Practical-1 (Hub and Switch)

- Hub
- PC0 – 192.52.5.1
- PC1 – 192.52.5.2
- PC2 – 192.52.5.3

- Switch
- PC3 – 192.52.5.4
- PC4 – 192.52.5.5
- PC5 – 192.52.5.6

Send packet to switch to hub

In switch PC command prompt – arp –a

Switch CLI: Show mac-address

Practical-2 (SMTP)

Router – 192.5.10.1 / 192.5.20.1

DNS Server - 192.5.10.2 / 192.5.20.2

- In services in DNS - name: future.first.in / 192.5.10.3
- In services in DNS - name: future.second.in / 192.5.20.3

Mail Server - 192.5.10.3 / 192.5.20.3

- In services in Email - user: user1 / 1234 - user2 / 1234
- In services in Email - user: user3 / 1234 - user4 / 1234 – user5 / 1234

PC0 - 192.5.10.11 / 192.5.10.1 / 192.5.10.2

- in configure mail - user1@future.first.in / 192.5.10.3 / user1 / 1234

PC1 - 192.5.10.12 / 192.5.10.1 / 192.5.10.2

- in configure mail - user2@future.first.in / 192.5.10.3 / user2 / 1234

PC2 - 192.5.20.11 / 192.5.20.1 / 192.5.20.2

- in configure mail – user3@future.second.in / 192.5.20.3 / user3 / 1234

PC3 - 192.5.20.12 / 192.5.20.1 / 192.5.20.2

- in configure mail – user4@future.second.in / 192.5.20.3 / user4 / 1234

PC4 - 192.5.20.13 / 192.5.20.1 / 192.5.20.2

- in configure mail – user5@future.second.in / 192.5.20.3 / user5 / 1234

Send mail to PC0 to PC2:- TO: user3@future.second.in / Subject: send mail

PC2: click receive

Practical-3 (DHCP)

Router0 – 192.5.10.1 / serial 10.0.0.1 / RIP- 10.0.0.0, 192.5.10.0

Router0 DNS Server: 192.5.10.2 / 192.5.10.1 / 192.5.10.2

- google.com / 192.5.10.2
- Yahoo.com / 192.5.20.2
- Cisco.com / 192.5.30.2

HTTP:

```
<html>
        <hr>
                <center>
                        <font size='+4' color='red' >
                                Google Website
                        </font>
                </center>
        <hr>
</html>
```

Router0 DHCP Server: 192.5.10.3 / 192.5.10.1 / 192.5.10.2

- Pool Name: ServerPool / 192.5.10.1 / 192.5.10.2
- 192 5 10 11 / 255 255 255 0
- 20

Router1 – 192.5.20.1 / serial 10.0.0.2, 20.0.0.1 / RIP- 10.0.0.0, 20.0.0.0, 192.5.20.0

Router1 DNS Server: 192.5.20.2 / 192.5.20.1 / 192.5.20.2

- google.com / 192.5.10.2
- Cisco.com / 192.5.30.2

HTTP:

```
<html>
    <hr>
        <center>
            <font size='+4' color='red' >
                Yahoo Website
            </font>
        </center>
    <hr>
</html>
```

Router1 DHCP Server: 192.5.20.3 / 192.5.20.1 / 192.5.20.2

- Pool Name: ServerPool / 192.5.20.1 / 192.5.20.2
- 192 5 20 11 / 255 255 255 0
- 20

Router2 – 192.5.30.1 / serial 20.0.0.2 / RIP- 20.0.0.0, 192.5.30.0

Router2 DNS Server: 192.5.30.2 / 192.5.30.1 / 192.5.30.2

- google.com / 192.5.10.2

HTTP:

```
<html>
    <hr>
        <center>
            <font size='+4' color='red' >
```

Cisco Website

<hr>

</html>

Router2 CLI:

ip helper-address 192.5.10.3

Practical-4 (ACL)

