinged with Router R1.

ping 30.0.0.1
Packets sent: 4 received: 4 lost: 0 loss: 0%
This was successful

Hence, although the routers were connected serially, the end devices were unable to ping each other.

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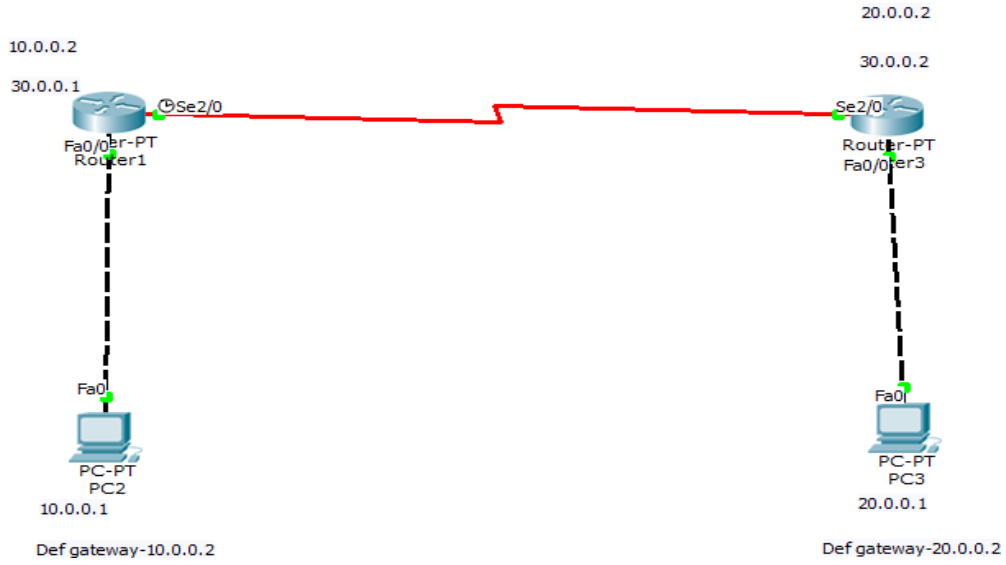
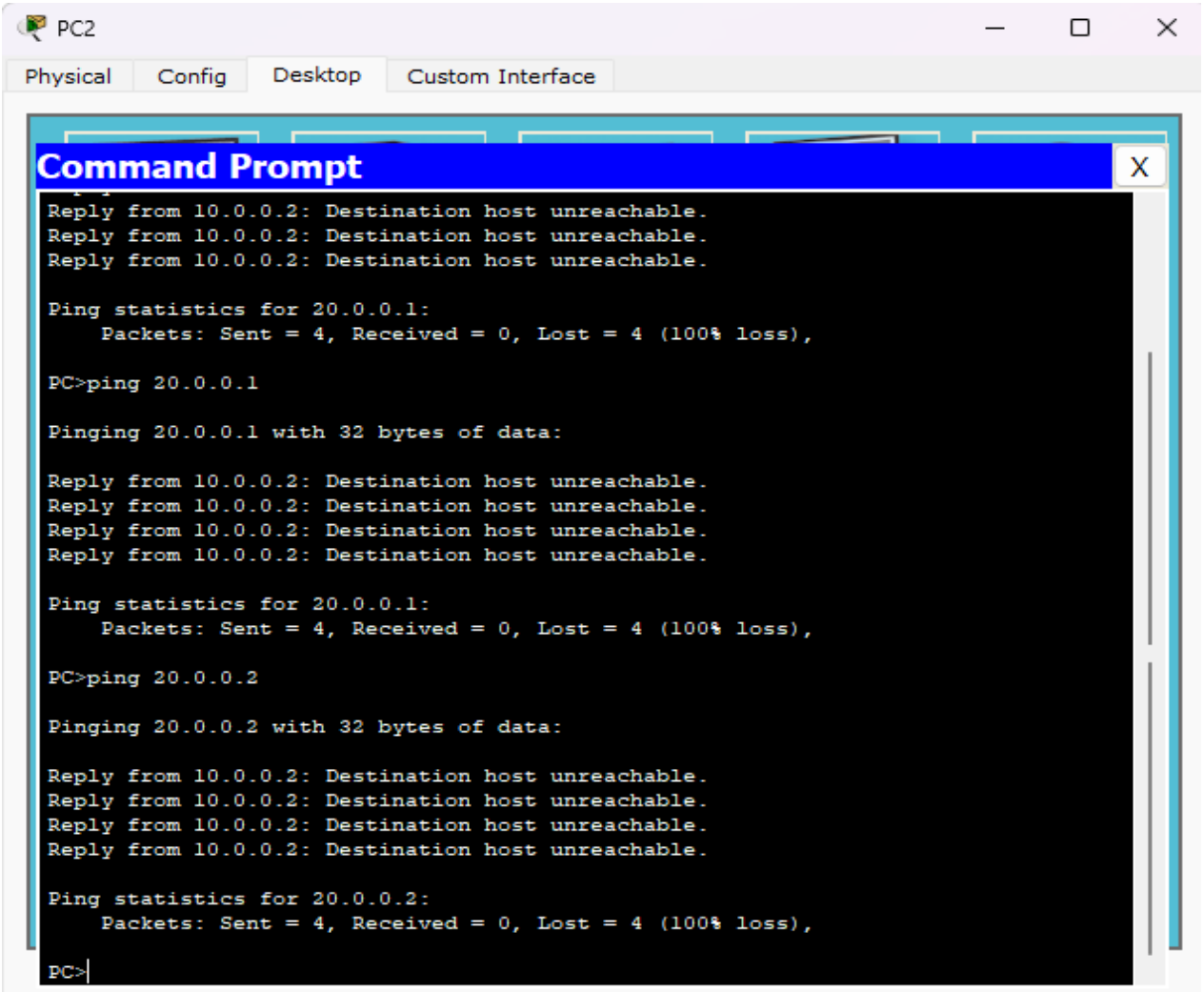
Screen Shots:

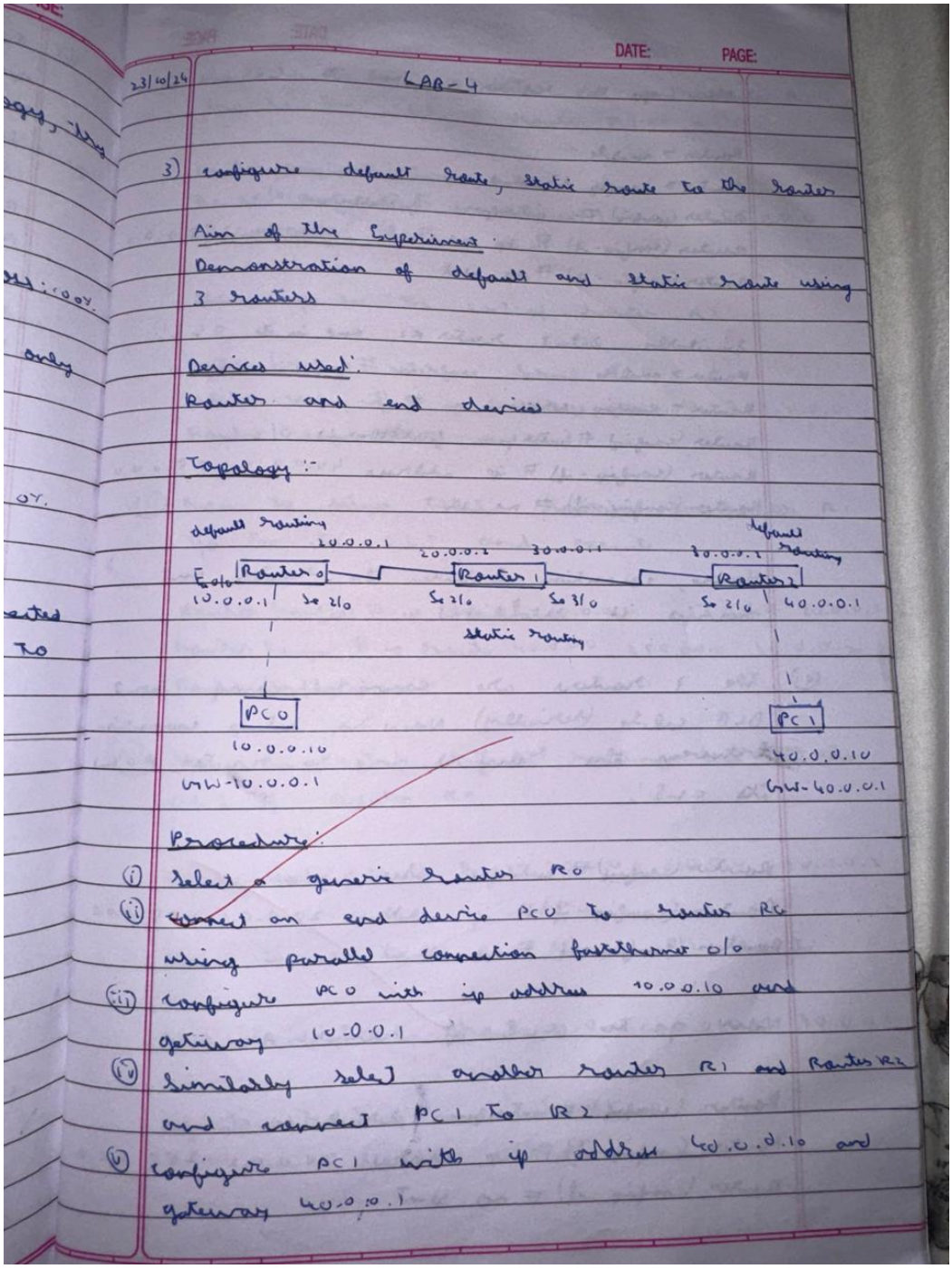


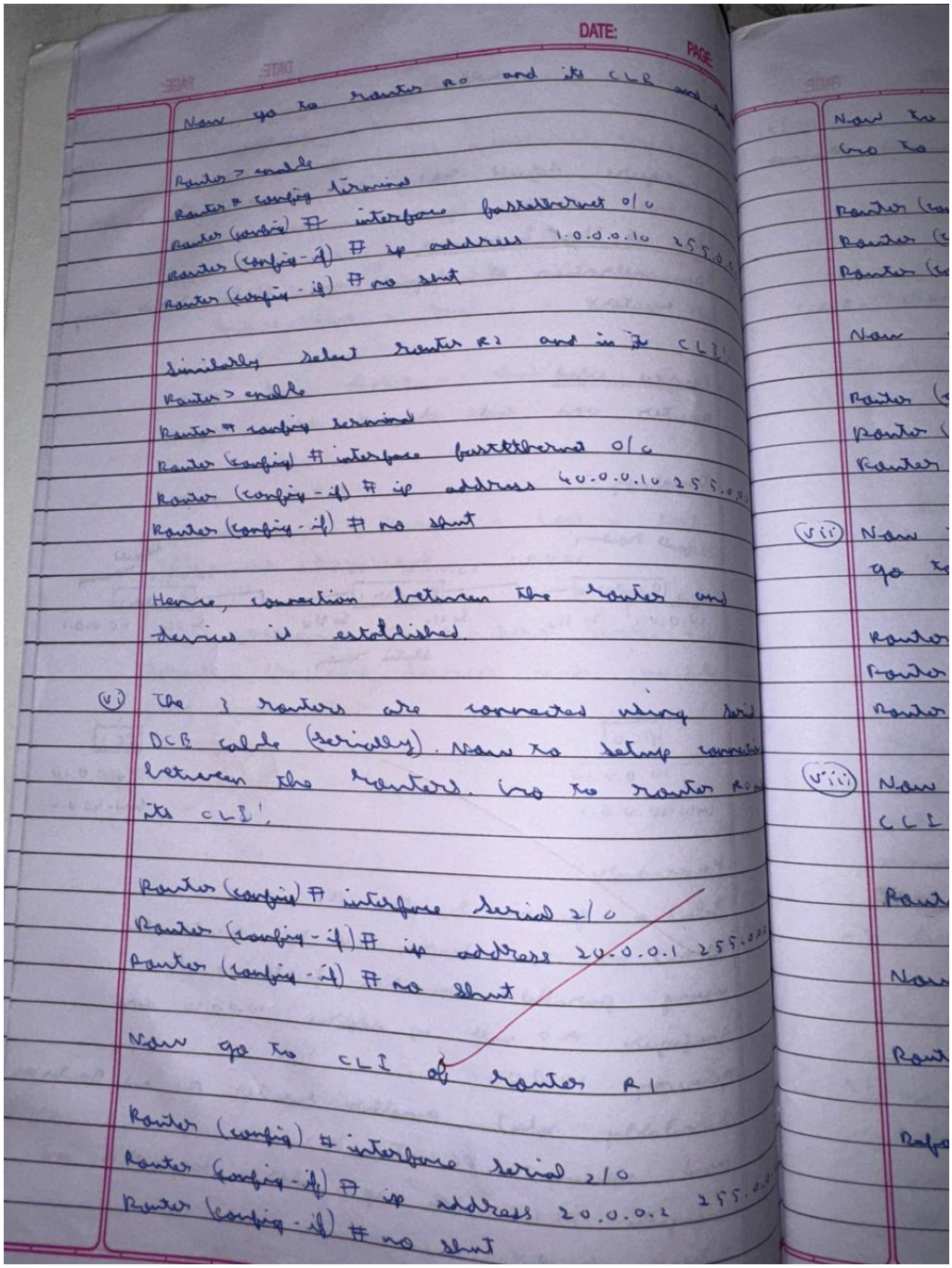


Program 4

Aim: Configure default route, static route to the Router(Part 2).

Topology , Procedure and Observation:





Now go to router R0 and its CLI and

Router > enable
Router # config terminal
Router (config) # interface fastEthernet 0/0
Router (config-if) # ip address 10.0.0.10 255.0.0.
Router (config-if) # no shut

Similarly select router R1 and in its CLI
Router > enable
Router # config terminal
Router (config) # interface fastEthernet 0/0
Router (config-if) # ip address 40.0.0.10 255.0.0.
Router (config-if) # no shut

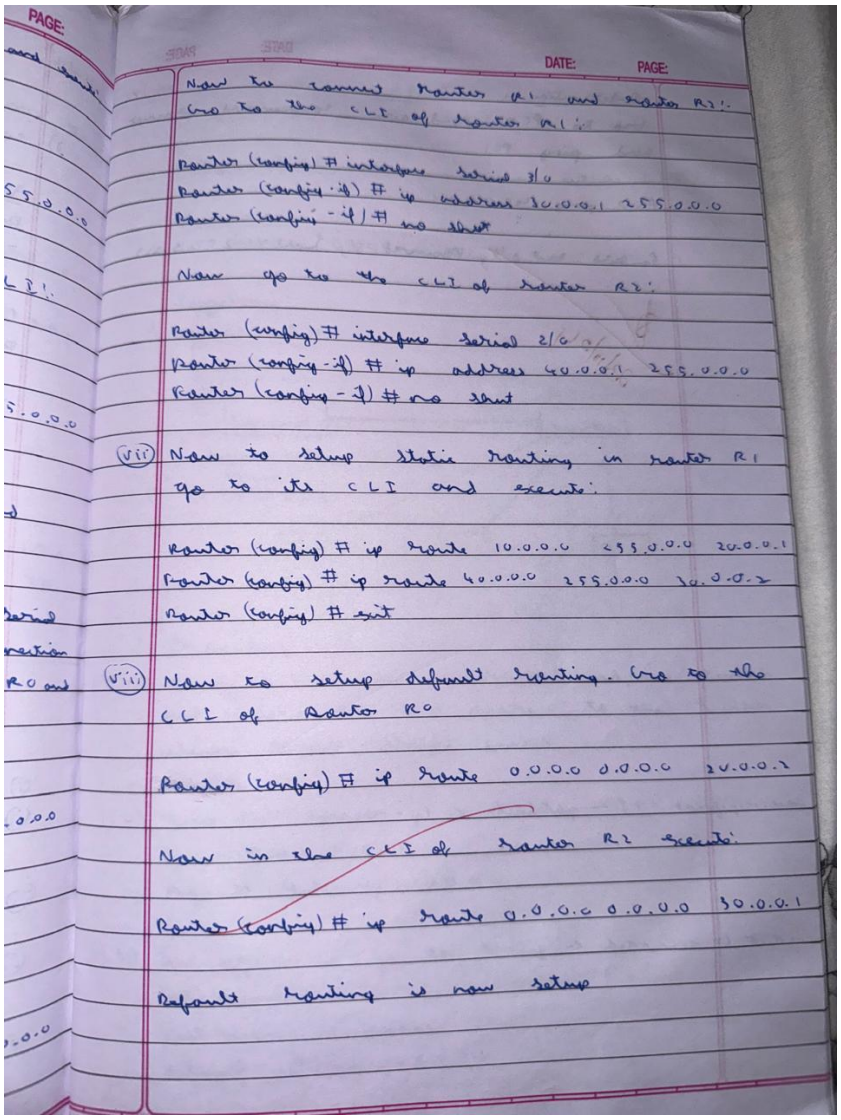
Hence, connection between the router and device is established.

(vi) The 2 routers are connected using serial DCE cable (serially). Now to setup connection between the routers. Go to router R0 its CLI,

Router (config) # interface serial 2/0
Router (config-if) # ip address 20.0.0.1 255.0.0.
Router (config-if) # no shut

Now go to CLI of router R1

Router (config) # interface serial 2/0
Router (config-if) # ip address 20.0.0.2 255.0.0.
Router (config-if) # no shut



Now to connect router R1 and router R2:-
Go to the CLI of router R1:

Router (config) # interface serial 2/0
Router (config-if) # ip address 30.0.0.1 255.0.0.0
Router (config-if) # no shut

Now go to the CLI of router R2:

Router (config) # interface serial 2/0
Router (config-if) # ip address 40.0.0.1 255.0.0.0
Router (config-if) # no shut

(vii) Now to setup static routing in router R1 go to its CLI and execute:

Router (config) # ip route 10.0.0.0 255.0.0.0 20.0.0.1
Router (config) # ip route 40.0.0.0 255.0.0.0 30.0.0.2
Router (config) # exit

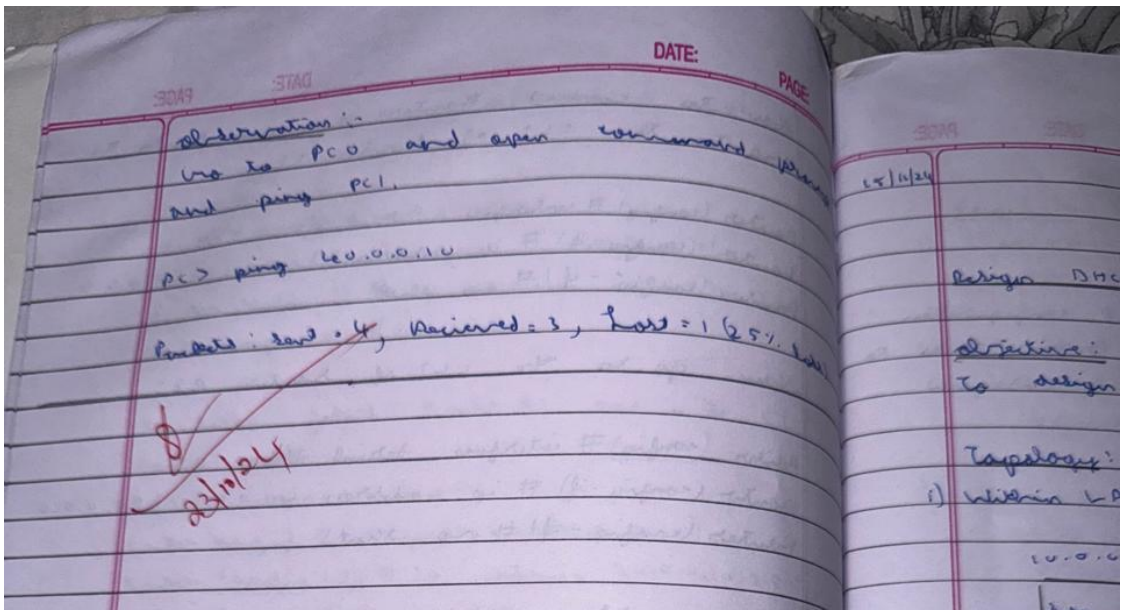
(viii) Now to setup default routing. Go to the CLI of Router R0

Router (config) # ip route 0.0.0.0 0.0.0.0 20.0.0.2

Now in the CLI of router R2 execute:

Router (config) # ip route 0.0.0.0 0.0.0.0 30.0.0.1

Default routing is now setup



Observation:-
Go to PC0 and open command prompt and ping PC1.

PC> ping 40.0.0.10

Packets: Sent = 4, Recieved = 3, Lost = 1 (25% loss)

22/11/24

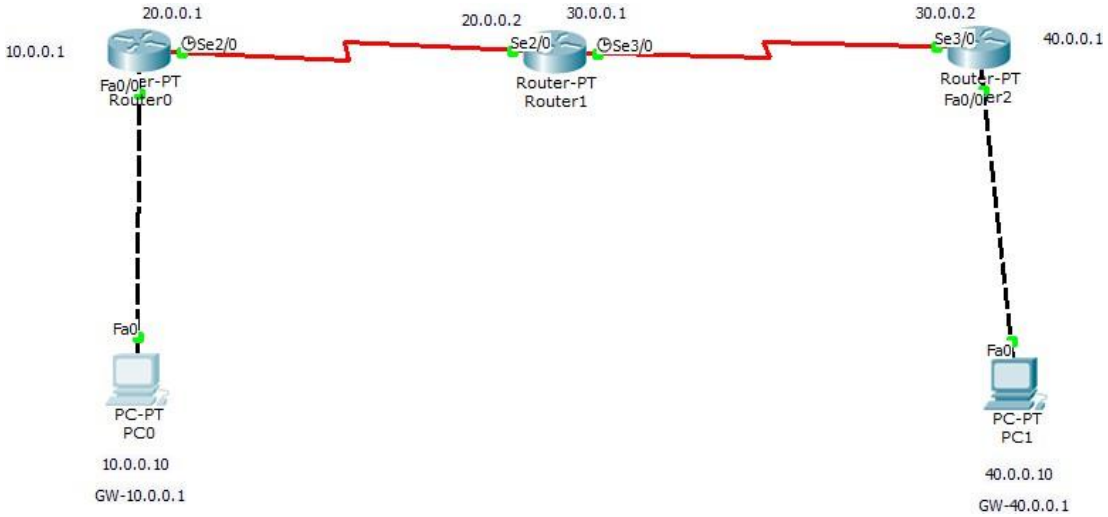
Design DHC

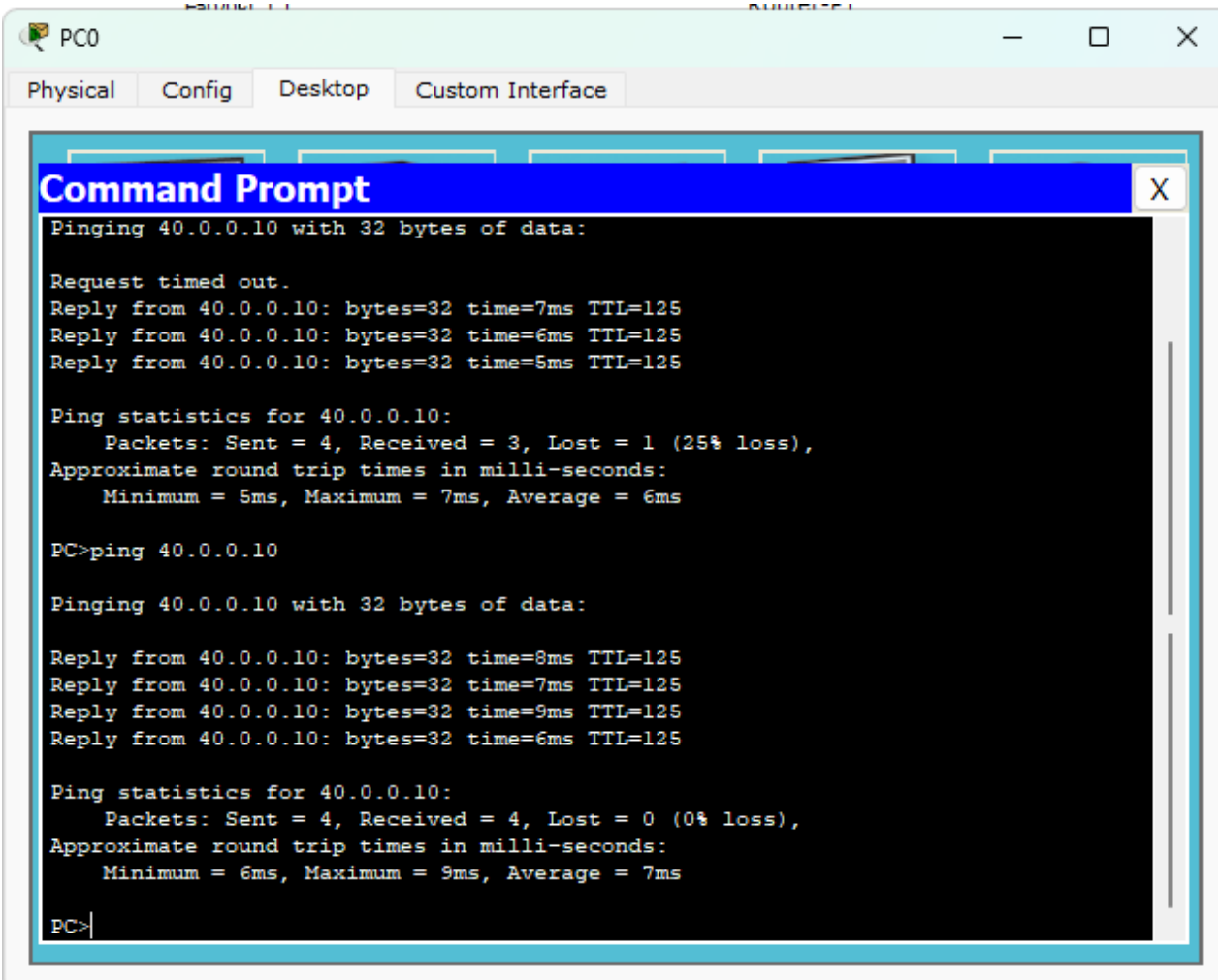
Objective:
To design

Topology:
i) Within LA

10.0.0

Screen Shots:

