PRACTICAL NO : 01

Study of Networking Device

Q1. Identify the network address & subnet mask for the ip address 192.168.1.0
Given ip address is 192.168.1.0
The subnet mask is 255.255.255.0 as it is belong to class C
In Binary Form:-
11111111 .11111111 .11111111.00000000 In this the 1st 24 bits represent the host part.

Q2. Create 4 Subnets:-
To create 4 subnets we need to binary two bits from the host part.
2^2=4
So the new subnet mask is 255.255.255.192
Binary Form:-
11111111.11111111.11111111.11000000
so 26 bits for the network part 6 bits for the host part. Total no. of subnet 4.
[combining 2 or more subnets will give us the Supernet.]
Total no. Of useable ip address in each subnet is 64- -2 because 1 address is for network
and 1 for broadcast, so subtracting them. 62 IP addresses are usable.
CIDR format:-classless InterDomain Representation.
New Subnet Mask:- 255.255.255.192/126
The 1st subnet mask is 192.168.1.0/126
The 2nd subnet mask is 192.168.1.64/126
Subnet 1=192.168.1.0 ---> Network address
Useable host address 192.168.1.62/126
Broadcast address 192.168.1.63/26
Subnet 2 192.168.1.64
1st host address 192.168.1.65
Last host address 192.168.1.126/26
Broadcast address 192.168.1.127
Subnet 3 192.168.1.128
Last address is 192.168.1.190

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15th address is 192.168.1.129
Subnet 4 192.168.1.192
Last address is 192.168.1.254
Broadcast address 192.168.1.255

Q3. A network address 192.168.1.0/24 creates 3 subnets with subnet 1 corrosting if so
subnet 2 with 20, and subnet 3 with 10.
(Since the no. The host bit is determined by the ip address. So ip address formula to
calculate no. Of bits required to satisfy each subnet ip address is 2^n/ no. of ip address
required.
Where n is the no. of bits and +2 represent n|6)
Subnet 1 of 50 ip address
Ex:- 2^6 = 64 with 62 usable ip addresses we need 6 host bits.
Subnet mask is 255.255.255.192/26
2^5 = 32 ,30 useable
Subnet mask is 255.255.255.224|27
2^4=16
Subnet 255.255.255.140|28
Subnet 1
Subnet mask: 255.255.255.192|26
Network address 192.168.1.0|26
Host address 192.168.1.1|26
Last host address 192.168.1.50|26
Useable ip address 62//
Broadcast 192.168.1.63|26

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PRACTICAL NO: 02

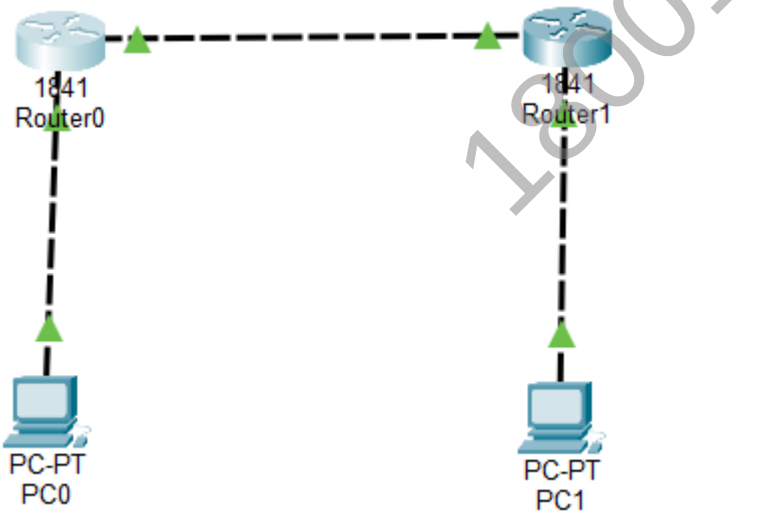
Demonstrate the Static Routing in Packet Tracer.

AIM :- To configure and demonstrate static routing between two networks using two routers in Packet Tracer.