Router0 - 192.5.10.1 / serial 10.0.0.1 / RIP- 10.0.0.0, 192.5.10.0

- PC0 – 192.5.10.11 / 192.5.10.1 / 192.5.10.2
- PC1 – 192.5.10.12 / 192.5.10.1 /192.5.10.2
- PC2 – 192.5.10.13 / 192.5.10.1 /192.5.10.2

ip access-list standard R0

permit 192.5.10.0 0.0.0.255

permit host 192.5.20.11

permit host 192.5.30.11

deny any

exit

interface GigabitEthernet0/0/0

ip access-group R0 in

exit

Router# - show running-config

Router1 - 192.5.20.1 / serial 10.0.0.2, 20.0.0.1 / RIP- 20.0.0.0, 10.0.0.0, 192.5.20.0

- PC3 – 192.5.20.11 / 192.5.20.1 / 192.5.20.2

- PC4 – 192.5.20.12 / 192.5.20.1 /192.5.20.2
- PC5 – 192.5.20.13 / 192.5.20.1 /192.5.20.2

ip access-list extended R1

permit 192.5.20.0 0.0.0.255 any

permit ip host 192.5.20.11 host 192.5.30.11

permit ip host 192.5.20.12 host 192.5.30.12

deny ip any any

exit

interface GigabitEthernet0/0/0

ip access-group R1 in

exit

Router# - show running-config

Router2 - 192.5.30.1 / serial 20.0.0.2 / RIP- 20.0.0.0, 192.5.30.0

- PC6 – 192.5.30.11 / 192.5.30.1 / 192.5.30.2
- PC7 – 192.5.30.12 / 192.5.30.1 /192.5.30.2
- PC8 – 192.5.30.13 / 192.5.30.1 /192.5.30.2

ip access-list extended R2

permit 192.5.20.0 0.0.0.255 any

permit ip host 192.5.30.11 host 192.5.20.11

permit ip host 192.5.30.12 host 192.5.20.12

deny ip any any

exit

interface GigabitEthernet0/0/0

ip access-group R2 in

exit

Router# - show running-config

Practical-5 (Telnet, SSH, FTP)

Router0 - 192.5.10.1 / serial 10.0.0.1 / RIP- 10.0.0.0, 192.5.10.0

- PC0 – 192.5.10.11 / 192.5.10.1
- PC1 – 192.5.10.12 / 192.5.10.1
- PC2 – 192.5.10.13 / 192.5.10.1
- Server – 192.5.10.2 / 192.5.10.1

Router1 - 192.5.20.1 / serial 10.0.0.2, 20.0.0.1 / RIP- 20.0.0.0, 10.0.0.0, 192.5.20.0

- PC3 – 192.5.20.11 / 192.5.20.1
- PC4 – 192.5.20.12 / 192.5.20.1
- PC5 – 192.5.20.13 / 192.5.20.1

Router2 - 192.5.30.1 / serial 20.0.0.2 / RIP- 20.0.0.0, 192.5.30.0

- PC6 – 192.5.30.11 / 192.5.30.1
- PC7 – 192.5.30.12 / 192.5.30.1
- PC8 – 192.5.30.13 / 192.5.30.1

Router0 in CLI for Telnet

- config – enable secret r0sct
- username user1 password pswd1
- username user2 password pswd2
- username user3 password pswd3
- line vty 0 1
- password telnet123
- login local
- exit
- config – do show run

Access router0 on PC0: in command prompt

- telnet 192.5.10.1
- user1
- pswd1
- enable
- r0sct
- show run
- show user

Access router0 on PC3: in command prompt

- telnet 192.5.10.1
- user1
- pswd1
- enable
- r0sct
- show run
- show user

Only 2 PCs access the router0 at a time

Router1 in CLI for SSH

- config – hostname mansi
- enable secret 123
- ip domain-name user
- crypto key generate rsa
- 1024
- ip ssh version 2
- line vty 0 1
- login local
- exit
- username user1 password pswd1
- username user2 password pswd2
- username user3 password pswd3
- do show run

Access router1 on PC2: in command prompt

- ssh –l user1 192.5.20.1
- Password - pswd1
- enable
- Password - 123

FTP on Server

Server0 -> Services -> FTP

- Username: user-ftp , Password: 1234 …. save

- Create the demo.txt file... and check on PC0 to upload the file

PC0 -> Text Editor -> write Hello then save file demo.txt

PC0 -> Command prompt

- dir
- FTP 192.5.10.2
- put demo.txt
- dir

Check on another department of PC3 and download the file

PC3 -> Command prompt

- dir
- FTP 192.5.10.2
- get demo.txt
- dir

Practical-6 (Subnetting)