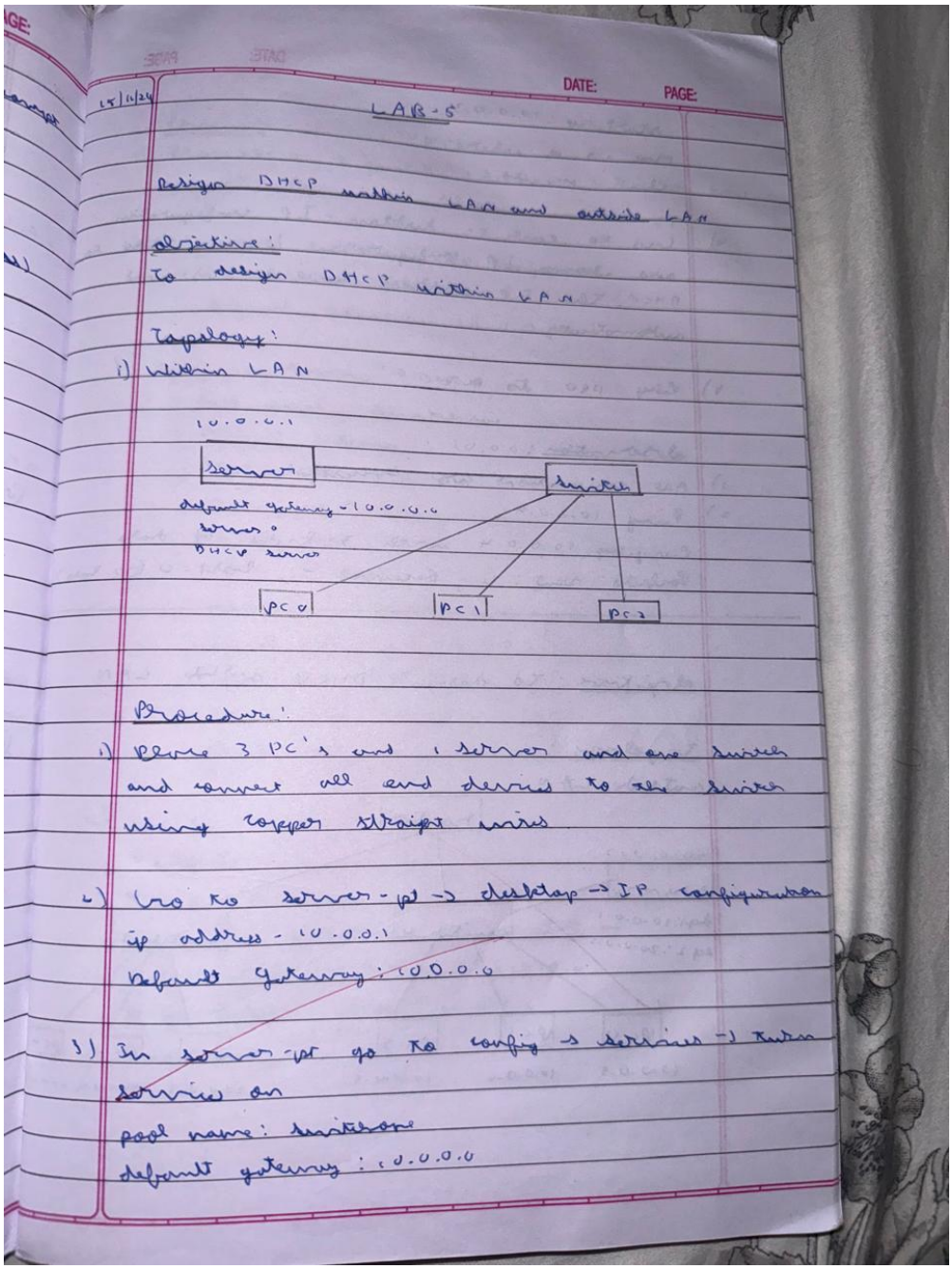




Program 5

Aim: Configure DHCP within a LAN and outside LAN.

Topology , Procedure and Observation:



DATE:

start ip : 10.0.0.3
Max no. of users : 100
click on add

4) Go to each pc desktop - IP configuration and change IP configuration from static to DHCP. The IP address will be assigned automatically

5) Ping PC0 to PC2

observation :

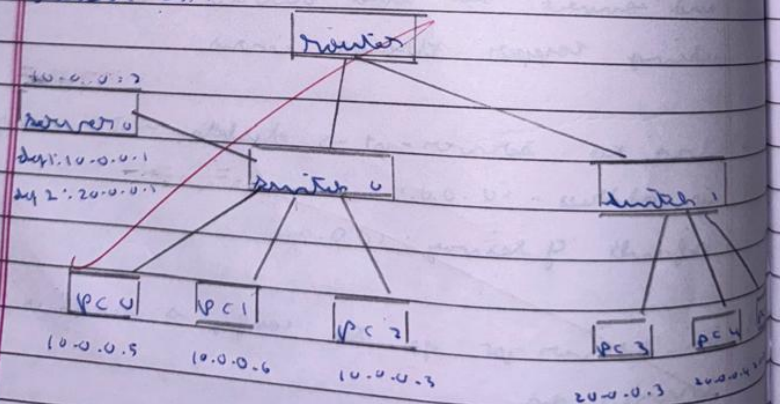
1) All connections are successful
2) Ping 10.0.0.4

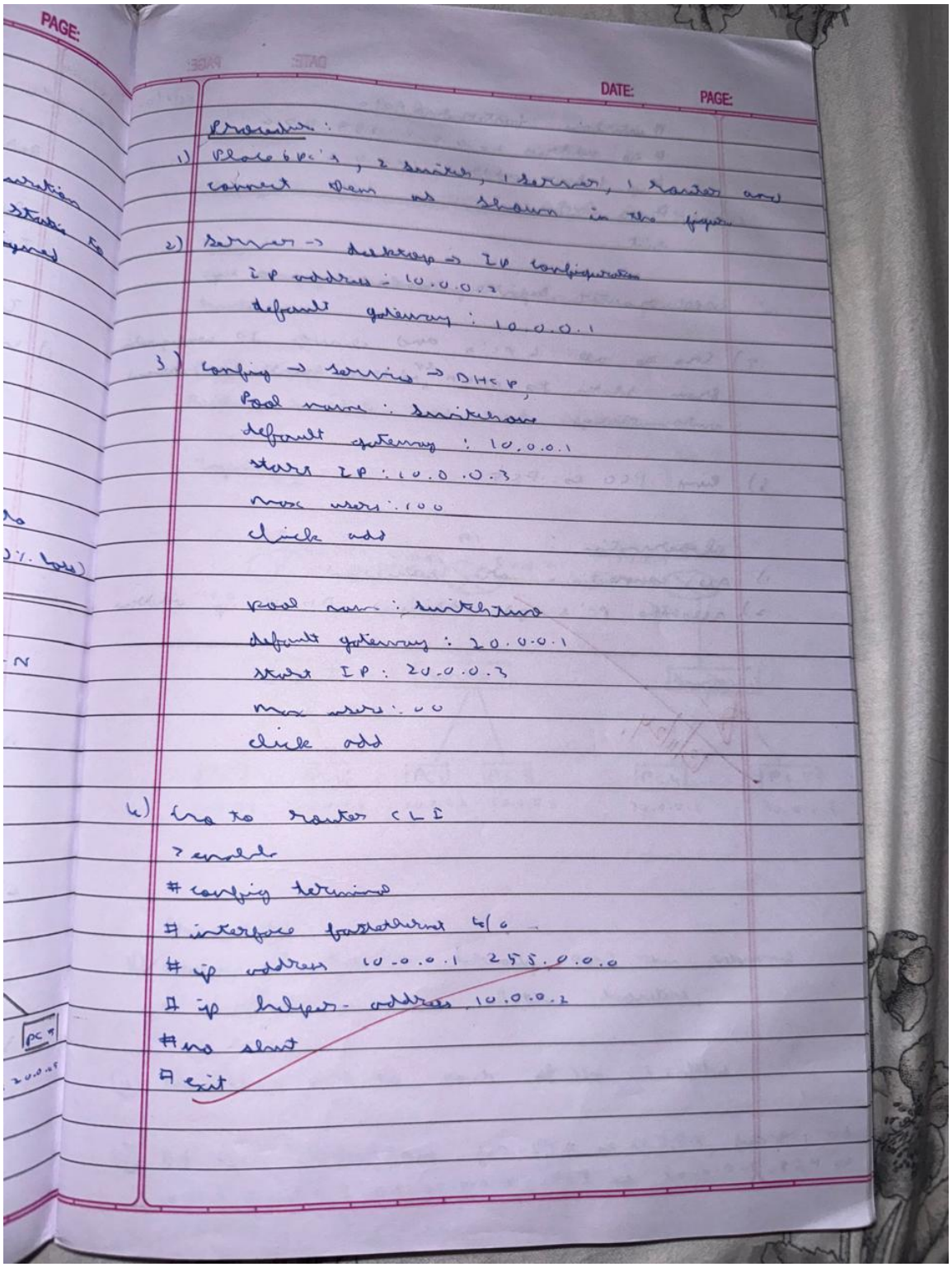
Pinging 10.0.0.4 with 32 bytes of data
Packets sent : 4, Received 4, Lost = 0 (0% loss)

objective : To design DHCP outside LAN

Topology :

outside LAN





Procedure:

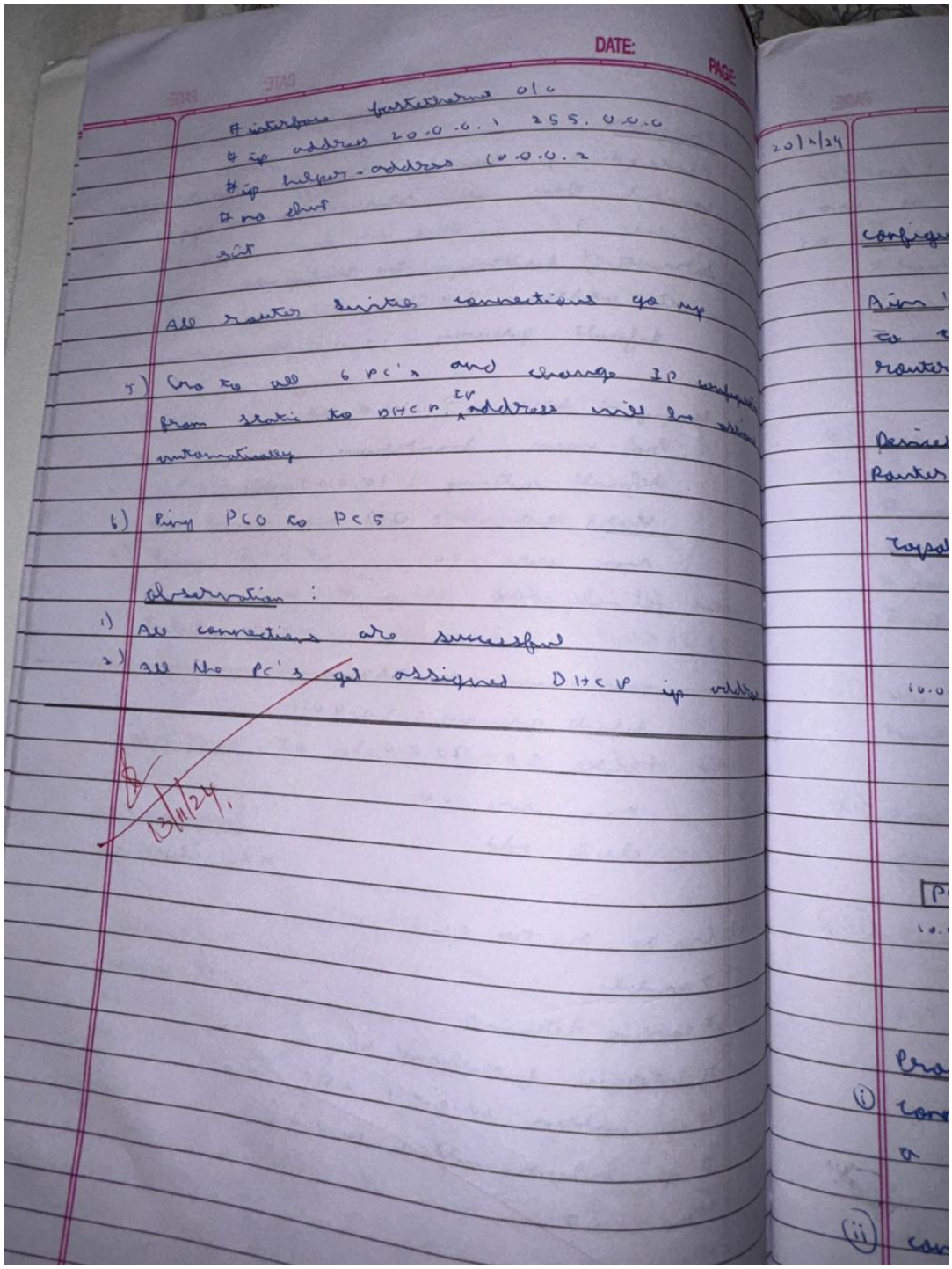
1) Place 6 PC's, 2 switch, 1 server, 1 router and connect them as shown in the figure.

2) Server → Desktop → IP configuration
   IP address : 10.0.0.2
   default gateway : 10.0.0.1

3) Config → Service → DHCP,
   Pool name : switchone
   default gateway : 10.0.0.1
   start IP : 10.0.0.3
   max users : 100
   click add

   pool name : switchtwo
   default gateway : 20.0.0.1
   start IP : 20.0.0.3
   max users : 00
   click add

4) Go to router CLI
   > enable
   # config terminal
   # interface fastethernet 4/0
   # ip address 10.0.0.1 255.0.0.0
   # ip helper-address 10.0.0.2
   # no shut
   # exit



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interface fastethernet 0/0
ip address 20.0.0.1 255.0.0.0
ip helper-address 10.0.0.2
no shut
exit

All routers switch connections up up

1) Go to all 6 pc's and change IP configuration from static to DHCP. IP address will be assigned automatically

2) Ping PC0 to PC5

Observation :

1) All connections are successful
2) All the pc's got assigned DHCP ip address

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20/11/24

Configu

Aim :

To

Router

Design

Router

Topol

10.0

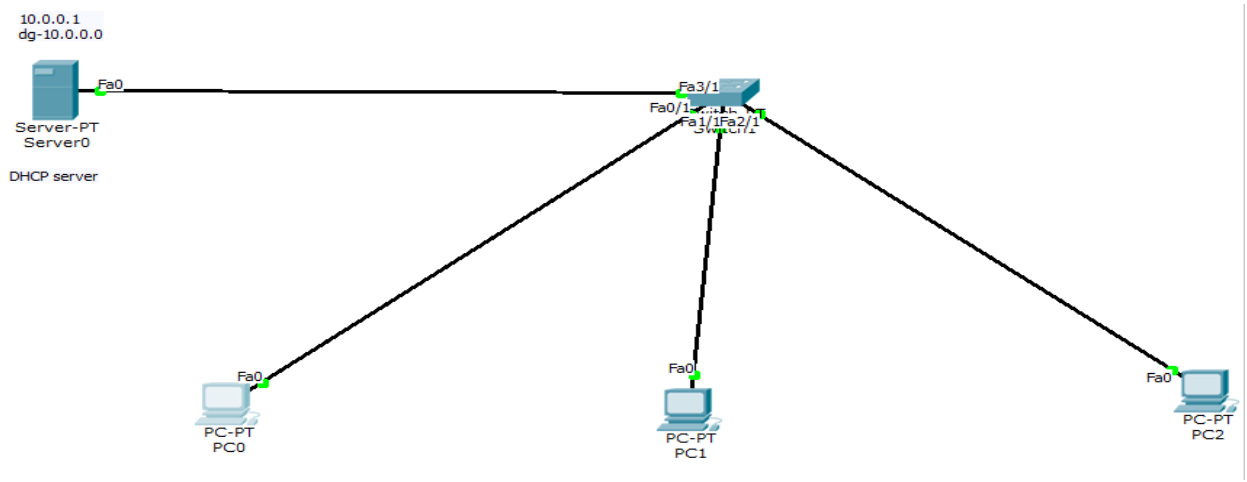
Pro

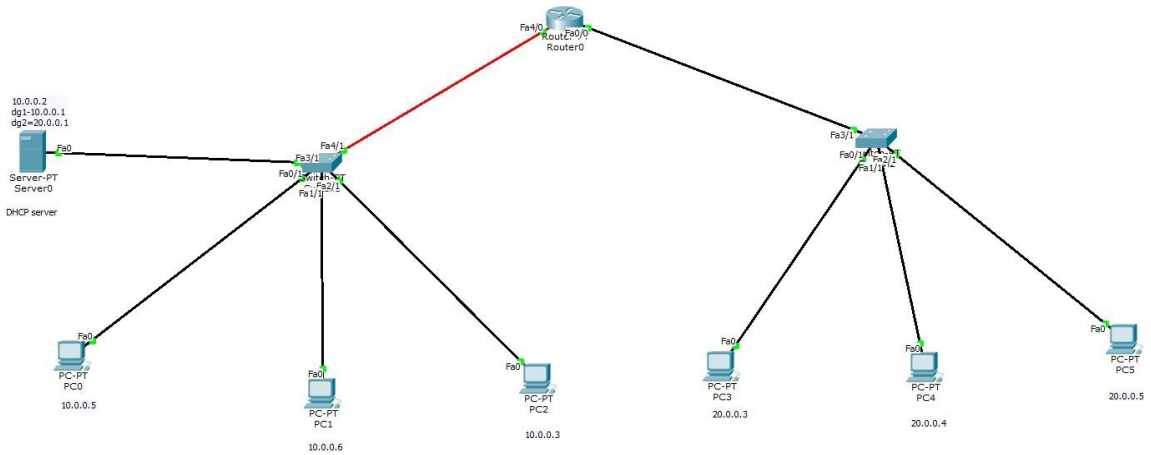
(i) Con

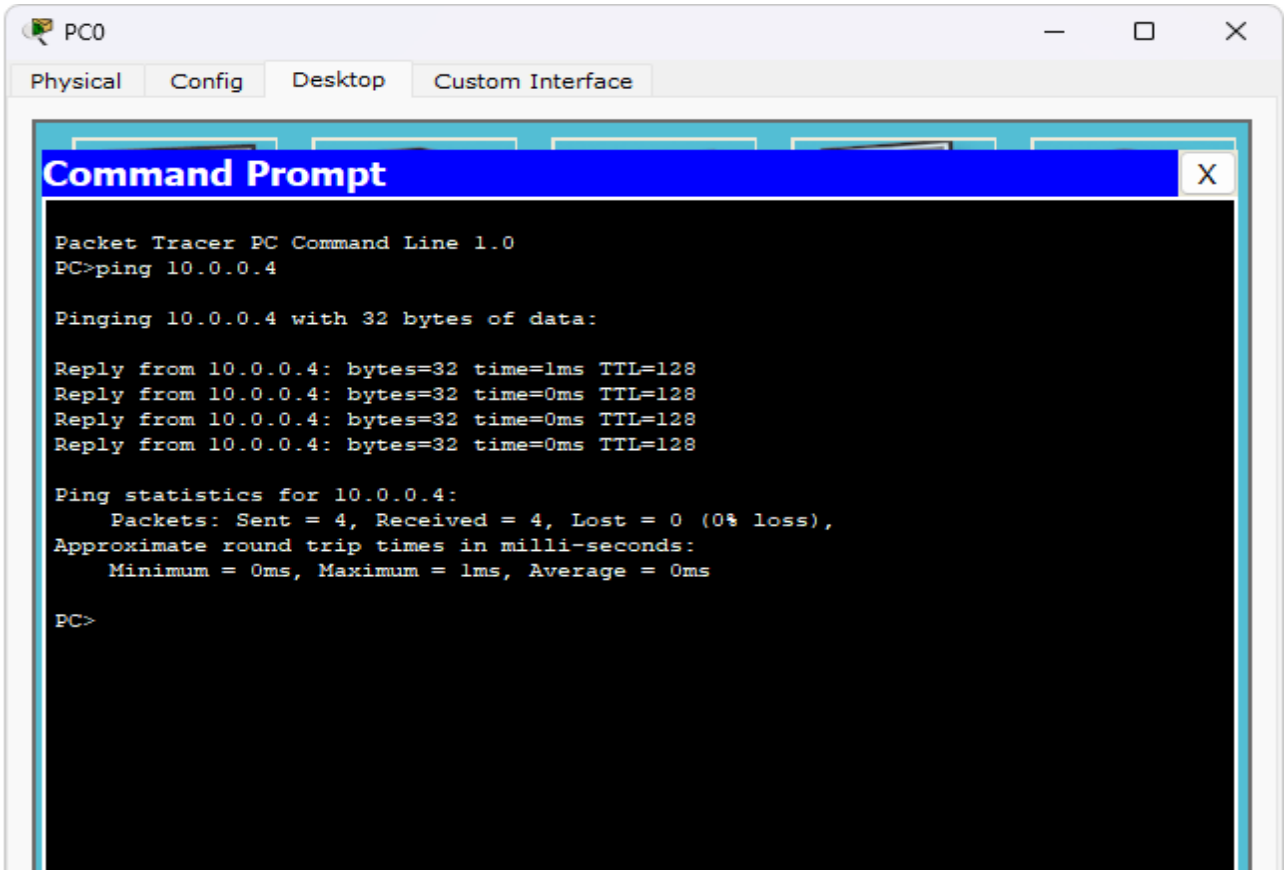
a

(ii) Con

Screen Shots:



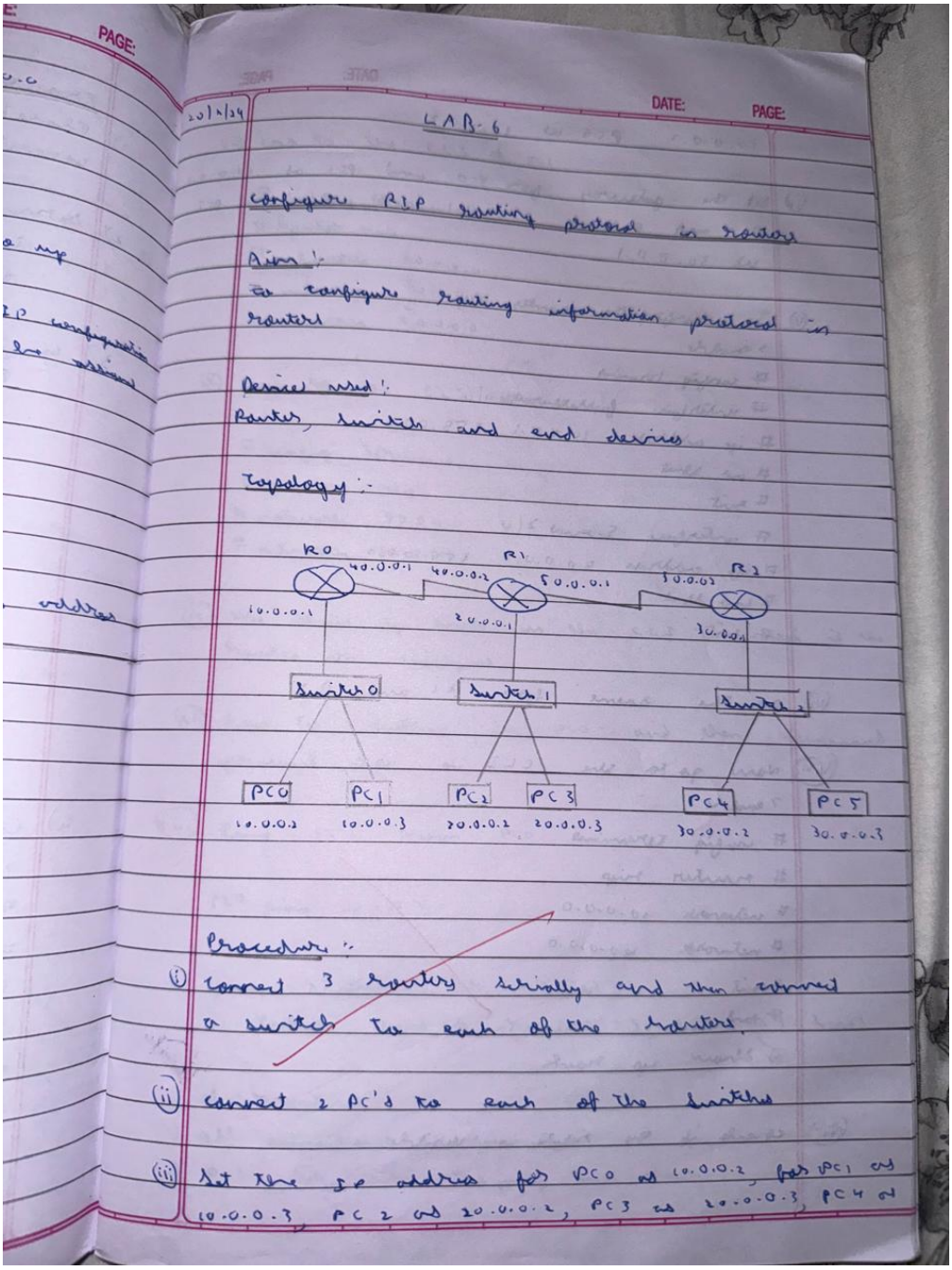


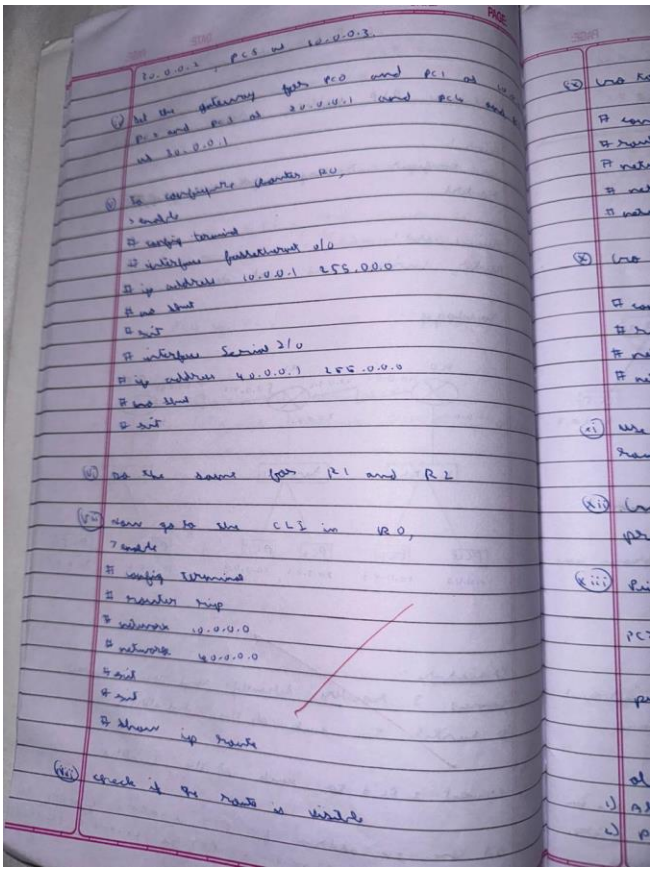

PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.4
Pinging 10.0.0.4 with 32 bytes of data:
Reply from 10.0.0.4: bytes=32 time=1ms TTL=128
Reply from 10.0.0.4: bytes=32 time=0ms TTL=128
Reply from 10.0.0.4: bytes=32 time=0ms TTL=128
Reply from 10.0.0.4: bytes=32 time=0ms TTL=128
Ping statistics for 10.0.0.4:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
PC>

Program 6

Aim: Configure RIP routing Protocol in Routers .