STEPS :-

1. In packet tracer place 2 PCs and 2 Routers.
2. Connect Router0 with PC0 via FastEthernet0/0 using cross-copper cord and Router1 with PC1 via FastEthernet0/0 using cross-copper cord.
3. Connect both routers via FastEthernet0/1 using cross-copper cord.
4. Set the IP address and default gateway of both the PCs in IP configuration of both PCs respectively.

TOPOLOGY :-



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Code

Router0 configuration

```
Router>enable
Router#configure terminal
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown
```

```
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.2
Router(config)#exit
```

Router1 configuration

```
Router>enable
Router#configure terminal
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 20.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 40.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.1
Router(config)#exit
```

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PC 0 :

```
C:\>ipconfig
C:\>ping 10.0.0.1
C:\>ping 20.0.0.1
C:\>ping 20.0.0.2
C:\>ping 40.0.0.1
C:\>ping 40.0.0.2
```

PC 1:

```
 C:\>ipconfig
C:\>ping 40.0.0.1
C:\>ping 20.0.0.2
C:\>ping 20.0.0.1
```

C:\>ping 10.0.0.1
C:\>ping 10.0.0.2

OUTPUT:-

PC 0:

```
C:\>ping 40.0.0.2

Pinging 40.0.0.2 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.2: bytes=32 time<1ms TTL=126
Reply from 40.0.0.2: bytes=32 time<1ms TTL=126
Reply from 40.0.0.2: bytes=32 time<1ms TTL=126

Ping statistics for 40.0.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC 1:

```
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time<1ms TTL=126
Reply from 10.0.0.2: bytes=32 time<1ms TTL=126
Reply from 10.0.0.2: bytes=32 time<1ms TTL=126
Reply from 10.0.0.2: bytes=32 time<1ms TTL=126

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
```

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Conclusion :

The above network topology has been executed successfully and static routing has been demonstrated. Communication between PC0 (10.0.0.2) and PC1 (40.0.0.2) across two routers has been verified with successful ping results.

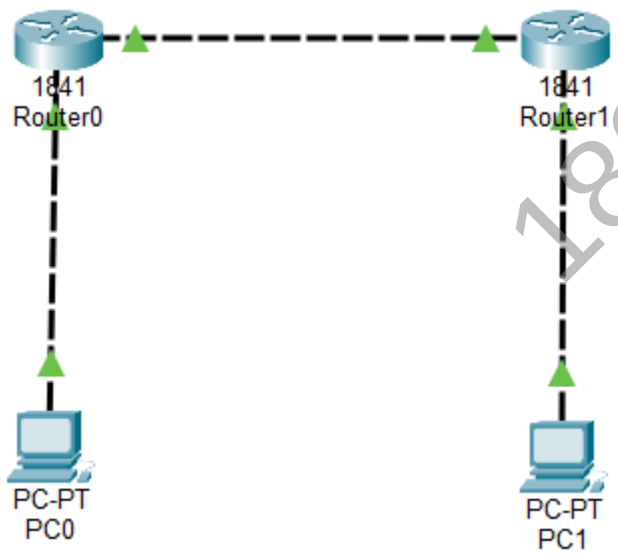
Q2.Demonstrate the OSPF Routing in Packet Tracer.

AIM :- To configure and demonstrate OSPF dynamic routing protocol between two networks using two routers in Packet Tracer.

STEPS :-

1. In packet tracer place 2 PCs and 2 Routers.
2. Connect Router0 with PC0 via FastEthernet0/0 using cross-copper cord and Router1 with PC1 via FastEthernet0/0 using cross-copper cord.
3. Connect both routers via FastEthernet0/1 using cross-copper cord.
4. Set the IP address and default gateway of both the PCs in IP configuration of both PCs respectively.
5. Configure OSPF routing protocol on both routers.

TOPOLOGY:-



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Code :

Router0 configuration :

```
Router>enable
Router#configure terminal
Router(config)#hostname Router0
Router0(config)#interface FastEthernet0/0
Router0(config-if)#ip address 192.168.1.1 255.255.255.0
```