Calculation: $2^n - 2 \geq 14 = 2^4 - 2 = 14$

Host bits = 4, Network bits = 28, Subnet Mask = 255.255.255.240 (/28), Usable Hosts = 14

Old Subnet mask (Decimal form)	255.255.255.0
Old Subnet mask (Binary form)	11111111.11111111.11111111.00000000
New Subnet mask (Binary form)	11111111.11111111.11111111.11110000
New Subnet mask (Decimal form)	255.255.255.240

Dept.	Device	IP Address	Subnet Mask
Dept. 1	Network	192.5.10.0	255.255.255.240
	Default Gateway	192.5.10.1	255.255.255.240
	Host (First)	192.5.10.2	255.255.255.240
	Host (Last)	192.5.10.14	255.255.255.240
	Broadcast	192.5.10.15	255.255.255.240
Dept. 2	Network	192.5.10.16	255.255.255.240
	Default Gateway	192.5.10.17	255.255.255.240
	Host (First)	192.5.10.18	255.255.255.240
	Host (Last)	192.5.10.30	255.255.255.240
	Broadcast	192.5.10.31	255.255.255.240

Dept. 3	Network	192.5.10.32	255.255.255.240
	Default Gateway	192.5.10.33	255.255.255.240
	Host (First)	192.5.10.34	255.255.255.240
	Host (Last)	192.5.10.46	255.255.255.240
	Broadcast	192.5.10.47	255.255.255.240
Dept. 4	Network	192.5.10.48	255.255.255.240
	Default Gateway	192.5.10.49	255.255.255.240
	Host (First)	192.5.10.50	255.255.255.240
	Host (Last)	192.5.10.62	255.255.255.240
	Broadcast	192.5.10.63	255.255.255.240
Dept. 5	Network	192.5.10.64	255.255.255.240
	Default Gateway	192.5.10.65	255.255.255.240
	Host (First)	192.5.10.66	255.255.255.240
	Host (Last)	192.5.10.78	255.255.255.240
	Broadcast	192.5.10.79	255.255.255.240

Router	Dept.	Network	Subnet Mask	Next Hop
Router0	Dept.3	192.5.10.32	255.255.255.240	10.0.0.2
	Dept.4	192.5.10.48	255.255.255.240	10.0.0.2
	Dept.5	192.5.10.64	255.255.255.240	10.0.0.2
		192.5.10.64	255.255.255.240	20.0.0.1
		192.5.10.64	255.255.255.240	20.0.0.2
Router1	Dept.1	192.5.10.0	255.255.255.240	10.0.0.1
	Dept.2	192.5.10.16	255.255.255.240	10.0.0.1
	Dept.5	192.5.10.64	255.255.255.240	20.0.0.2
Router2	Dept.1	192.5.10.0	255.255.255.240	20.0.0.1
		192.5.10.0	255.255.255.240	10.0.0.2
		192.5.10.0	255.255.255.240	10.0.0.1
	Dept.2	192.5.10.16	255.255.255.240	20.0.0.1
		192.5.10.16	255.255.255.240	10.0.0.2
		192.5.10.16	255.255.255.240	10.0.0.1
	Dept.3	192.5.10.32	255.255.255.240	20.0.0.1
	Dept.4	192.5.10.48	255.255.255.240	20.0.0.1

Practical-7 (Client/Server)

Server Code:

```
import socket
import datetime

print("Starting server...")
```

```
server_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
host = socket.gethostname()
port = 12345
server_socket.bind((host, port))
server_socket.listen(1)

print("Server is waiting for connection...")
conn, addr = server_socket.accept()
print("Connected to:", addr)

while True:
    client_msg = conn.recv(1024).decode()
    if not client_msg:
        break

    current_time = datetime.datetime.now().strftime("[%Y-%m-%d %H:%M:%S]")
    print(f"Client {current_time}: {client_msg}")

    if client_msg.lower() == "quit":
        print("Server: Connection closed by client.")
        break

    server_msg = input("Server (Enter Text): ")
    conn.send(server_msg.encode())

    if server_msg.lower() == "quit":
        print("Server: Connection closed by server.")
        break

conn.close()
server_socket.close()
print("Server shut down.")
```