Topology , Procedure and Observation:





2.0.0.2, PC5 is 20.0.0.3.

(v) Set the gateway for PC0 and PC1 as 40.0.0.1 and PC4 and PC6 as 50.0.0.1 and PC5 as 30.0.0.1

(vi) To configure the router R0,

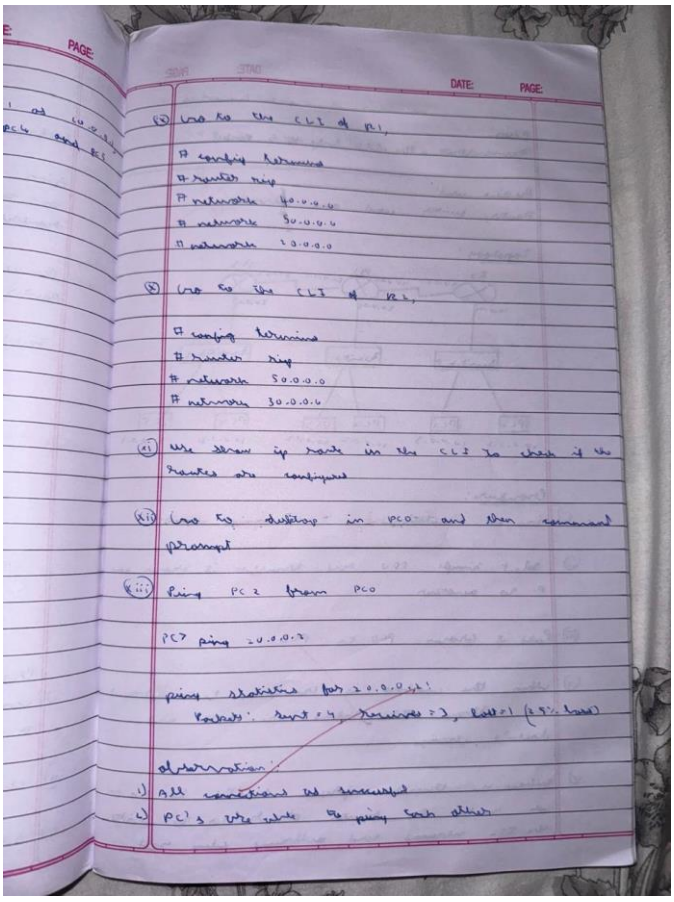
enable
configure terminal
interface fastethernet 0/0
ip address 40.0.0.1 255.0.0.0
no shut
exit
interface Serial 2/0
ip address 40.0.0.1 255.0.0.0
no shut
exit

(vii) Do the same for R1 and R2

(viii) Now go to the CLI in R0,

enable
configure terminal
router rip
network 10.0.0.0
network 40.0.0.0
exit
end
show ip route

(ix) check if the route is visible



(x) Now for the CLI of R1,

configure terminal
router rip
network 40.0.0.0
network 50.0.0.0
network 20.0.0.0

(xi) Now go the CLI of R2,

configure terminal
router rip
network 50.0.0.0
network 30.0.0.0

(xii) Use show ip route in the CLI to check if the routes are configured

(xiii) Now go desktop in PC0 and then command prompt

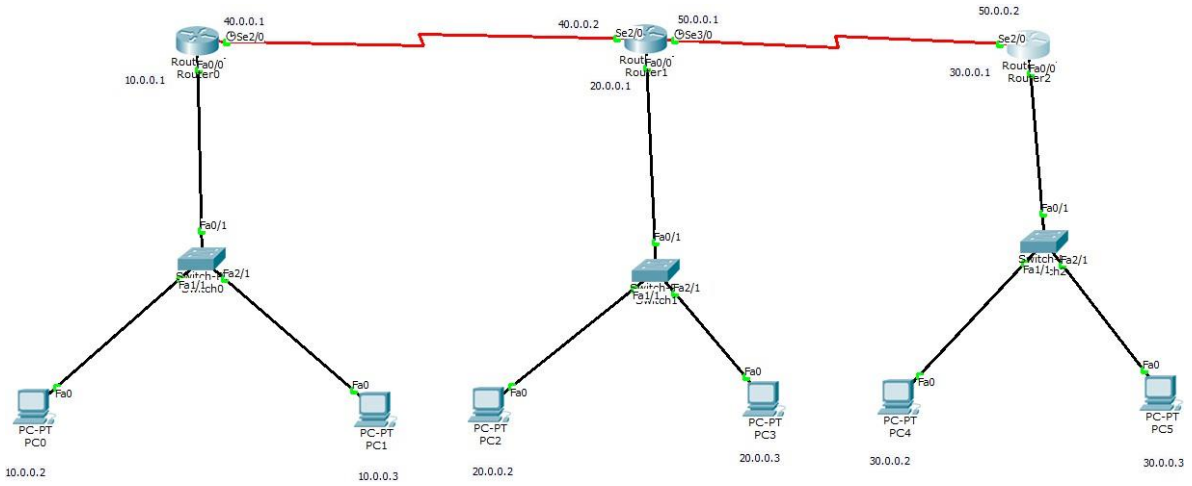
(xiv) Ping PC 2 from PC0

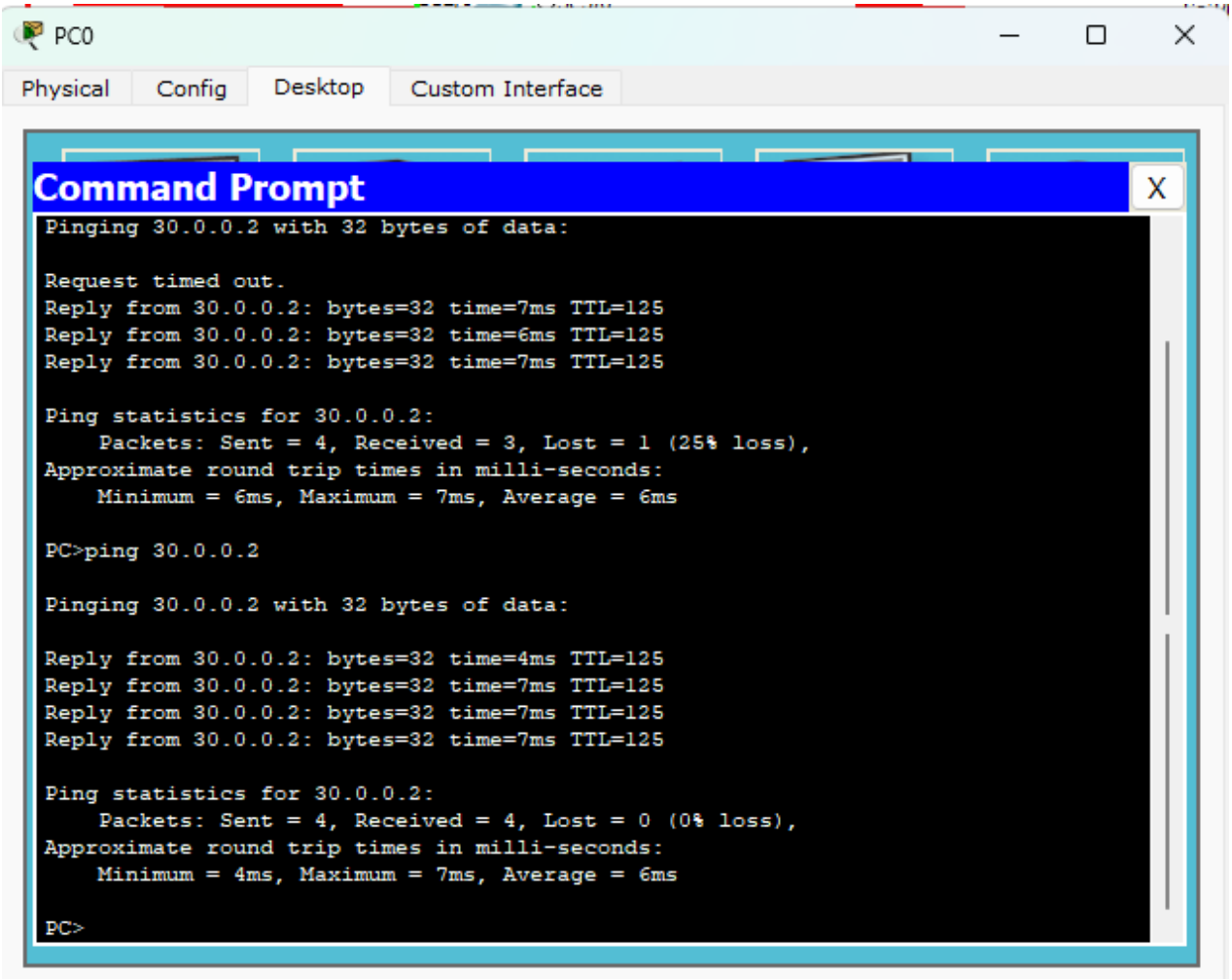
PC7 ping 20.0.0.2

ping statistics for 20.0.0.2:
Packets: sent = 4, received = 3, lost = 1 (25% loss)

observation:
1) All connections are successful
2) PC's are able to ping each other

Screen Shots:

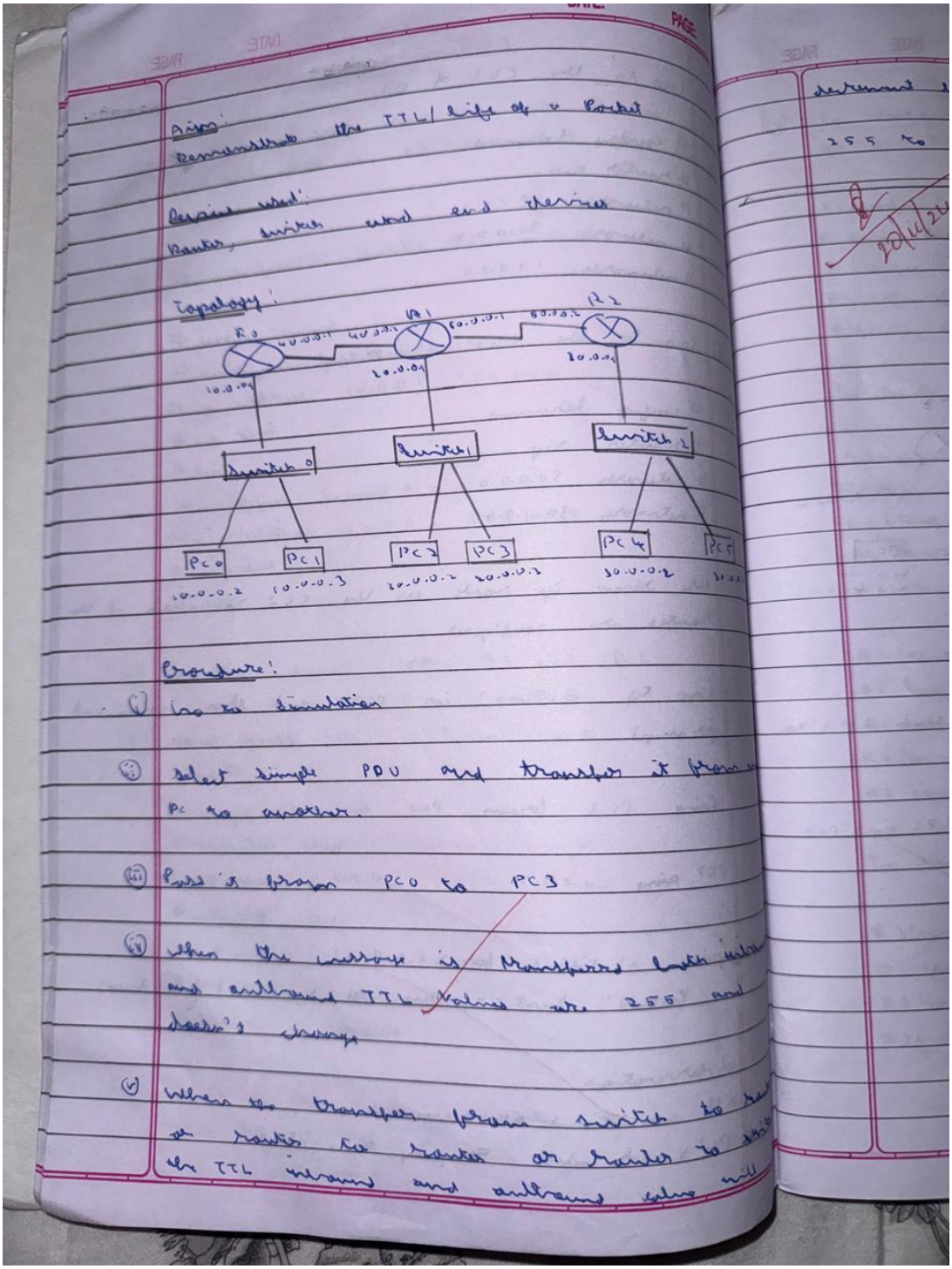


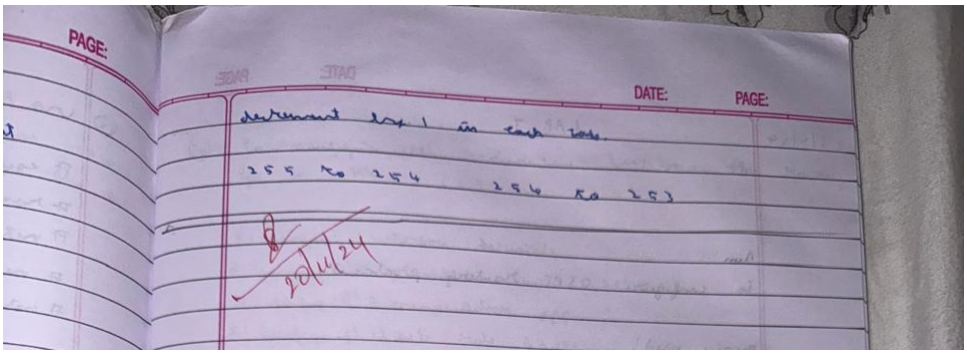


Program 7

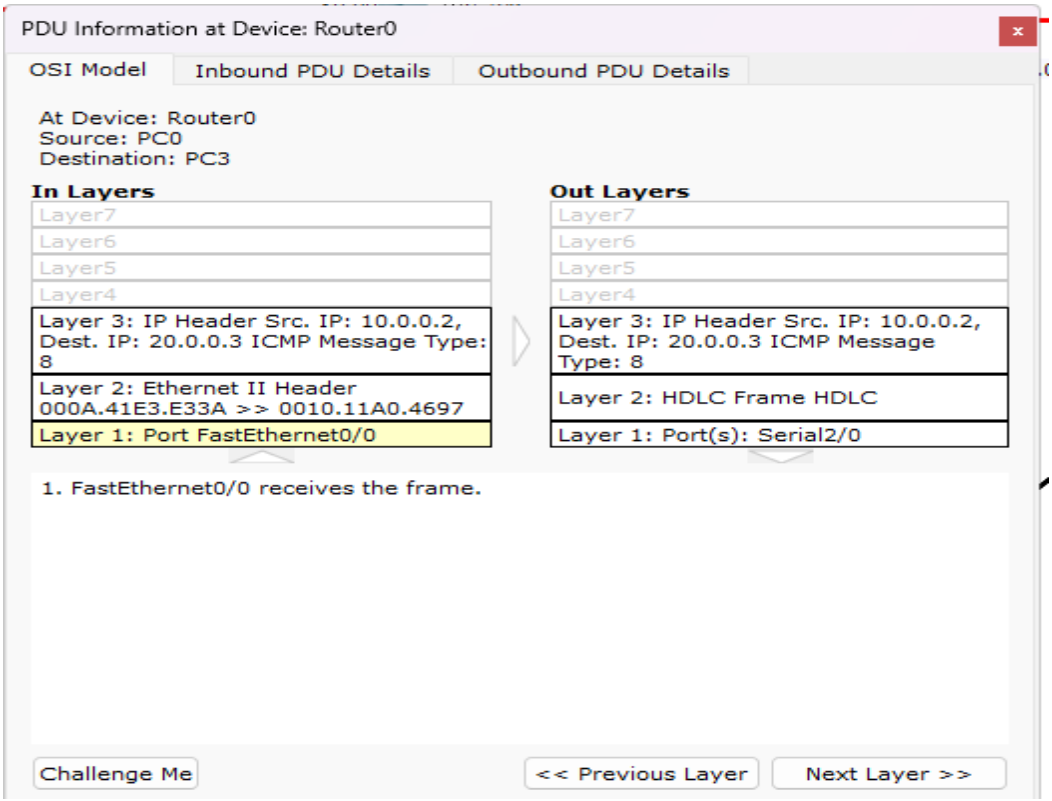
Aim: Demonstrate the TTL/ Life of a Packet .

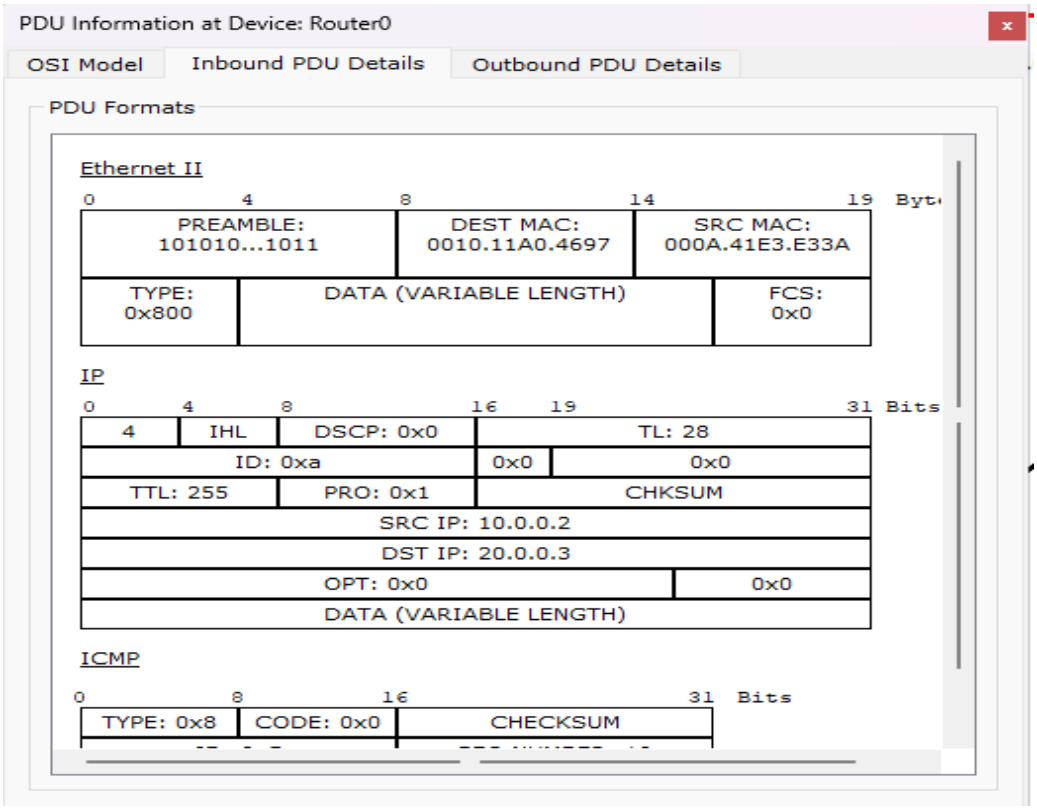
Topology , Procedure and Observation:

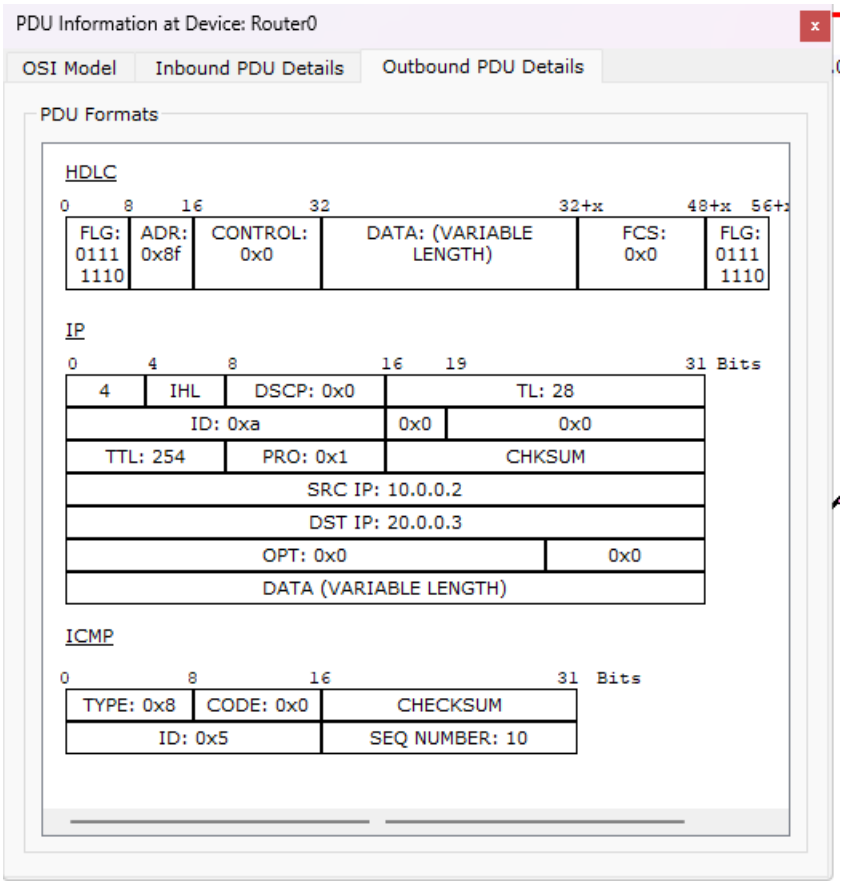




Screen Shots:



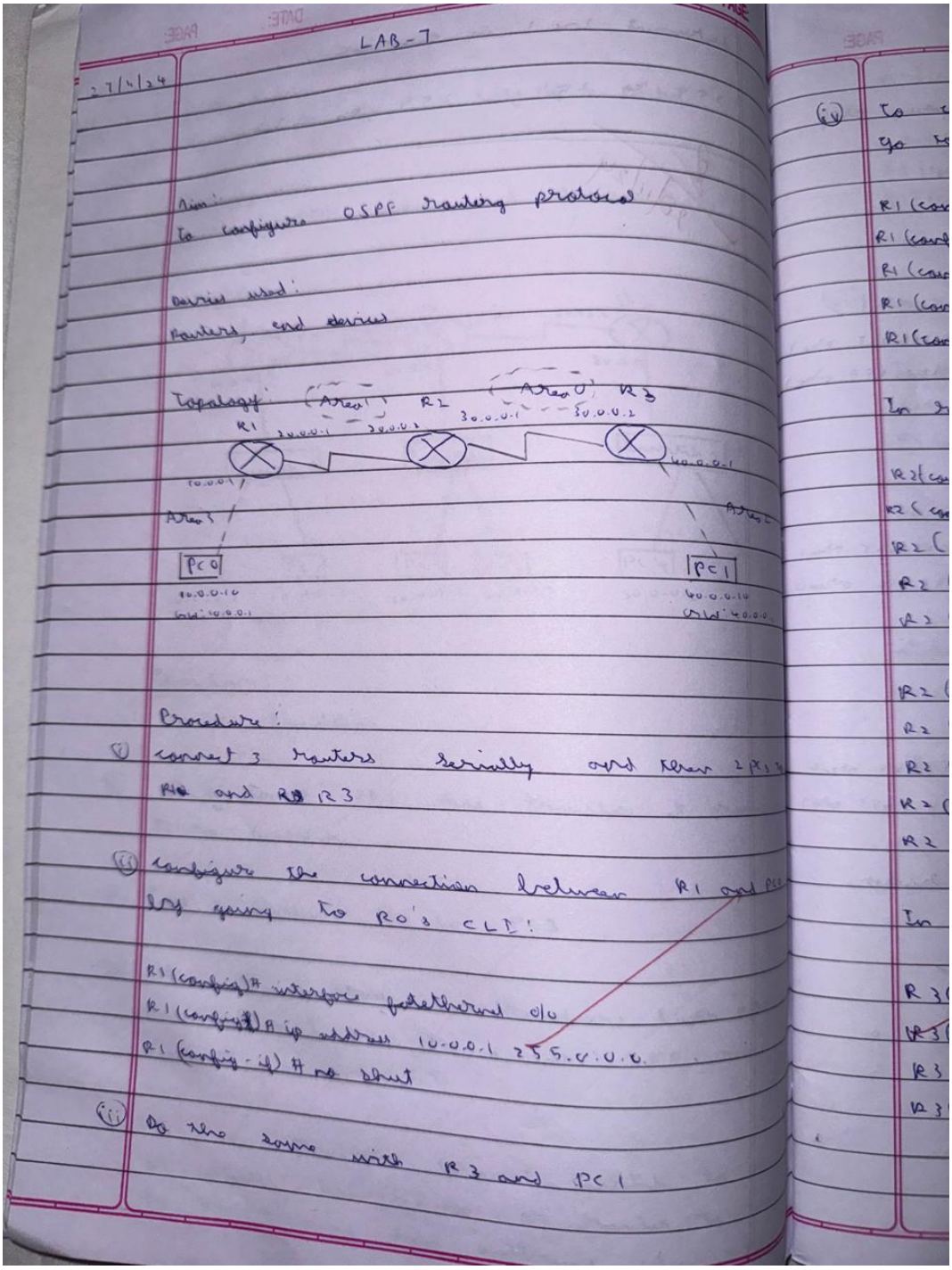

PDU Information at Device: Router0
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
Ethernet II
0 4 8 14 19 Byt
PREAMBLE: 101010...1011
DEST MAC: 0010.11A0.4697
SRC MAC: 000A.41E3.E33A
TYPE: 0x800
DATA (VARIABLE LENGTH)
FCS: 0x0
IP
0 4 8 16 19 31 Bits
4
IHL
DSCP: 0x0
TL: 28
ID: 0xa
0x0
0x0
TTL: 255
PRO: 0x1
CHKSUM
SRC IP: 10.0.0.2
DST IP: 20.0.0.3
OPT: 0x0
0x0
DATA (VARIABLE LENGTH)
ICMP
0 8 16 31 Bits
TYPE: 0x8
CODE: 0x0
CHECKSUM


PDU Information at Device: Router0
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
HDLC
0 8 16 32 32+x 48+x 56+
FLG: 0111 1110
ADR: 0x8f
CONTROL: 0x0
DATA: (VARIABLE LENGTH)
FCS: 0x0
FLG: 0111 1110
IP
0 4 8 16 19 31 Bits
4
IHL
DSCP: 0x0
TL: 28
ID: 0xa
0x0
0x0
TTL: 254
PRO: 0x1
CHKSUM
SRC IP: 10.0.0.2
DST IP: 20.0.0.3
OPT: 0x0
0x0
DATA (VARIABLE LENGTH)
ICMP
0 8 16 31 Bits
TYPE: 0x8
CODE: 0x0
CHECKSUM
ID: 0x5
SEQ NUMBER: 10

Program 8

Aim: Configure OSPF routing protocol .

Topology , Procedure and Observation:



(iv) To configure the connections between the routers, go to R0's CLI

R1(config)# interface serial2/0
R1(config-if)# ip address 20.0.0.1 255.0.0.0
R1(config-if)# encapsulation ppp
R1(config-if) clock rate 64000
R1(config-if)# no shut

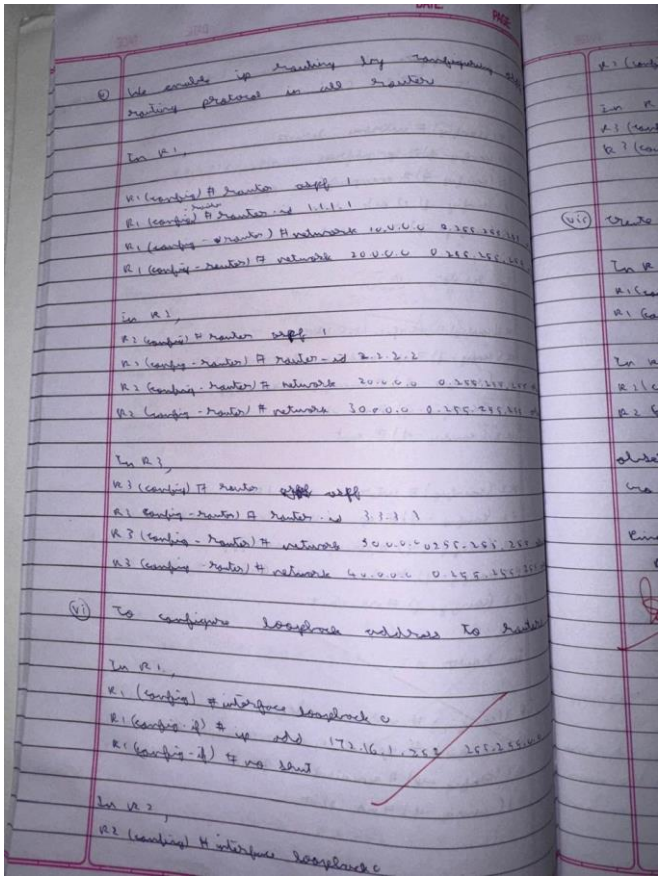
In router R2,

R2(config)# interface serial2/0
R2(config-if)# ip address 20.0.0.2 255.0.0.0
R2(config-if)# encapsulation ppp
R2(config-if)# no shut
R2(config-if)# exit

R2(config)# interface serial3/0
R2(config-if)# ip address 30.0.0.1 255.0.0.0
R2(config-if)# encapsulation ppp
R2(config-if)# clock rate 64000
R2(config-if)# no shut

In router R3,

R3(config)# interface serial3/0
R3(config-if)# ip address 30.0.0.2 255.0.0.0
R3(config-if)# encapsulation ppp
R3(config-if)# no shut



(v) We enable ip routing by configuring routing protocol in all routers

In R1,

R1 (config) # router ospf 1
R1 (config) # router-id 1.1.1.1
R1 (config - router) # network 10.0.0.0 0.255.255.255
R1 (config - router) # network 20.0.0.0 0.255.255.255

In R2,

R2 (config) # router ospf 1
R2 (config - router) # router-id 2.2.2.2
R2 (config - router) # network 20.0.0.0 0.255.255.255
R2 (config - router) # network 30.0.0.0 0.255.255.255

In R3,

R3 (config) # router ospf 1
R3 (config - router) # router-id 3.3.3.3
R3 (config - router) # network 30.0.0.0 0.255.255.255
R3 (config - router) # network 40.0.0.0 0.255.255.255

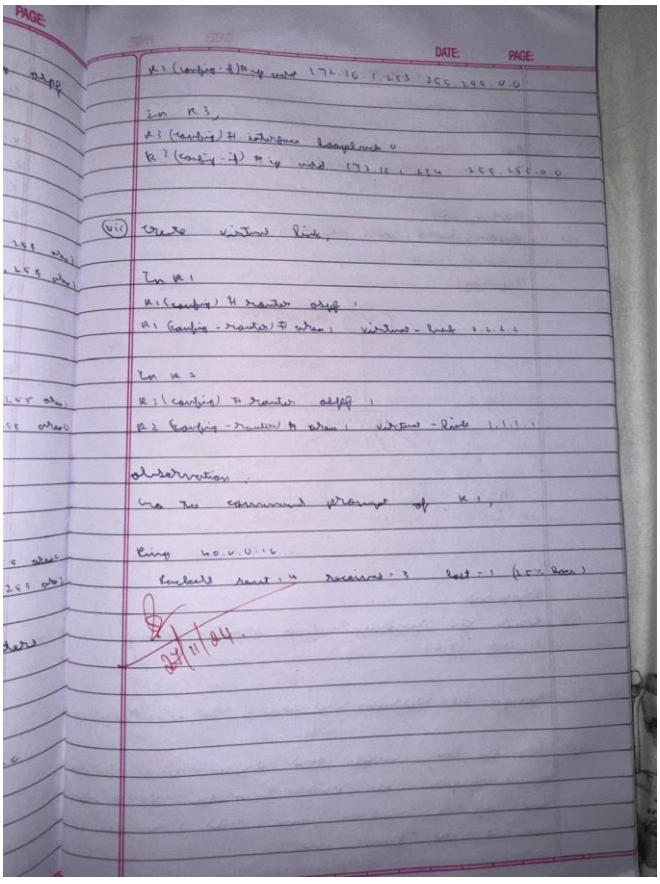
(vi) To configure loopback address to routers

In R1,

R1 (config) # interface loopback 0
R1 (config - if) # ip add 172.16.1.253 255.255.0.0
R1 (config - if) # no shut

In R2,

R2 (config) # interface loopback 0



R1 (config - if) # ip add 172.16.1.253 255.255.0.0

In R3,

R3 (config) # interface loopback 0
R3 (config - if) # ip add 172.16.1.254 255.255.0.0

(vii) Create virtual link

In R1

R1 (config) # router ospf 1
R1 (config - router) # area 1 virtual-link 3.3.3.3

In R3

R3 (config) # router ospf 1
R3 (config - router) # area 1 virtual-link 1.1.1.1

observation:

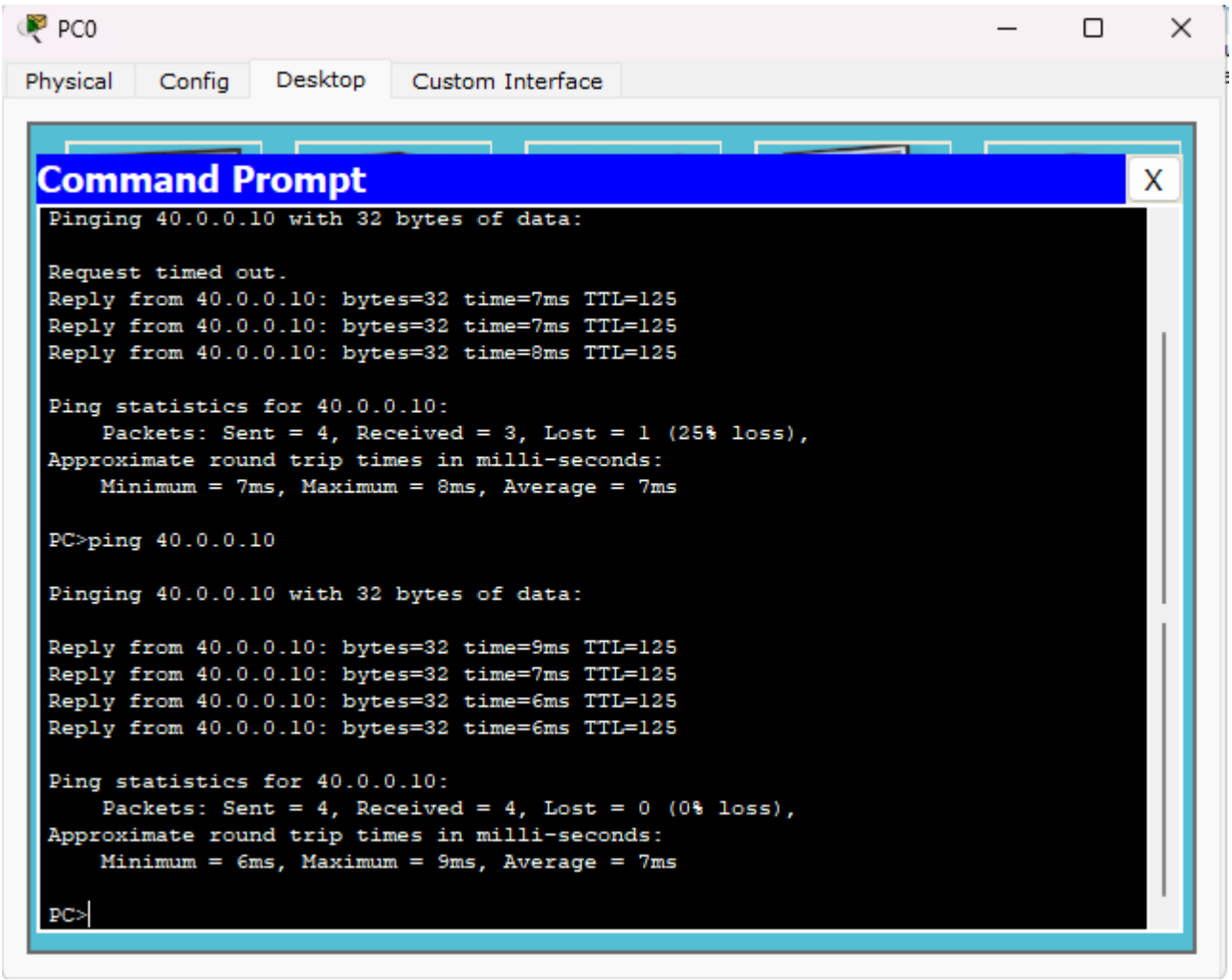
Use the command prompt of R1,

Ping 40.0.0.16

Packets sent = 4 received = 3 lost = 1 (25% loss)

27/11/24

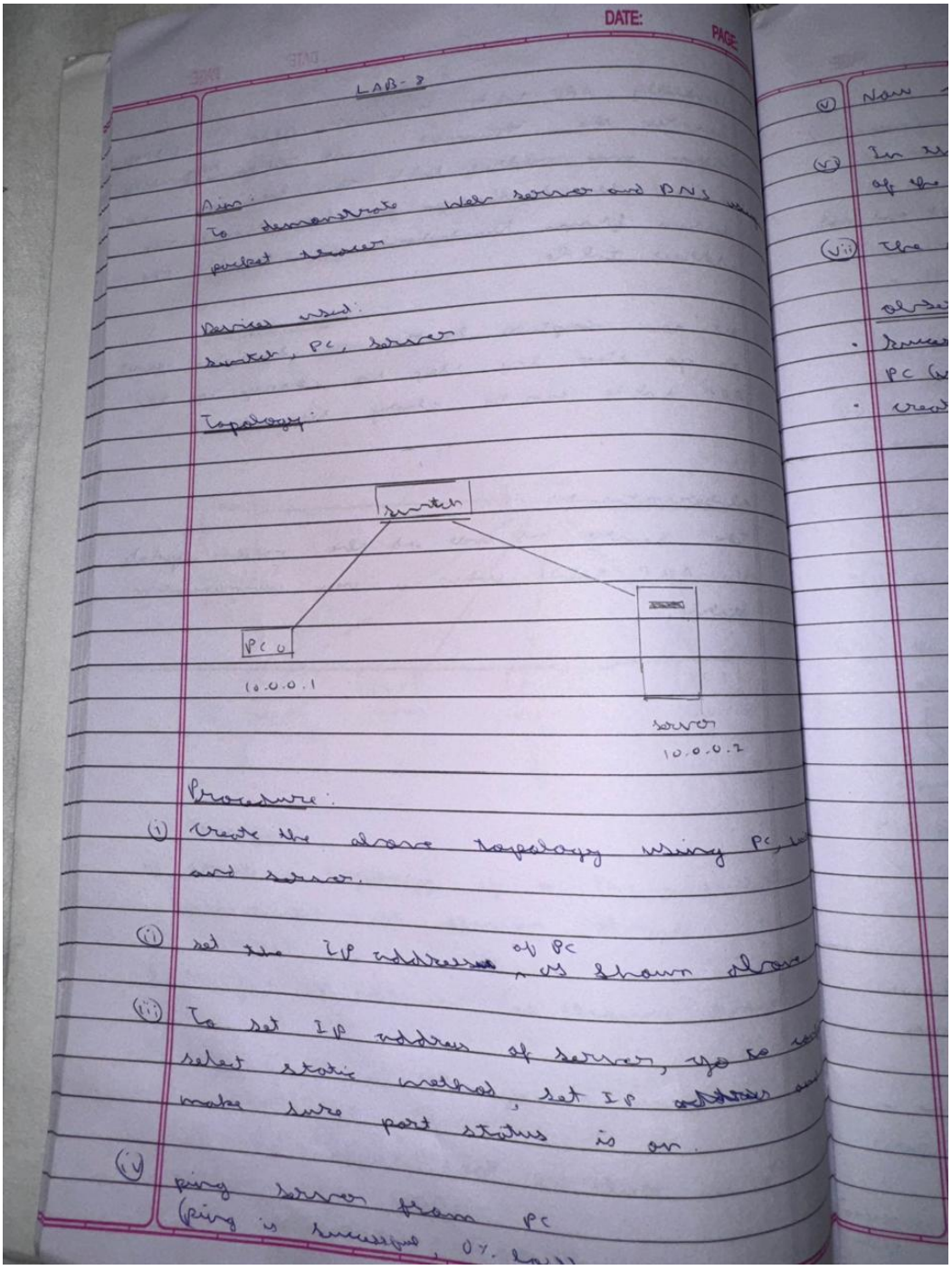
Screen Shots:

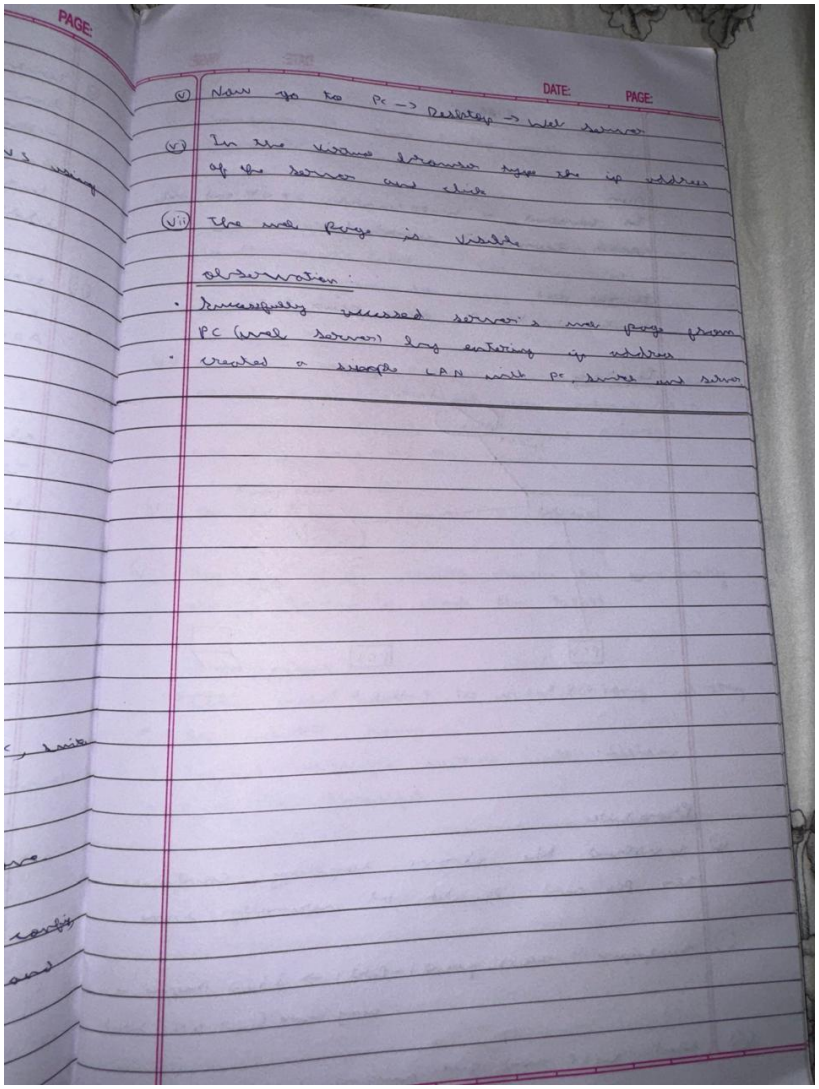


Program 9

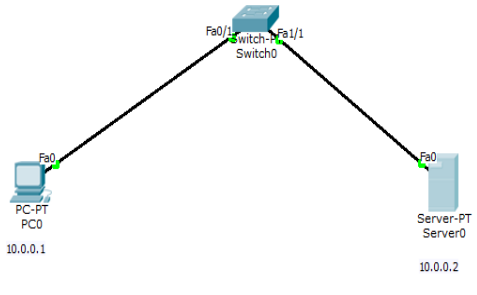
Aim: Configure Web Server, DNS within a LAN.

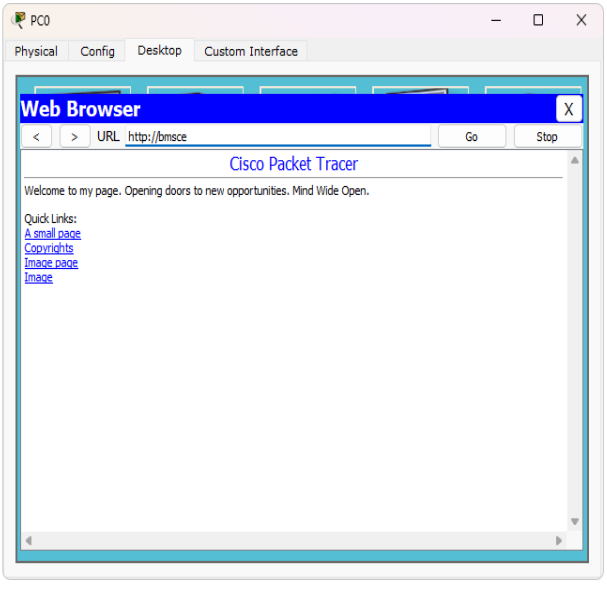
Topology , Procedure and Observation:





Screen Shots:

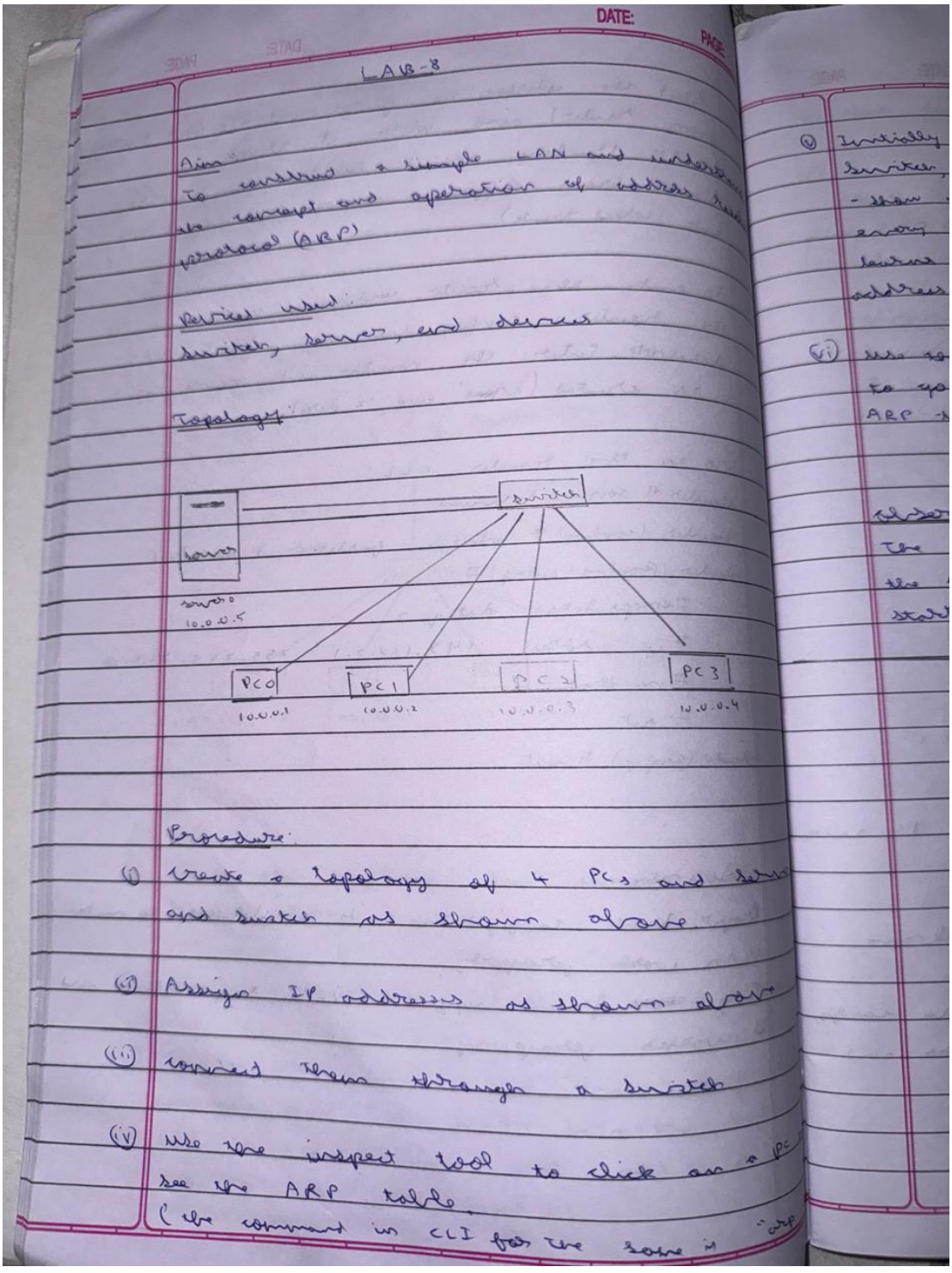


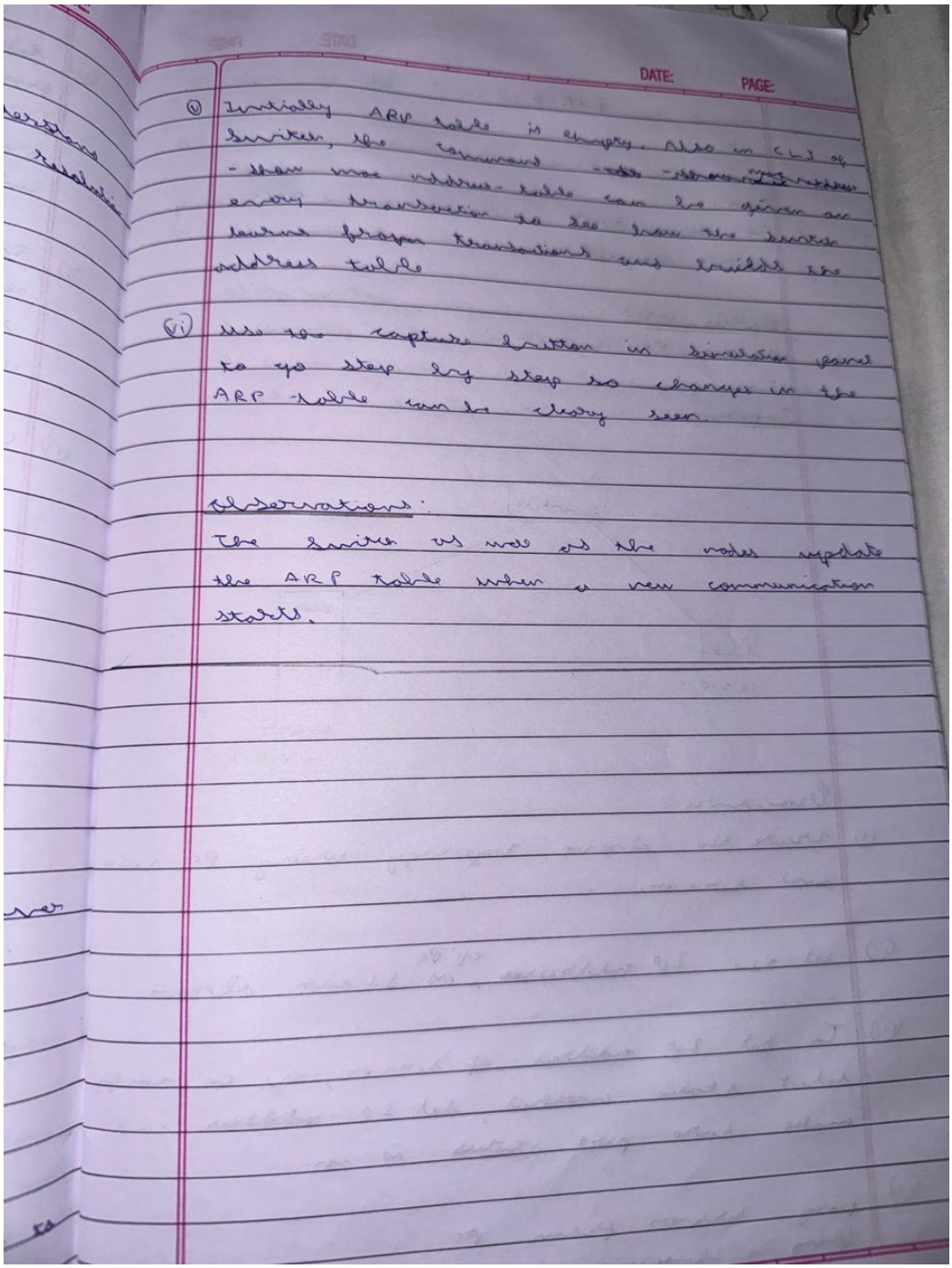


Program 10

Aim: To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)

Topology , Procedure and Observation:





DATE: PAGE:

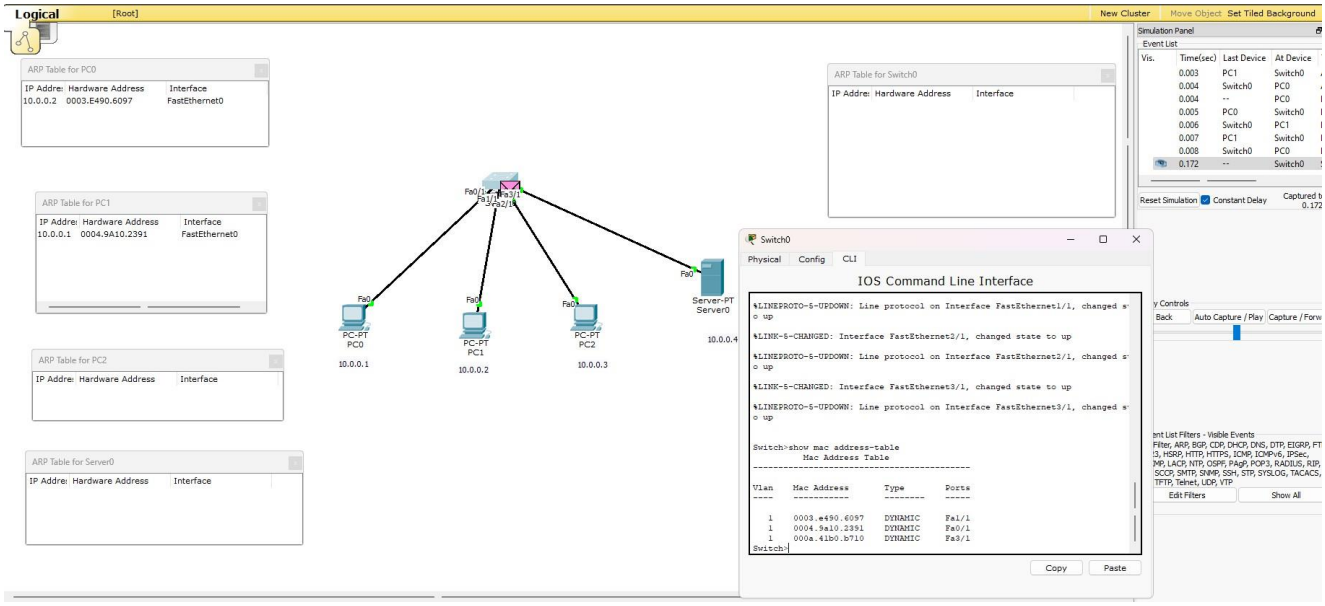
(v) Initially ARP table is empty. Also in CLI of switch, the command [illegible] - show mac address-table can be given on every transaction to see how the switch learns proper translations and builds the address table.

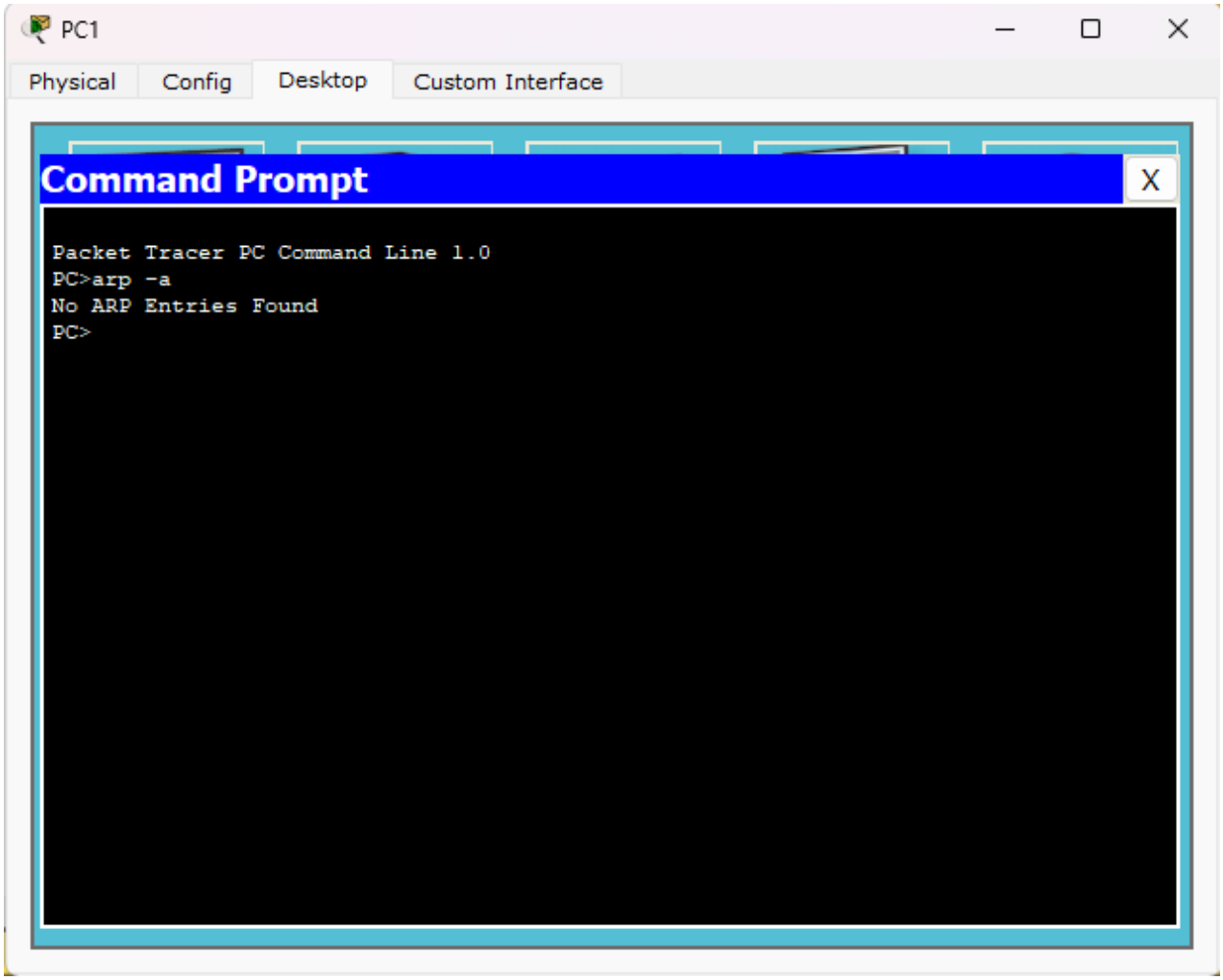
(vi) Use the capture button in simulation panel to go step by step so changes in the ARP table can be clearly seen.

Observations:

The switch as well as the nodes update the ARP table when a new communication starts.

Screen Shots:

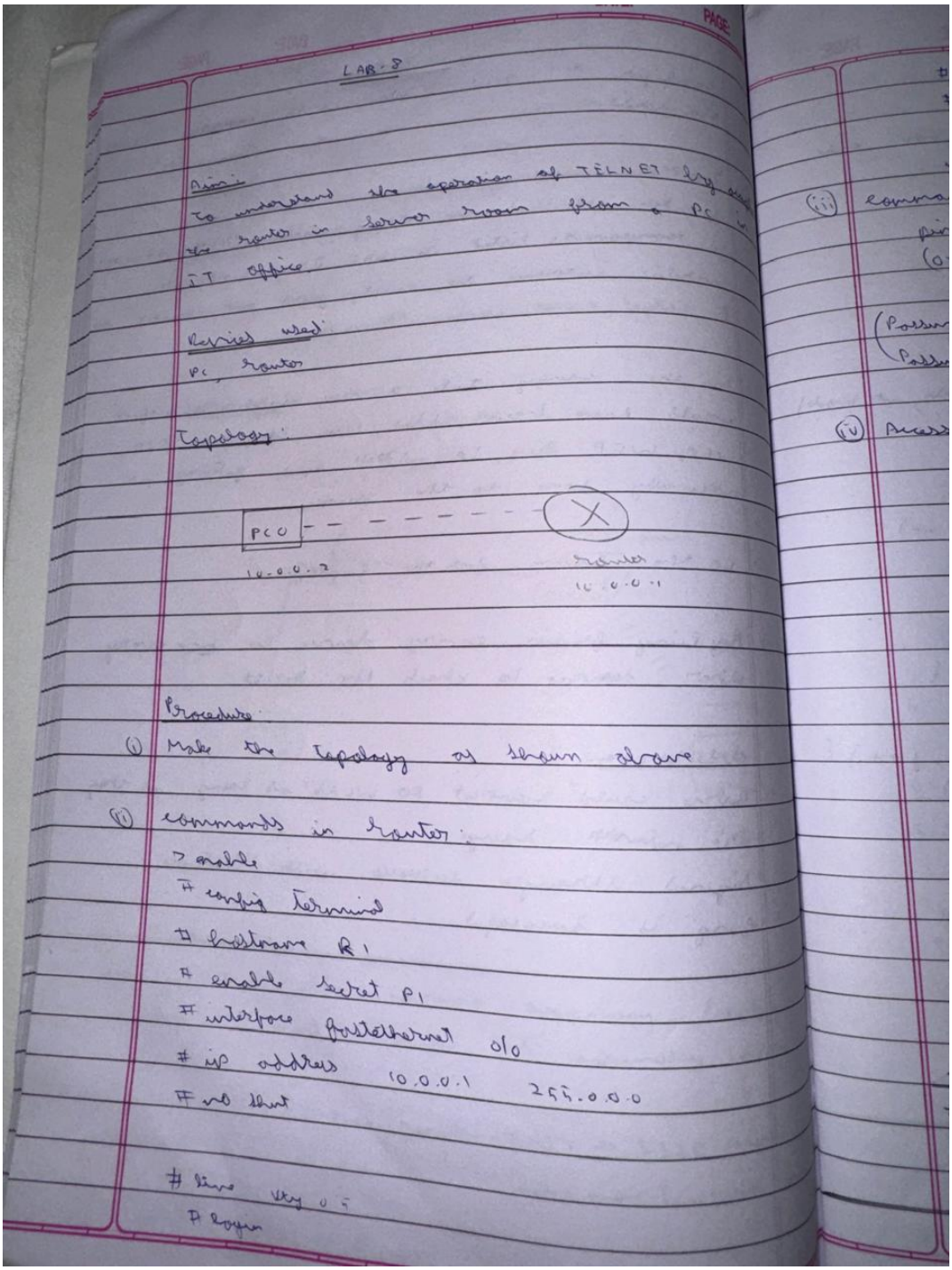


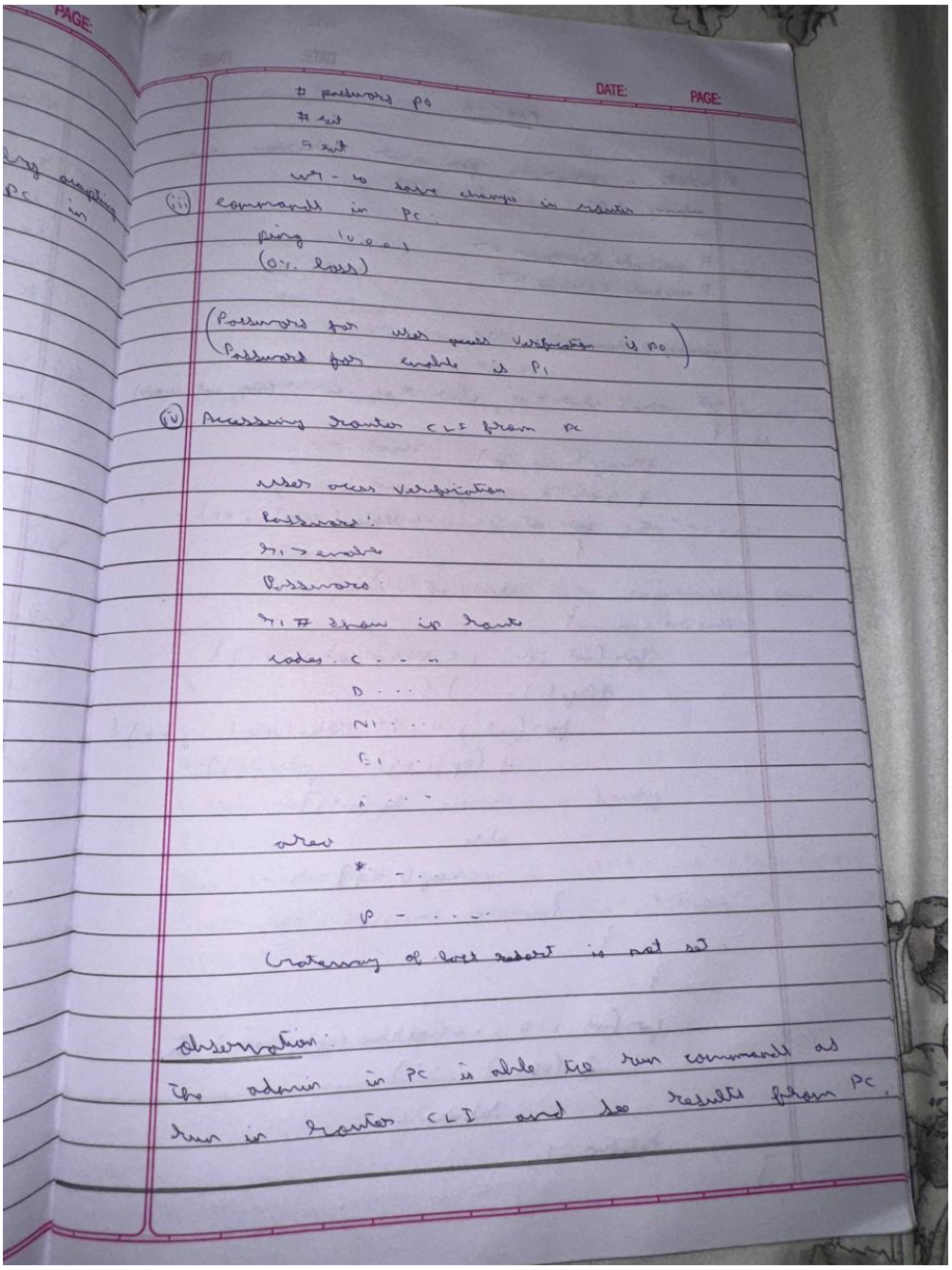


Program 11

Aim: To understand the operation of TELNET by accessing the router in the server room from a PC in the IT office.

Topology , Procedure and Observation:





password P0
exit
? exit
We'll - to save changes in router
(iii) commands in PC:
ping 10.0.0.1
(0% loss)

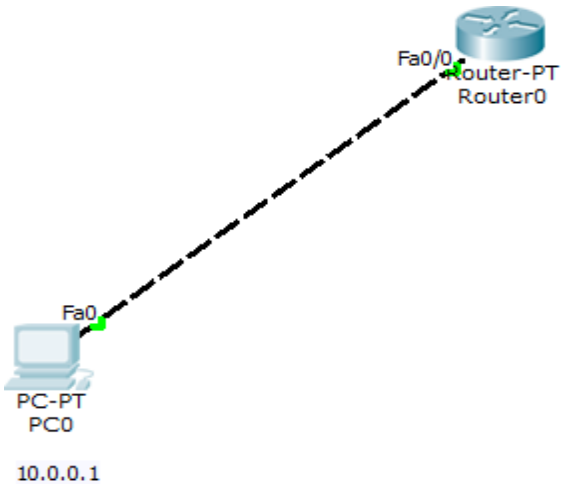
(Password for user mode verification is P0
Password for enable is P1)

(iv) Accessing router CLI from PC

User exec Verification
Password:
P1 > enable
Password:
P1 # show ip route
codes: C - -
D - -
N1 - -
E1 - -
A - -
area
* - -
P - - -
Gateway of last resort is not set

observation:
The admin in PC is able to run commands as run in router CLI and see results from PC.