Client Code:

```
import socket
import datetime

print("Starting client...")

client_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
host = socket.gethostname()
port = 12345
client_socket.connect((host, port))
```

```
print("Connected to server. You can start chatting...")

while True:
    client_msg = input("Client (Enter Text): ")
    client_socket.send(client_msg.encode())

    if client_msg.lower() == "quit":
        print("Client: Connection closed by client.")
        break

    server_msg = client_socket.recv(1024).decode()
    current_time = datetime.datetime.now().strftime("[%Y-%m-%d %H:%M:%S]")
    print(f"Server {current_time}: {server_msg}")

    if server_msg.lower() == "quit":
        print("Client: Connection closed by server.")
        break

client_socket.close()
print("Client shut down.")
```

py server.py

py client.py

Practical-8 (OSPF)

Router0 – 192.5.10.1 / Serial - 10.0.0.1, 30.0.0.2

- PC0 – 192.5.10.11

config - router ospf 1

network 192.5.10.0 0.0.0.255 area 0

network 10.0.0.0 0.255.255.255 area 0

network 30.0.0.0 0.255.255.255 area 0

exit

config – do show ip protocols

do show ip route

Router1 – 192.5.20.1 / Serial – 10.0.0.2, 20.0.0.1

- PC1 – 192.5.20.11

config - router ospf 1

network 192.5.20.0 0.0.0.255 area 0

network 10.0.0.0 0.255.255.255 area 0

network 20.0.0.0 0.255.255.255 area 0

exit

config - do show ip route

Router2 – 192.5.30.1 / Serial – 20.0.0.2, 30.0.0.1

- PC2 – 192.5.30.11

config - router ospf 1

network 192.5.30.0 0.0.0.255 area 0

network 20.0.0.0 0.255.255.255 area 0

network 30.0.0.0 0.255.255.255 area 0

exit

config - do show ip route

Practical-9 (BGP)

Router0 – 192.5.10.1 / Serial - 10.0.0.1, 30.0.0.2

- PC0 – 192.5.10.11

config – router bgp 10005

neighbor 10.0.0.2 remote-as 20005

neighbor 30.0.0.1 remote-as 30005

network 192.5.10.0 mask 255.255.255.0

config – do show ip route

do show run

Router1 – 192.5.20.1 / Serial – 10.0.0.2, 20.0.0.1

- PC1 – 192.5.20.11

config – router bgp 20005

neighbor 10.0.0.1 remote-as 10005

neighbor 20.0.0.2 remote-as 30005

network 192.5.20.0 mask 255.255.255.0

config – do show ip route

do show run

Router2 – 192.5.30.1 / Serial – 20.0.0.2, 30.0.0.1

- PC2 – 192.5.30.11

config – router bgp 30005

neighbor 20.0.0.1 remote-as 20005

neighbor 30.0.0.2 remote-as 10005

network 192.5.30.0 mask 255.255.255.0

config – do show ip route

do show run

Practical-10 (EIGRP)

Router0 – 192.5.10.1 / Serial - 10.0.0.1, 30.0.0.2

- PC0 – 192.5.10.11

config – router eigrp 1005

network 192.5.10.0

network 10.0.0.0

network 30.0.0.0

do show ip route

do show run

Router1 – 192.5.20.1 / Serial – 10.0.0.2, 20.0.0.1

- PC1 – 192.5.20.11

config – router eigrp 1005

network 192.5.20.0

network 10.0.0.0

network 20.0.0.0

do show ip route

do show run

Router2 – 192.5.30.1 / Serial – 20.0.0.2, 30.0.0.1

- PC2 – 192.5.30.11

config – router eigrp 1005

network 192.5.30.0

network 20.0.0.0

network 30.0.0.0

do show ip route

do show run