Screen Shots:



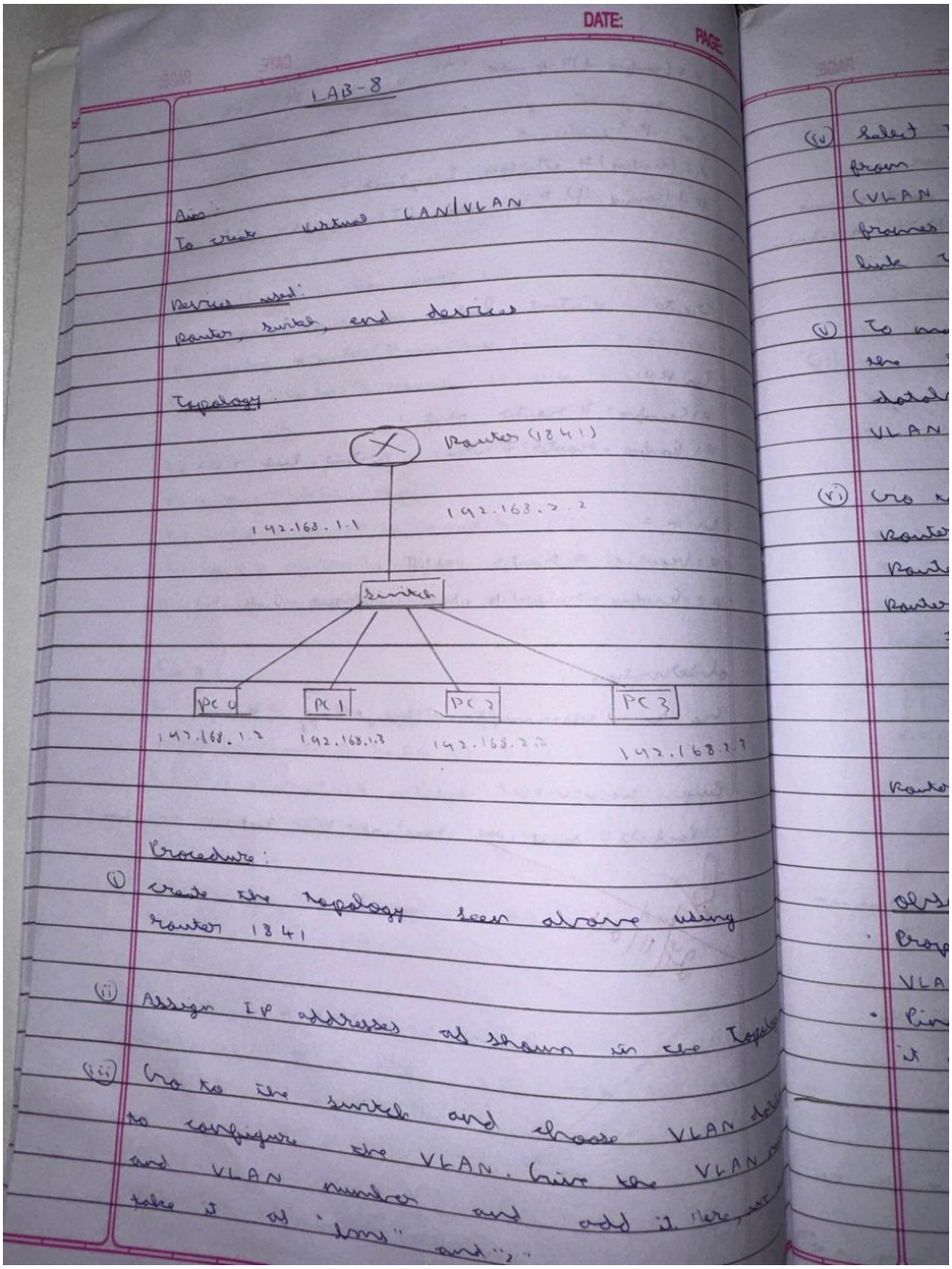
Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=0ms TTL=255
Reply from 10.0.0.2: bytes=32 time=0ms TTL=255
Reply from 10.0.0.2: bytes=32 time=0ms TTL=255
Reply from 10.0.0.2: bytes=32 time=0ms TTL=255

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>telnet 10.0.0.2
Trying 10.0.0.2 ...Open


User Access Verification

Password:
R1>enable
Password:
R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
R1#
```

Program 12

Aim: To construct a VLAN and make the PC's communicate among a VLAN .

Topology , Procedure and Observation:



DATE: PAGE:

(iv) Select the interface i.e fastethernet 4/1 (our switch from router) and make it trunk.
(VLAN trunking allows switches to forward frames from different VLANS over a single link called trunk)

(v) To make the router understand VLAN, go to the router's config tab and select VLAN database. Enter the number and name of VLAN created ('two' and 'i here).

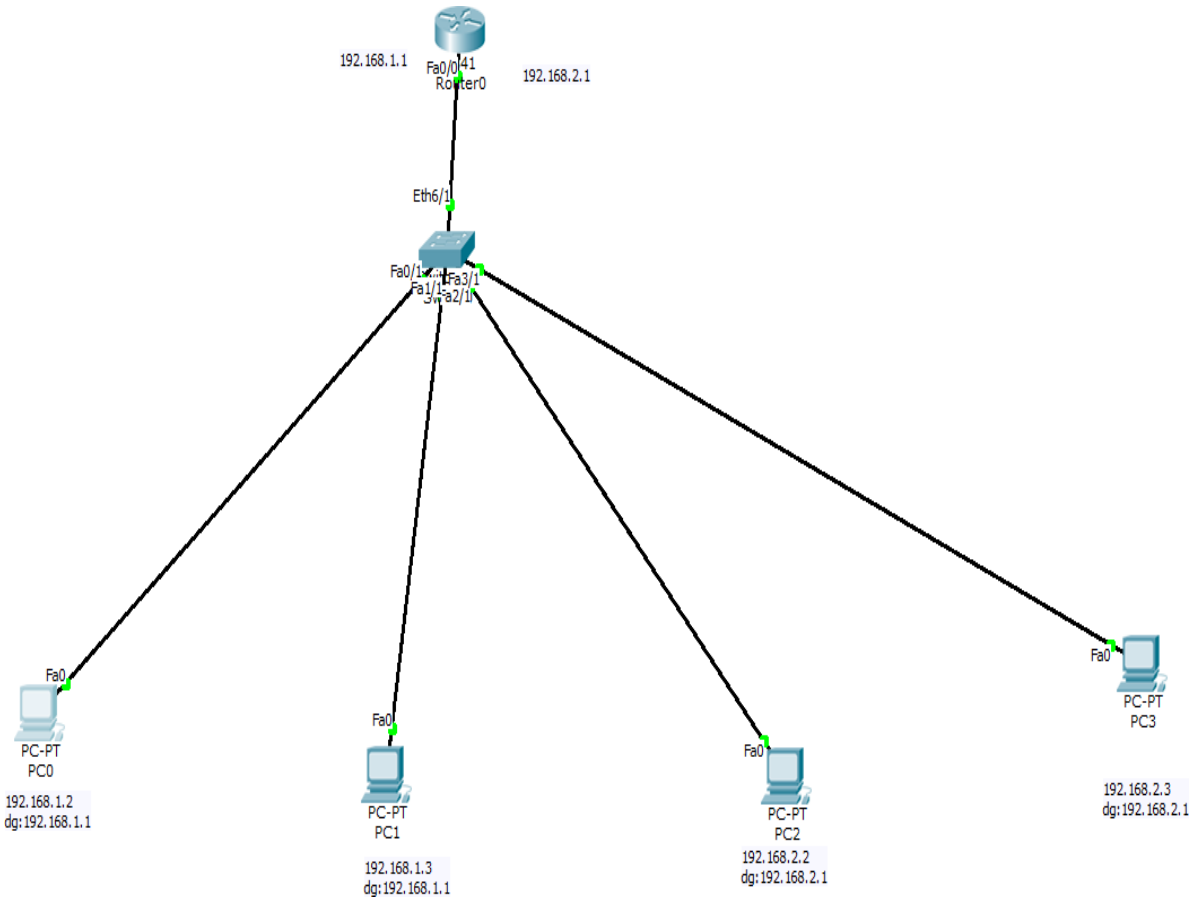
(vi) Go to the router CLI:

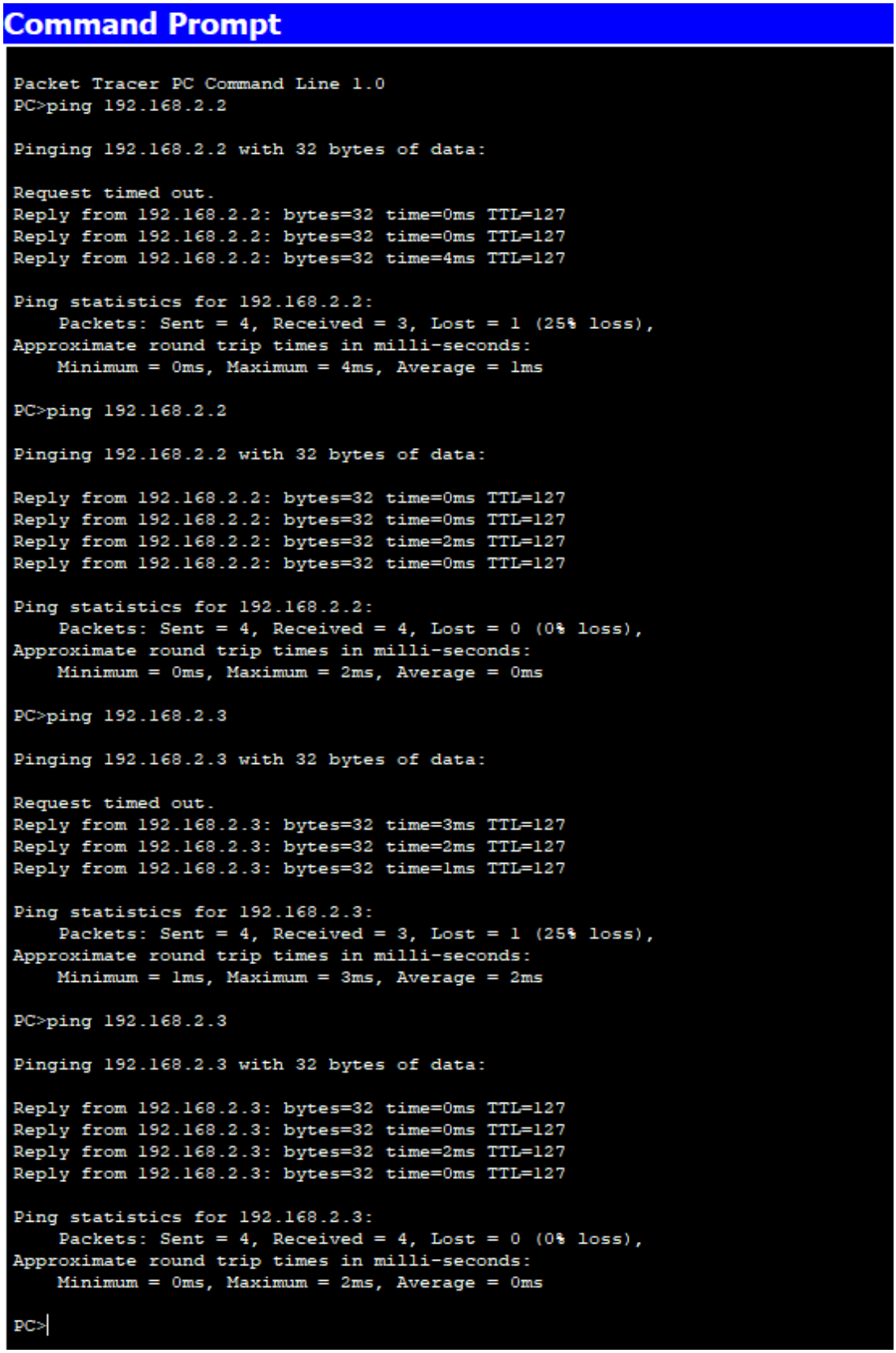
```
Router # config terminal
Router (config) # interface fastethernet 0/0.1
Router (config-subif) #
    #encapsulation dot1q 2
    # ip address 192.168.2.1 255.255.255.0
    #no shut
    # exit
Router (config) # exit
```

Observation:

- Proper trunk configuration is established to make VLAN work properly
- Ping from any one VLAN to another and it works properly.

Screen Shots:

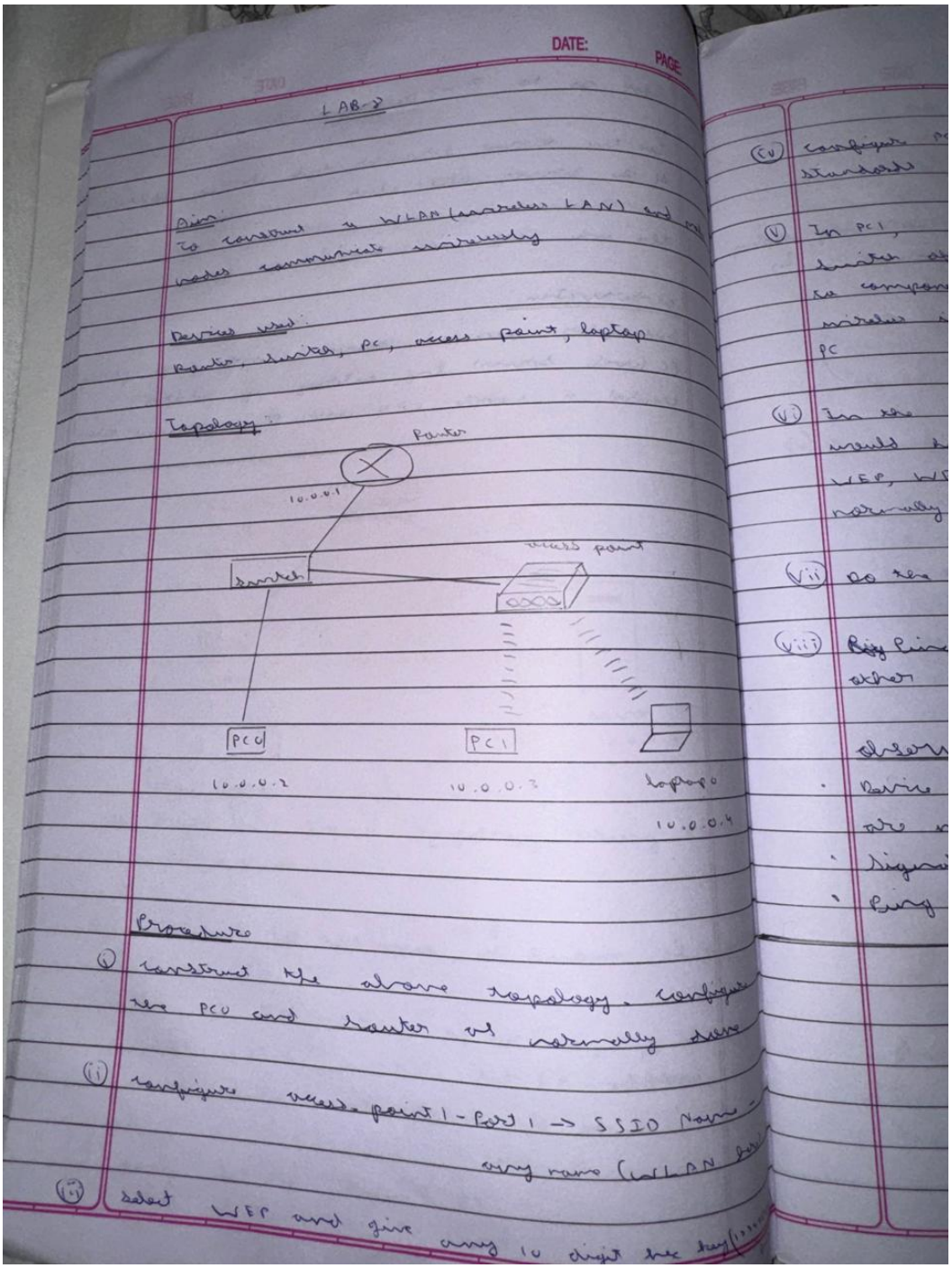


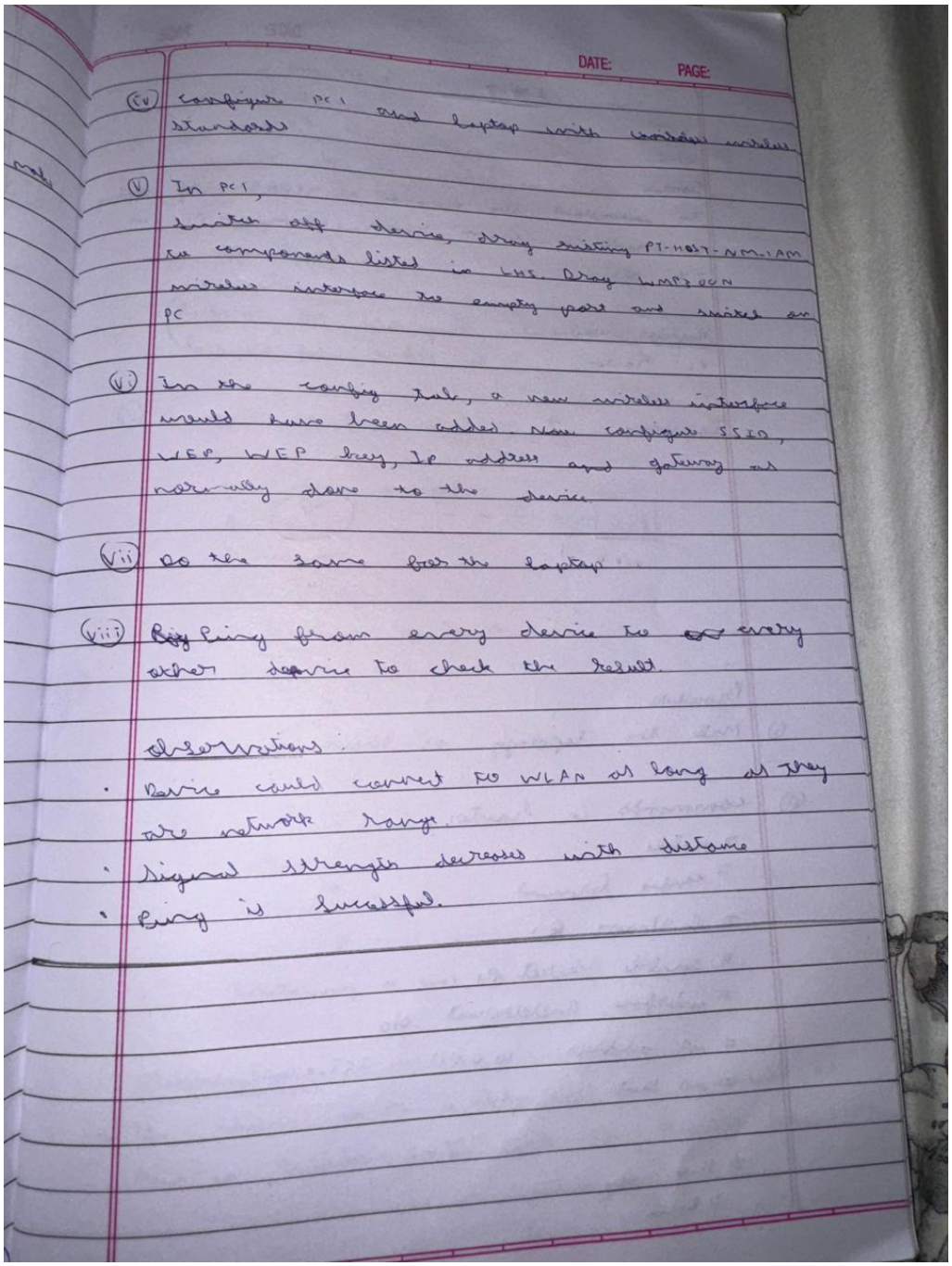

Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 192.168.2.2
Pinging 192.168.2.2 with 32 bytes of data:
Request timed out.
Reply from 192.168.2.2: bytes=32 time=0ms TTL=127
Reply from 192.168.2.2: bytes=32 time=0ms TTL=127
Reply from 192.168.2.2: bytes=32 time=4ms TTL=127
Ping statistics for 192.168.2.2:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 4ms, Average = 1ms
PC>ping 192.168.2.2
Pinging 192.168.2.2 with 32 bytes of data:
Reply from 192.168.2.2: bytes=32 time=0ms TTL=127
Reply from 192.168.2.2: bytes=32 time=0ms TTL=127
Reply from 192.168.2.2: bytes=32 time=2ms TTL=127
Reply from 192.168.2.2: bytes=32 time=0ms TTL=127
Ping statistics for 192.168.2.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 2ms, Average = 0ms
PC>ping 192.168.2.3
Pinging 192.168.2.3 with 32 bytes of data:
Request timed out.
Reply from 192.168.2.3: bytes=32 time=3ms TTL=127
Reply from 192.168.2.3: bytes=32 time=2ms TTL=127
Reply from 192.168.2.3: bytes=32 time=1ms TTL=127
Ping statistics for 192.168.2.3:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 3ms, Average = 2ms
PC>ping 192.168.2.3
Pinging 192.168.2.3 with 32 bytes of data:
Reply from 192.168.2.3: bytes=32 time=0ms TTL=127
Reply from 192.168.2.3: bytes=32 time=0ms TTL=127
Reply from 192.168.2.3: bytes=32 time=2ms TTL=127
Reply from 192.168.2.3: bytes=32 time=0ms TTL=127
Ping statistics for 192.168.2.3:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 2ms, Average = 0ms
PC>

Program 13

Aim: To construct a WLAN and make the nodes communicate wirelessly.

Topology , Procedure and Observation:





DATE: PAGE:

(iv) Configure PC1 and laptop with wireless modules with standards

(v) In PC1, switch off device, drag existing PT-HOST-NM-1AM to components listed in LHS. Drag WMP300N wireless interface to empty port and switch on PC

(vi) In the config tab, a new wireless interface would have been added. Now configure SSID, WEP, WEP key, IP address and gateway as mentioned above to the device.

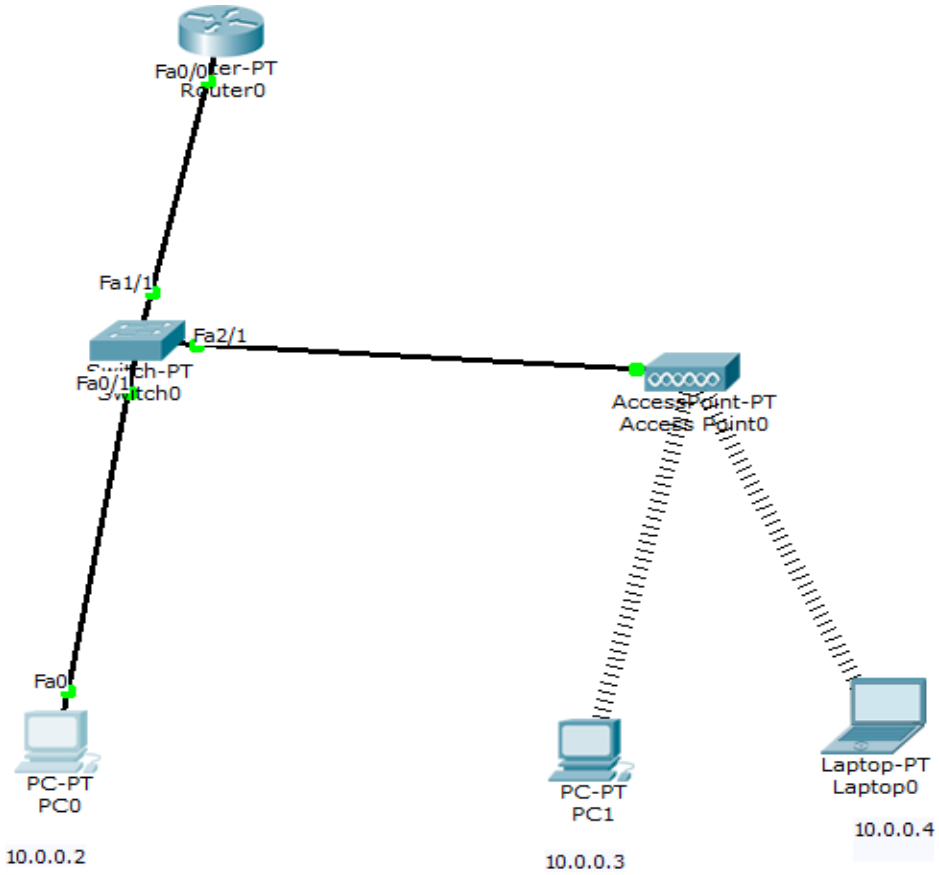
(vii) Do the same for the laptop

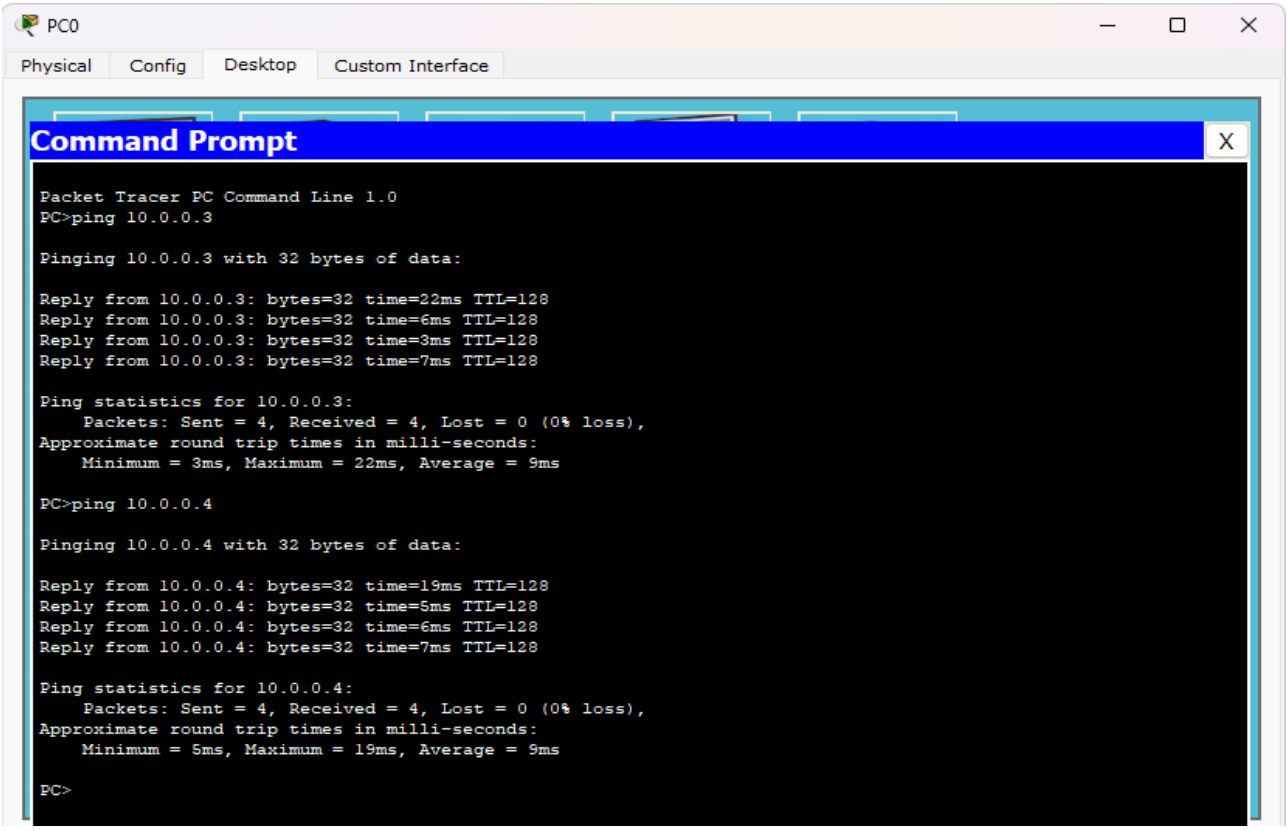
(viii) Ping from every device to every other device to check the result.

Observations:

- Device could connect to WLAN as long as they are network range
- Signal strength decreases with distance
- Ping is successful.

Screen Shots:



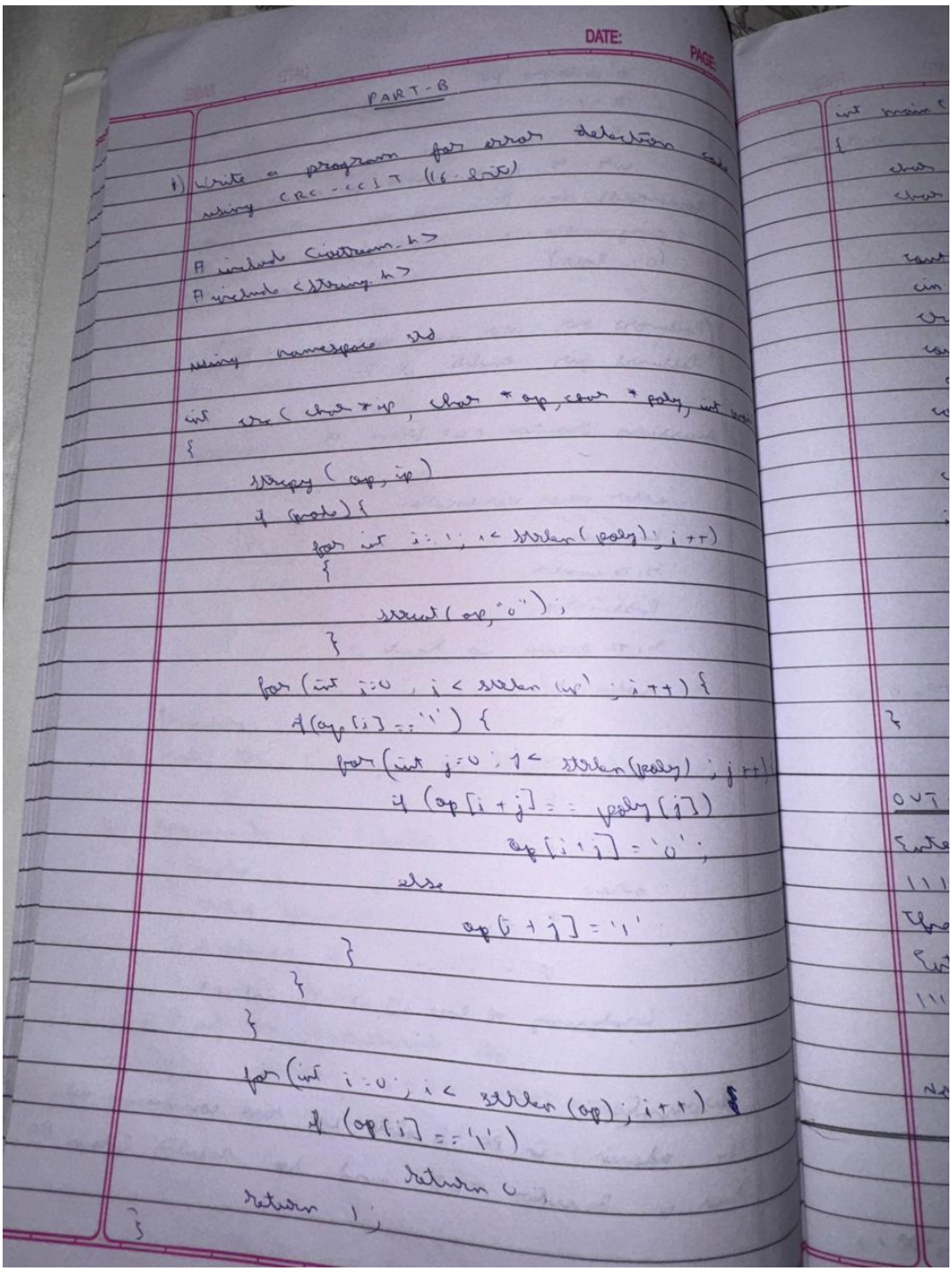


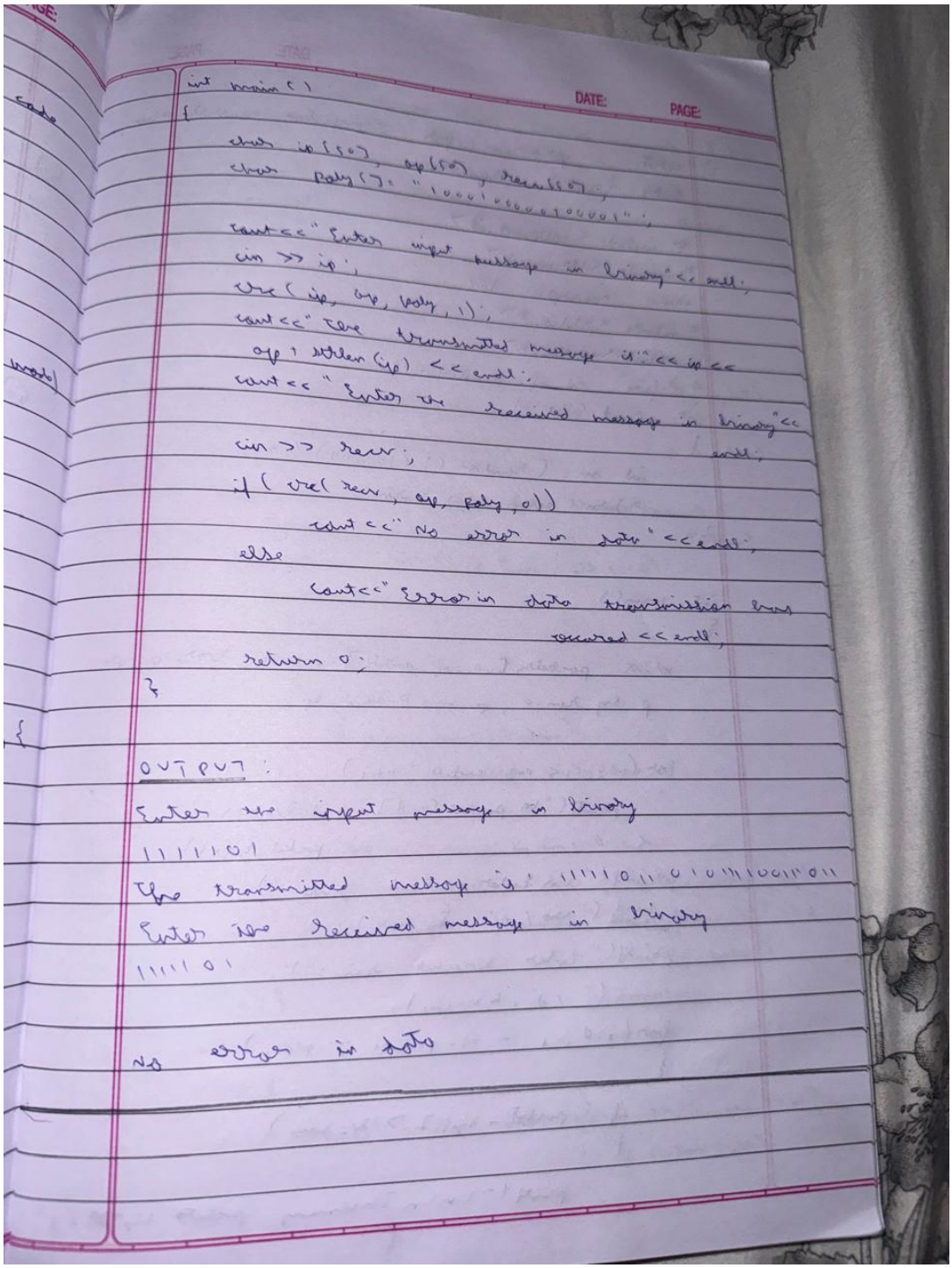
PART-B

Program 14

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

Code and Output:





```
int main()
{
    char ip[50], op[50], recv[50];
    char poly[] = "10001000000100001";
    cout<<"Enter input message in binary"<<endl;
    cin >> ip;
    vrc(ip, op, poly, 1);
    cout<<"the transmitted message is:"<<ip<<
    op + strlen(ip) <<endl;
    cout<<"Enter the received message in binary"<<
                                        endl;
    cin >> recv;
    if (vrc(recv, op, poly, 0))
        cout<<"No error in data"<<endl;
    else
        cout<<"Error in data transmission has
                occured"<<endl;
    return 0;
}
```

OUTPUT:

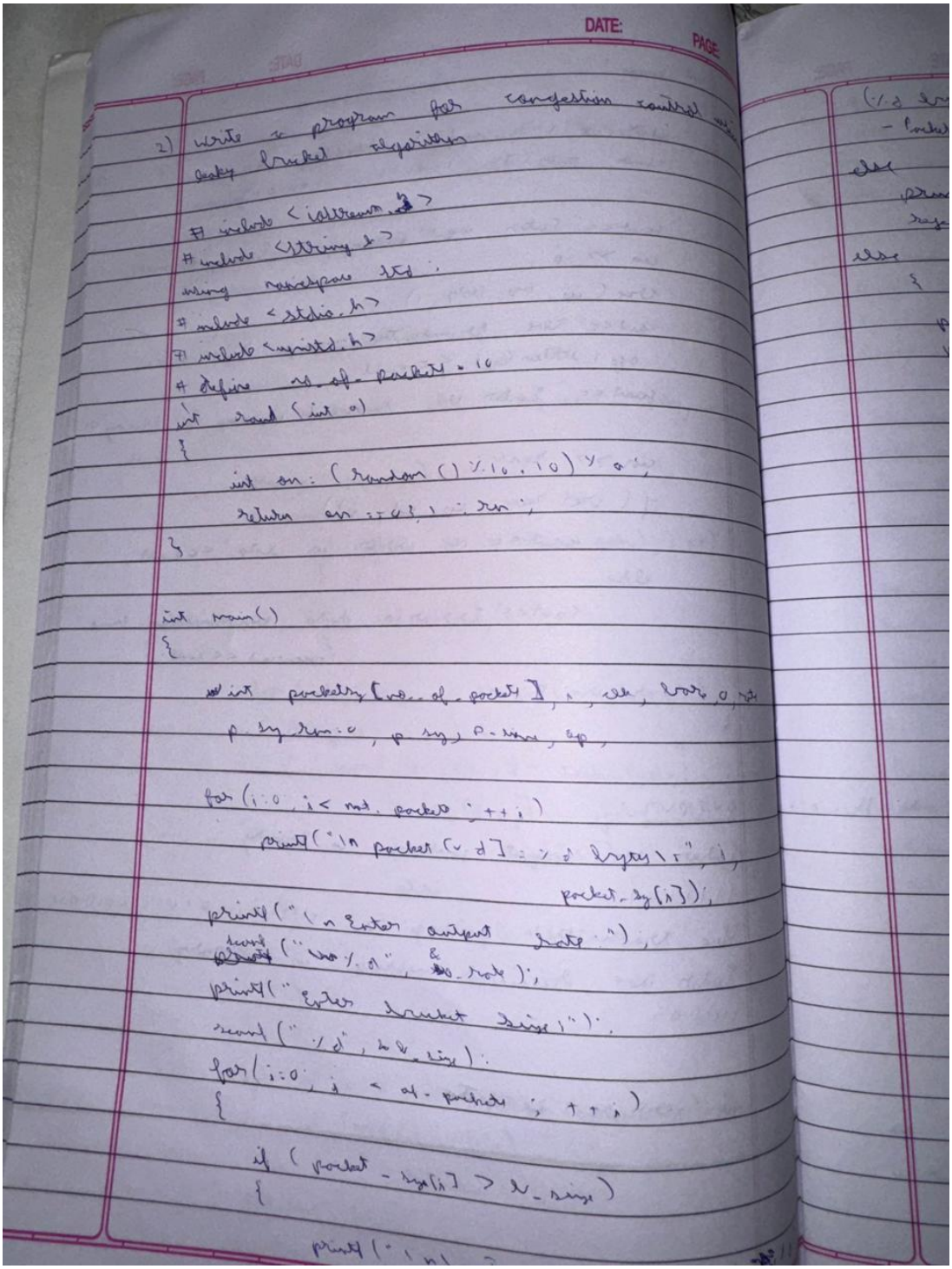
Enter the input message in binary
1111101
The transmitted message is: 1111101 01011100111011
Enter the received message in binary
1111101

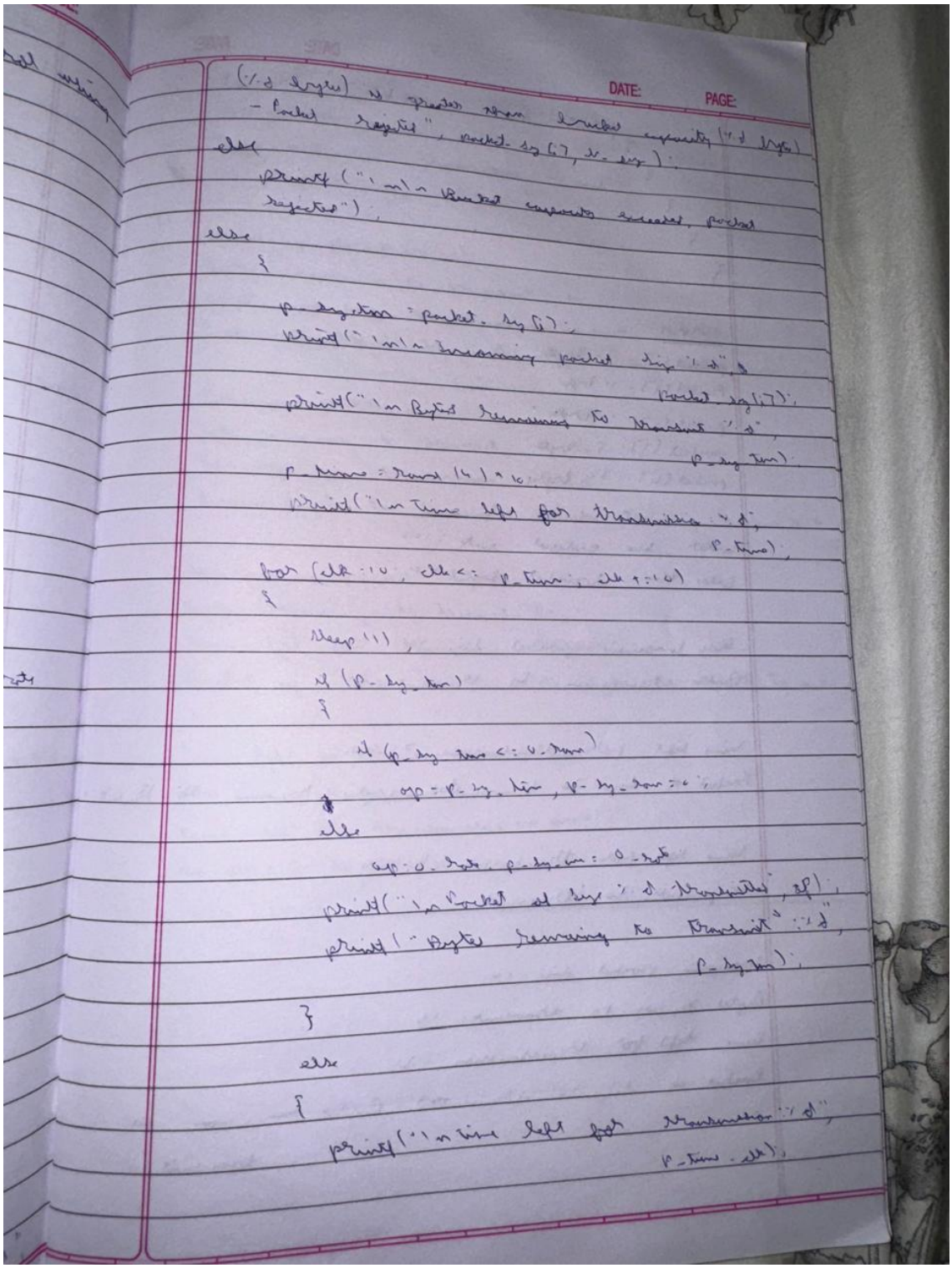
No error in data

Program 15

Write a program for congestion control using Leaky bucket algorithm.

Code and Output:





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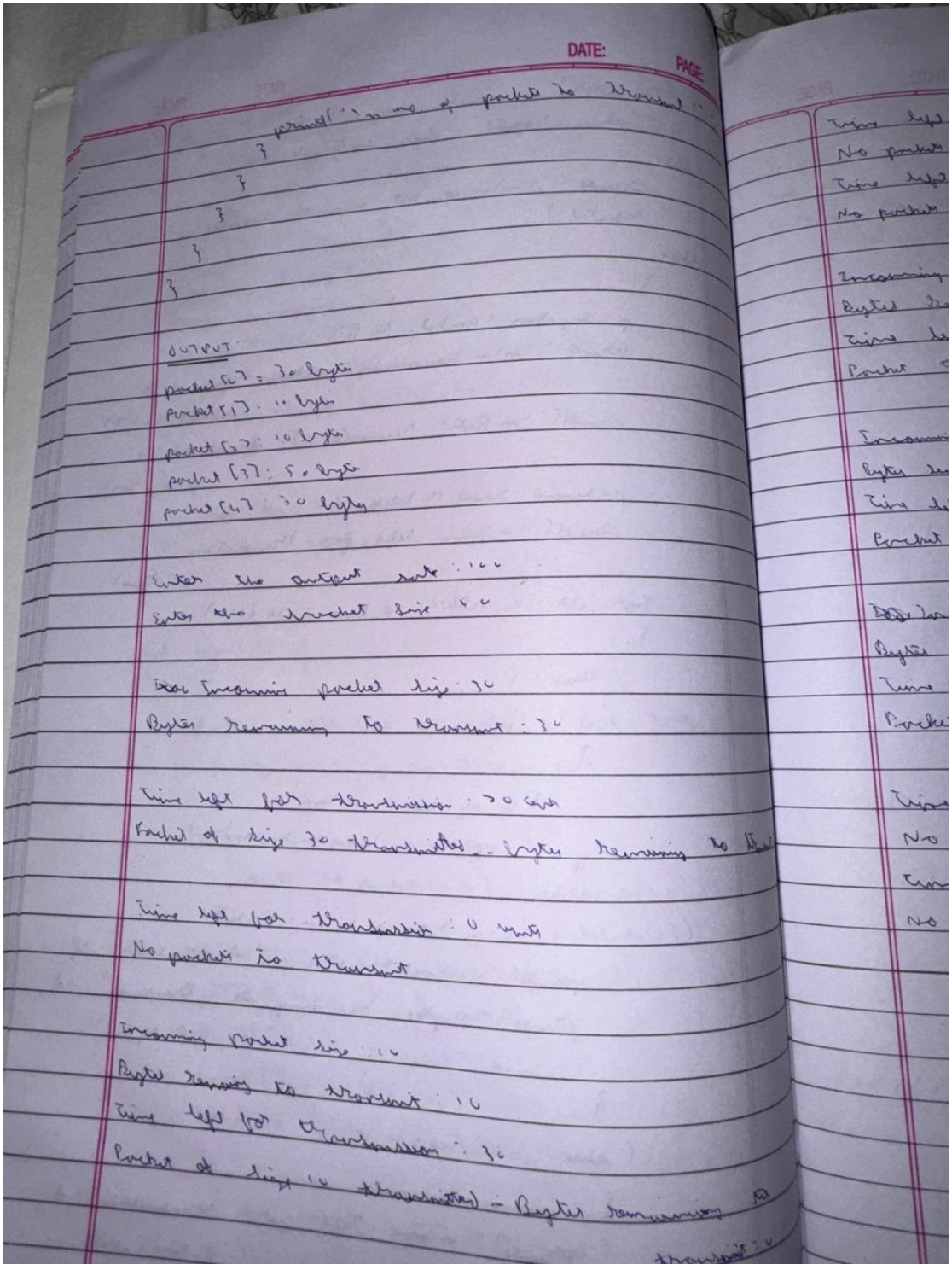
```
(i/2 bytes) is greater than buffer capacity (1 byte)
- Packet rejected", packet.seq[7], s.seq);
else
    printf("\n Buffer capacity exceeded, Packet
    rejected");
else
{
    p_bytetoo = packet.seq[i];
    printf("\n Incoming packet %d: %d",
                                    packet.seq[i]);
    printf("\n Bytes remaining to transmit: %d",
                                    p_bytes_tm);
    p_time = round(14) * 10;
    printf("\n Time left for transmitting: %d",
                                    p_time);
    for (clk=0; clk<= p_time; clk++)
    {
        sleep(1);
        if (p_bytes_tm)
        {
            if (p_bytes_tm <= 0.5*tm)
                op = p_bytes_tm, p_bytes_tm = 0;
            else
                op = 0.5*tm, p_bytes_tm = 0.5*tm;
            printf("\n Packet at %d: %d transmitted", op);
            printf("\n Bytes remaining to transmit: %d",
                                    p_bytes_tm);
        }
        else
        {
            printf("\n Time left for transmission: %d",
                                    p_time - clk);
```



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printf("\n no of packet to transmit : ");

}

}

}

}

}

OUTPUT:

packet[0] = 30 bytes

packet[1] = 10 bytes

packet[2] = 10 bytes

packet[3] = 50 bytes

packet[4] = 30 bytes

Enter the output rate : 100

Enter the packet size : 10

Incoming packet size : 30

Bytes remaining to transmit : 30

Time left for transmission : 10 sec

Packet of size 30 transmitted - 0 bytes remaining to tx

Time left for transmission : 0 sec

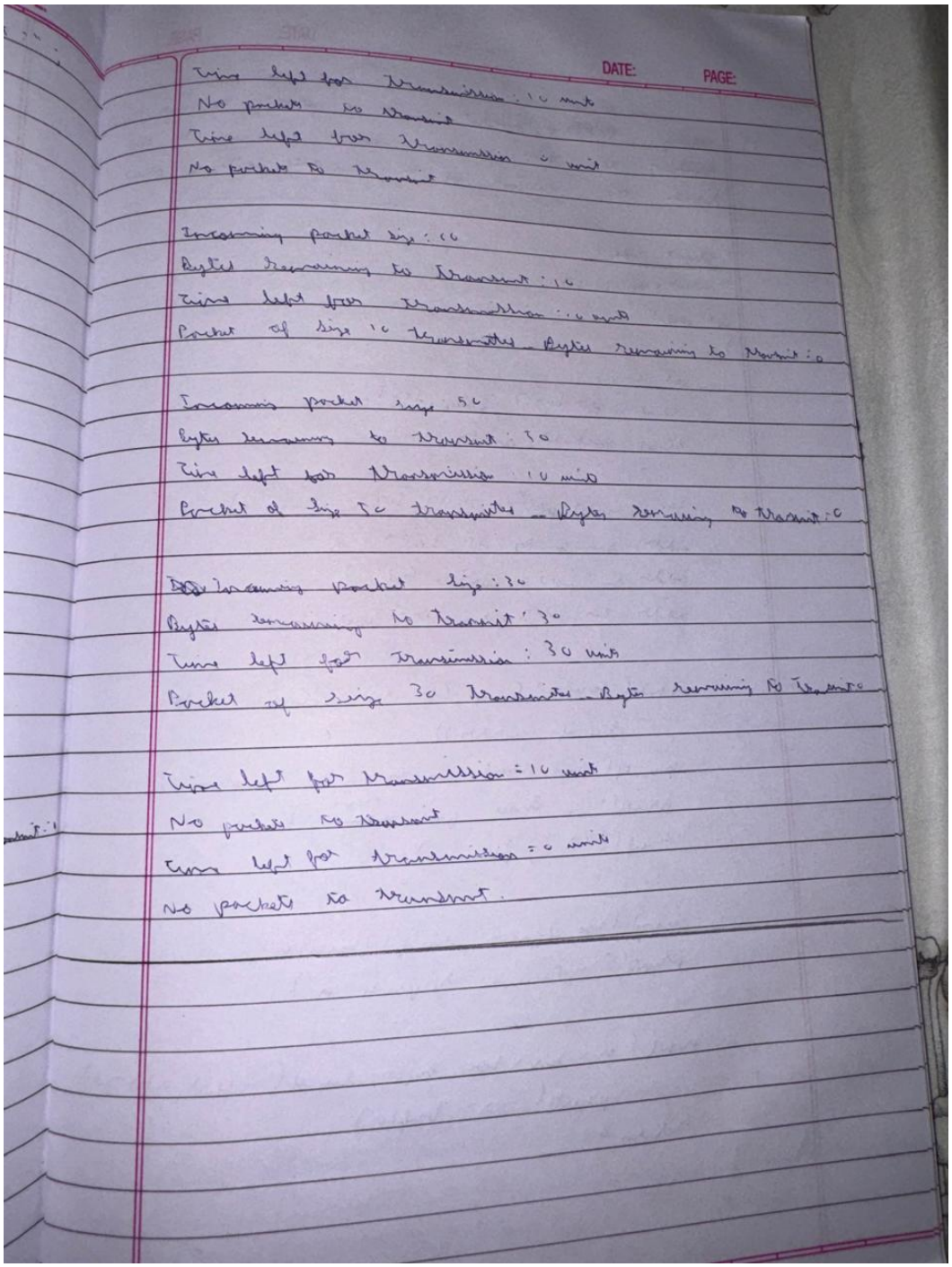
No packet to transmit

incoming packet size : 10

Bytes remaining to transmit : 10

Time left for transmission : 30

Packet of size 10 transmitted - Bytes remaining to transmit : 0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Time left for Transmission : 10 units
No packets to transmit
Time left for Transmission : 0 units
No packets to transmit

Incoming packet size : 60
Bytes remaining to transmit : 60
Time left for Transmission : 6 units
Packet of size 10 transmitted - Bytes remaining to transmit : 0

Incoming packet size 50
Bytes remaining to transmit : 50
Time left for Transmission : 10 units
Packet of size 50 transmitted - Bytes remaining to transmit : 0

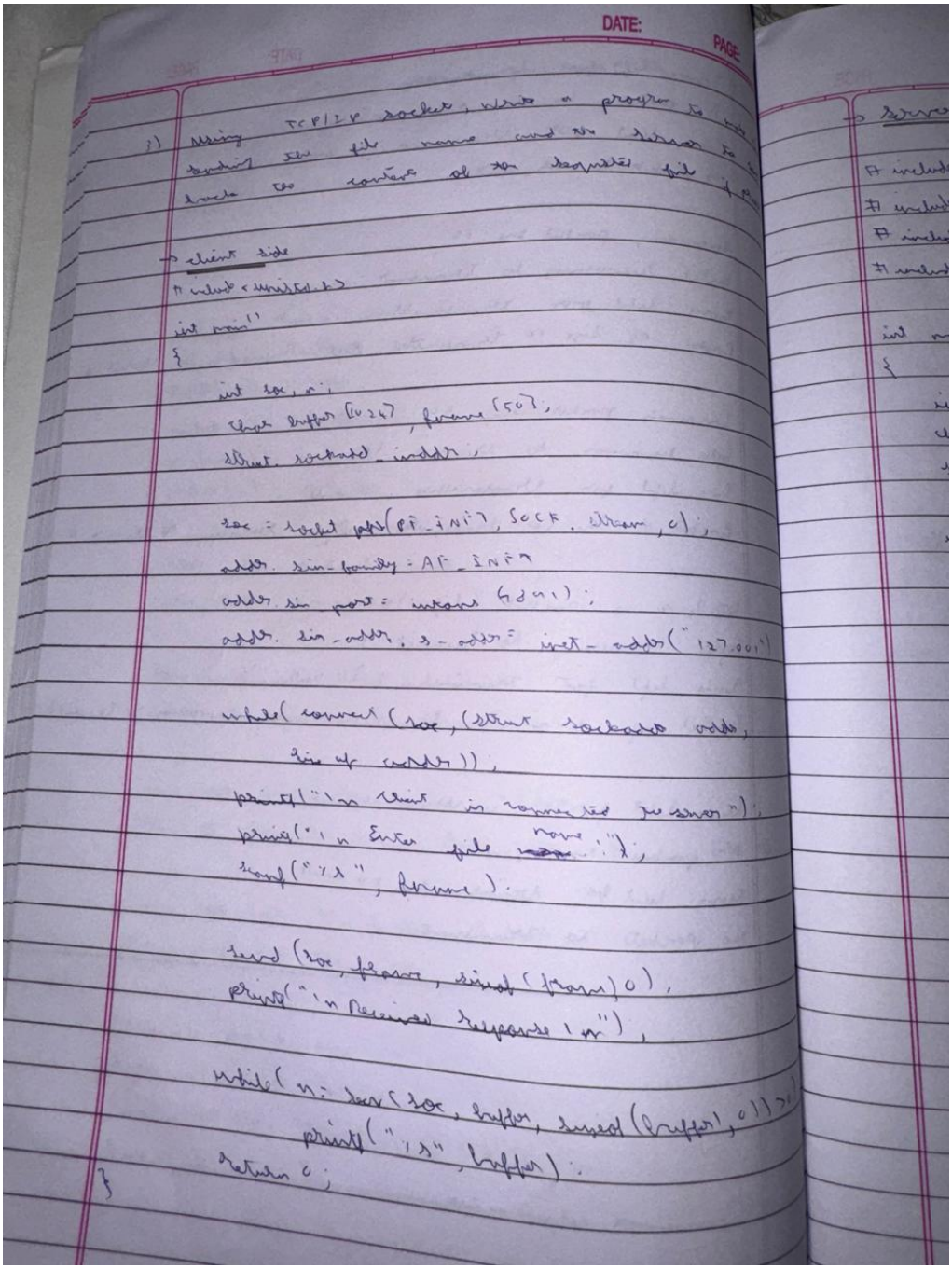
Incoming packet size : 30
Bytes remaining to transmit : 30
Time left for Transmission : 30 units
Packet of size 30 transmitted - Bytes remaining to transmit : 0

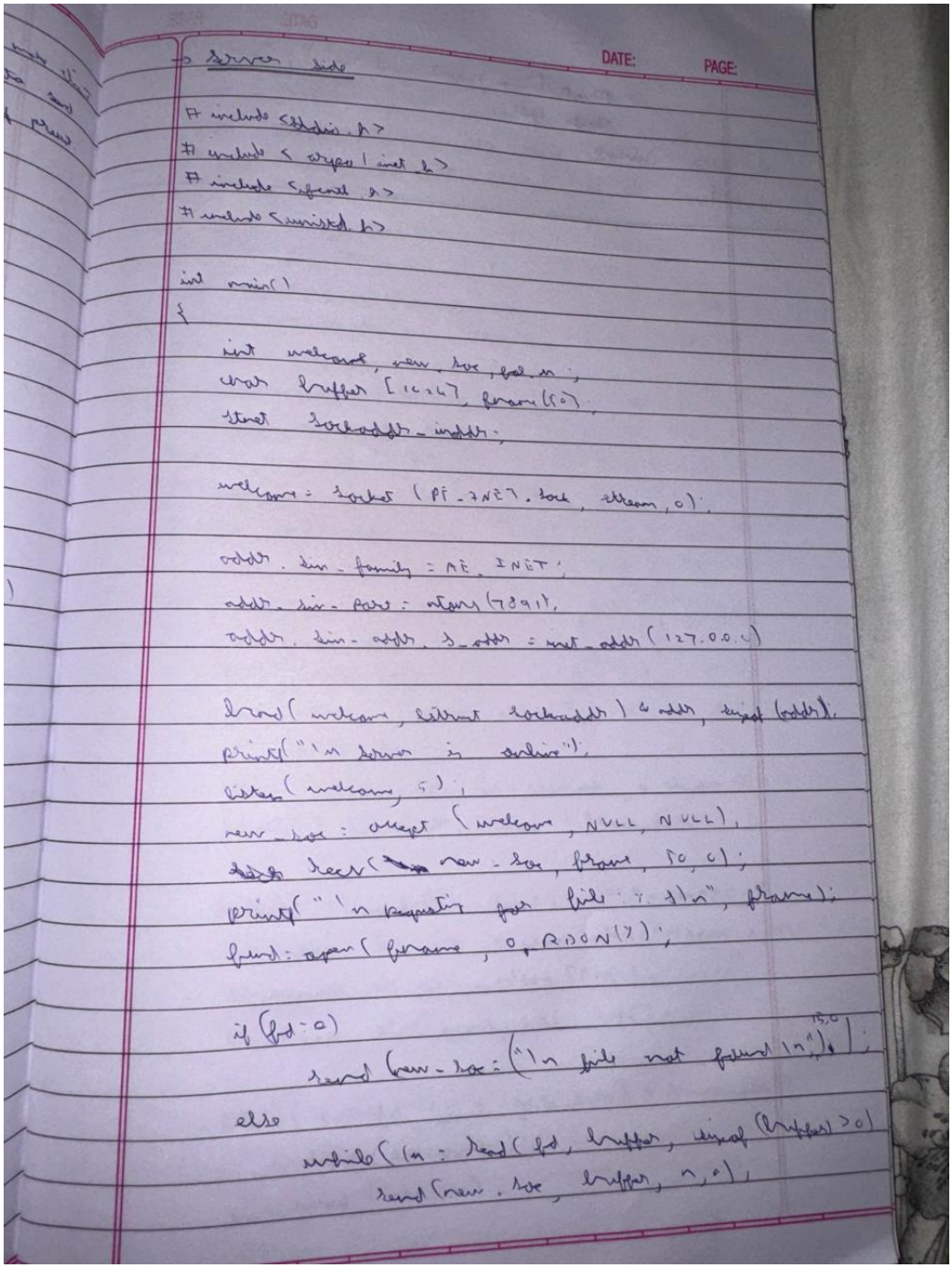
Time left for Transmission : 10 units
No packets to transmit
Time left for Transmission : 0 units
No packets to transmit.

Program 16

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

Code and Output:





=> Server side

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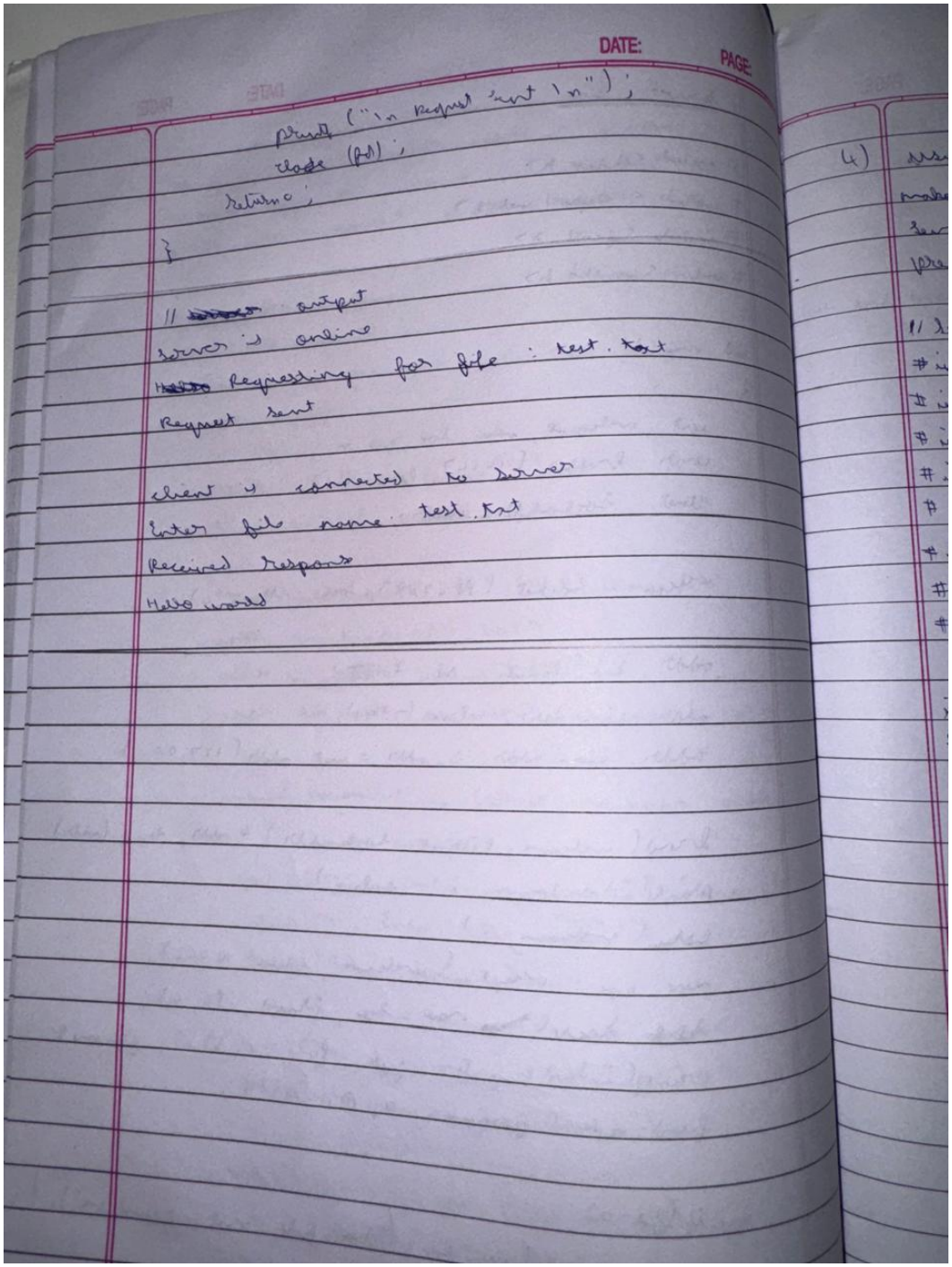
```
#include <stdio.h>
#include <sys/socket.h>
#include <fcntl.h>
#include <unistd.h>

int main()
{
    int welcome, new_sock, fd, n;
    char buffer[1024], fname[50];
    struct sockaddr_in addr;

    welcome = socket(PF_INET, SOCK_STREAM, 0);

    addr.sin_family = AF_INET;
    addr.sin_port = htons(7891);
    addr.sin_addr.s_addr = inet_addr("127.0.0.1");

    bind(welcome, (struct sockaddr*)&addr, sizeof(addr));
    printf("\n Server is online");
    listen(welcome, 5);
    new_sock = accept(welcome, NULL, NULL);
    recv(new_sock, fname, 50, 0);
    printf("\n requesting for file : %s\n", fname);
    fd = open(fname, O_RDONLY);

    if (fd == 0)
        send(new_sock, "\n file not found \n", 15, 0);
    else
    {
        while((n = read(fd, buffer, sizeof(buffer)) > 0)
            send(new_sock, buffer, n, 0);
    }
```



printf("\n Request sent \n");
close(fd);
return 0;
}

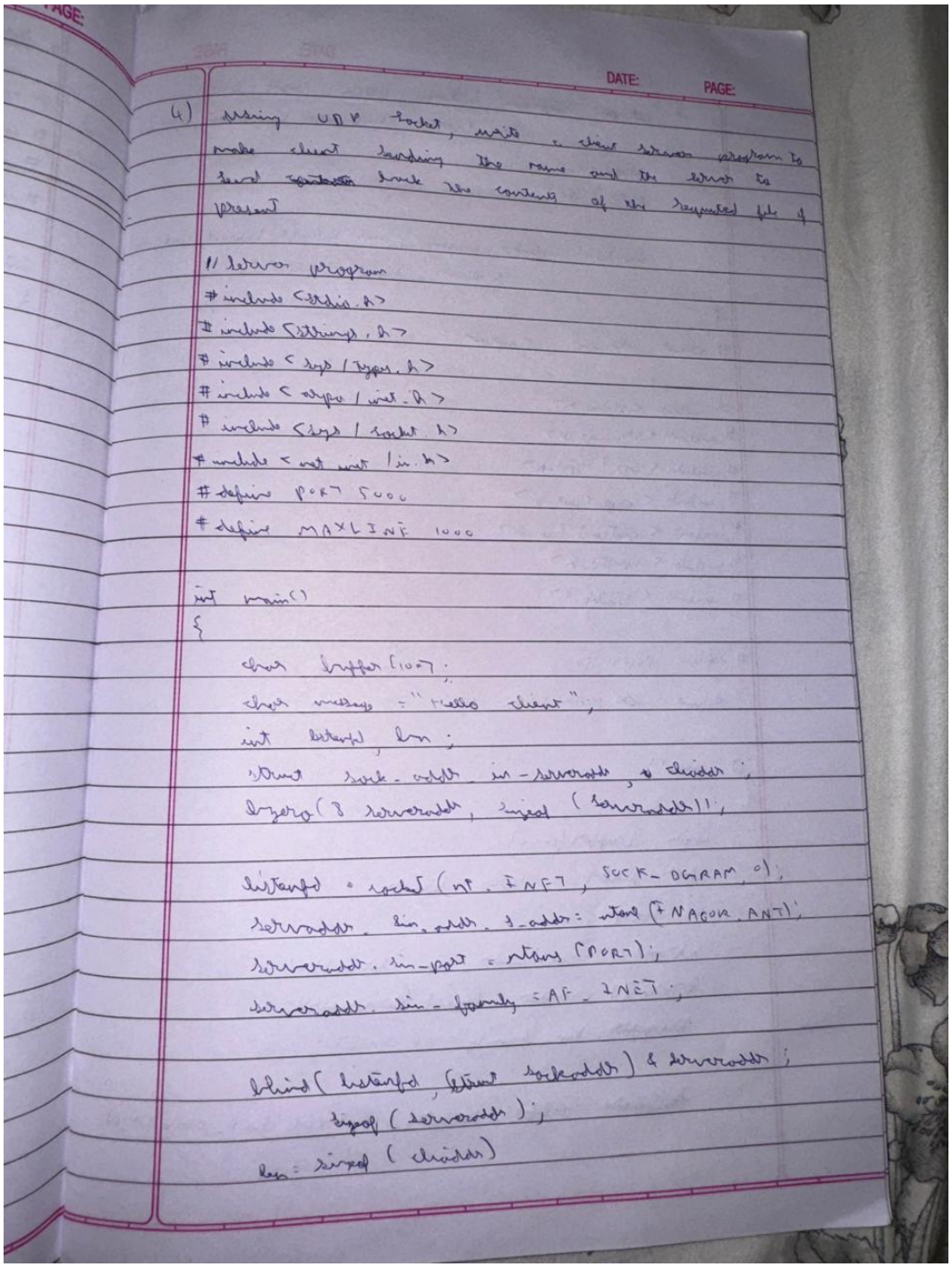
// output
Server is online
Requesting for file : test.txt
Request sent

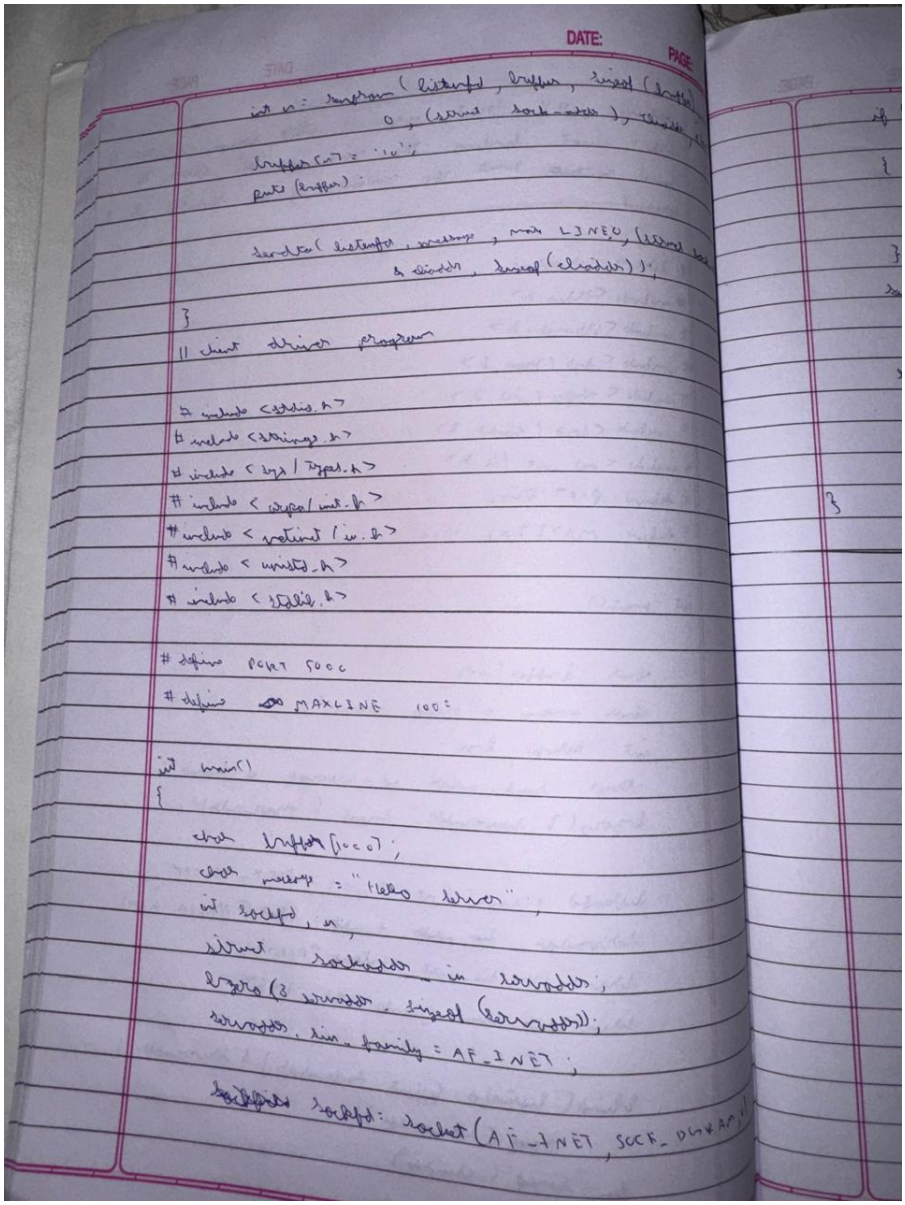
client is connected to server
Enter file name: test.txt
Received response
Hello world

Program 17

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

Code and Output:





```
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int n = recvfrom ( listenfd, buffer, sizeof (buffer),
                   0, (struct sockaddr *), &clilen);

buffer[n] = '\0';
puts (buffer);

sendto( listenfd, mesg, MAXLINE, (struct sockaddr *)
        &cliaddr, sizeof(cliaddr));

}
// client driver program

#include <stdio.h>
#include <string.h>
#include <sys/types.h>
#include <arpa/inet.h>
#include <netinet/in.h>
#include <unistd.h>
#include <stdlib.h>

#define PORT 5000
#define MAXLINE 1000

int main()
{

  char buffer[100];
  char *mesg = "Hello Server";
  int sockfd, n;
  struct sockaddr_in servaddr;
  bzero(&servaddr, sizeof(servaddr));
  servaddr.sin_family = AF_INET;

  sockfd = socket(AF_INET, SOCK_DGRAM,
```

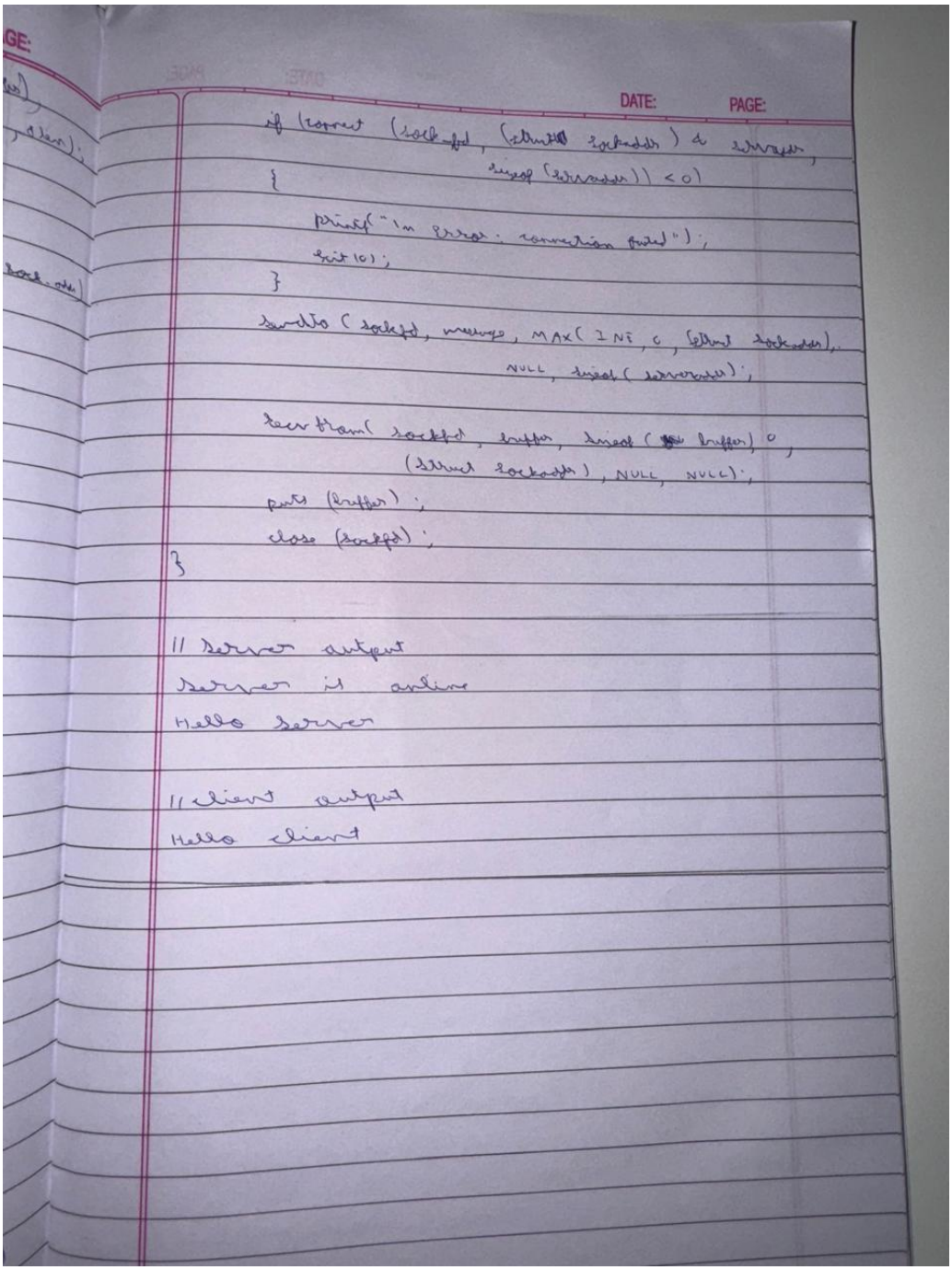

```
if (connect (sockfd, (struct sockaddr *) &server,
                sizeof (server)) < 0)
{
    printf("In error : connection failed");
    exit(0);
}

sendto (sockfd, message, MAX(INT, 0, (struct sockaddr),
                NULL, sizeof (server));

recvfrom( sockfd, buffer, sizeof (buffer), 0,
                (struct sockaddr), NULL, NULL);
puts (buffer);
close (sockfd);
}
```

// Server output

Server is online

Hello Server

// client output

Hello client