```
Router0(config-if)#no shutdown
Router0(config-if)#exit
Router0(config)#interface FastEthernet0/1
Router0(config-if)#ip address 10.0.0.1 255.255.255.0
Router0(config-if)#no shutdown
Router0(config-if)#exit
Router0(config)#router ospf 1
Router0(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router0(config-router)#network 10.0.0.0 0.0.0.255 area 0
Router0(config-router)#exit
Router0(config)#exit
Router0#copy running-config startup-config
```

Router1 configuration :

```
Router>enable
Router#configure terminal
Router(config)#hostname Router1
Router1(config)#interface FastEthernet0/1
Router1(config-if)#ip address 10.0.0.2 255.255.255.0
Router1(config-if)#no shutdown
Router1(config-if)#exit
Router1(config)#interface FastEthernet0/0
Router1(config-if)#ip address 172.16.1.1 255.255.255.0
Router1(config-if)#no shutdown
Router1(config-if)#exit
Router1(config)#router ospf 1
Router1(config-router)#network 10.0.0.0 0.0.0.255 area 0
Router1(config-router)#network 172.16.1.0 0.0.0.255 area 0
Router1(config-router)#exit
Router1(config)#exit
Router1#copy running-config startup-config
```

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PC0 configuration :

- IP Address: 192.168.1.2
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

PC1 Configuration :

- IP Address: 172.16.1.2
- Subnet Mask: 255.255.255.0
- Default Gateway: 172.16.1.1

PC0 Command Prompt :

C:\>ipconfig
C:\>ping 192.168.1.1
C:\>ping 10.0.0.1
C:\>ping 10.0.0.2
C:\>ping 172.16.1.1
C:\>ping 172.16.1.2

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PC1 Command Prompt :

C:\>ipconfig
C:\>ping 172.16.1.1
C:\>ping 10.0.0.2
C:\>ping 10.0.0.1
C:\>ping 192.168.1.1
C:\>ping 192.168.1.2

Router Verification Command

Router0#show ip route
Router0#show ip ospf neighbour
Router0#show ip ospf database
Router1#show ip route
Router1#show ip ospf neighbour

OUTPUT:

PC0 OUTPUT :

```
C:\>PING 172.16.1.2

Pinging 172.16.1.2 with 32 bytes of data:

Request timed out.
Reply from 172.16.1.2: bytes=32 time<1ms TTL=126
Reply from 172.16.1.2: bytes=32 time<1ms TTL=126
Reply from 172.16.1.2: bytes=32 time<1ms TTL=126

Ping statistics for 172.16.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC1 OUTPUT :

```
C:\>PING 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=126
Reply from 192.168.1.2: bytes=32 time<1ms TTL=126
Reply from 192.168.1.2: bytes=32 time<1ms TTL=126
Reply from 192.168.1.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

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OSPF Neighbour Output:

```
Router#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
172.16.1.1        1   FULL/BDR        00:00:34    10.0.0.2        FastEthernet0/1
```

IP Route Output:

```
Router#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

     10.0.0.0/24 is subnetted, 1 subnets
C       10.0.0.0 is directly connected, FastEthernet0/1
O    172.16.0.0/16 [110/2] via 10.0.0.2, 00:07:45, FastEthernet0/1
C    192.168.1.0/24 is directly connected, FastEthernet0/0
```

Conclusion : The above network topology has been executed successfully and OSPF dynamic routing has been demonstrated.

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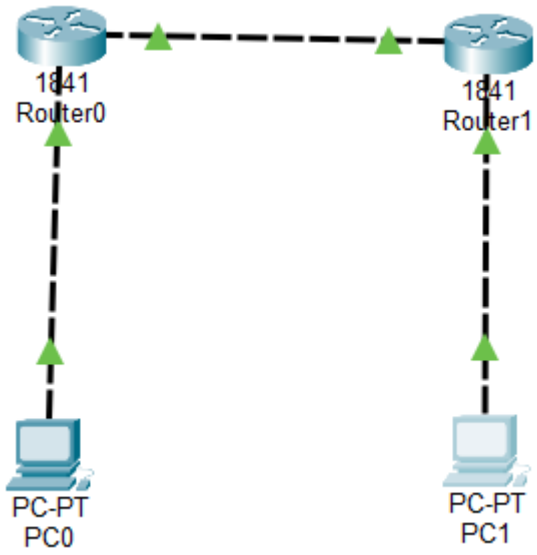
Q3. Demonstrate the RIP Routing in Packet Tracer.

AIM :- To configure and demonstrate RIP dynamic routing protocol between two networks using two routers in Packet Tracer.

STEPS :-

1. In packet tracer place 2 PCs and 2 Routers.
2. Connect Router0 with PC0 via FastEthernet0/0 using cross-copper cord and Router1 with PC1 via FastEthernet0/0 using cross-copper cord.
3. Connect both routers via FastEthernet0/1 using cross-copper cord.
4. Set the IP address and default gateway of both the PCs in IP configuration of both PCs respectively.
5. Configure RIP version 2 routing protocol on both routers.

TOPOLOGY :-



Code:

Router0 Configuration:

```
Router>enable
Router#configure terminal
Router(config)#hostname Router0
Router0(config)#interface FastEthernet0/0
Router0(config-if)#ip address 192.168.10.1 255.255.255.0
Router0(config-if)#no shutdown
Router0(config-if)#exit
Router0(config)#interface FastEthernet0/1
Router0(config-if)#ip address 10.10.10.1 255.255.255.0
Router0(config-if)#no shutdown
Router0(config-if)#exit
Router0(config)#router rip
Router0(config-router)#version 2
Router0(config-router)#network 192.168.10.0
Router0(config-router)#network 10.10.10.0
Router0(config-router)#no auto-summary
Router0(config-router)#exit
Router0(config)#exit
Router0#copy running-config startup-config
```

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Router1 configuration:

```
Router>enable
Router#configure terminal
Router(config)#hostname Router1
Router1(config)#interface FastEthernet0/1
Router1(config-if)#ip address 10.10.10.2 255.255.255.0
Router1(config-if)#no shutdown
Router1(config-if)#exit
Router1(config)#interface FastEthernet0/0
Router1(config-if)#ip address 172.16.20.1 255.255.255.0
Router1(config-if)#no shutdown
Router1(config-if)#exit
Router1(config)#router rip
Router1(config-router)#version 2
Router1(config-router)#network 10.10.10.0
Router1(config-router)#network 172.16.20.0
Router1(config-router)#no auto-summary
Router1(config-router)#exit
Router1(config)#exit
Router1#copy running-config startup-config
```

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PC0 Configuration:

- IP Address: 192.168.10.2
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.10.1

PC1 Configuration:

- IP Address: 172.16.20.2
- Subnet Mask: 255.255.255.0
- Default Gateway: 172.16.20.1

PCO Command Prompt :

```
C:\>ipconfig
C:\>ping 192.168.10.1
C:\>ping 10.10.10.1
```

C:\>ping 10.10.10.2
C:\>ping 172.16.20.1
C:\>ping 172.16.20.2

PC0 Command Prompt :
C:\>ipconfig
C:\>ping 172.16.20.1
C:\>ping 10.10.10.2
C:\>ping 10.10.10.1
C:\>ping 192.168.10.1
C:\>ping 192.168.10.2

Router Verification Commands:
Router0#show ip route
Router0#show ip protocols
Router0#show ip rip database
Router1#show ip route
Router1#show ip protocols

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OUTPUT :
PC0 OUTPUT :

```
C:\>ping 172.16.20.2

Pinging 172.16.20.2 with 32 bytes of data:

Reply from 172.16.20.2: bytes=32 time=1ms TTL=126
Reply from 172.16.20.2: bytes=32 time<1ms TTL=126
Reply from 172.16.20.2: bytes=32 time<1ms TTL=126
Reply from 172.16.20.2: bytes=32 time<1ms TTL=126

Ping statistics for 172.16.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

PC1 OUTPUT :

```
C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.10.2: bytes=32 time=1ms TTL=126
Reply from 192.168.10.2: bytes=32 time<1ms TTL=126
Reply from 192.168.10.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

IP ROUTE OUTPUT :

```
router0#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

     10.0.0.0/24 is subnetted, 1 subnets
C       10.10.10.0 is directly connected, FastEthernet0/1
     172.16.0.0/24 is subnetted, 1 subnets
R       172.16.20.0 [120/1] via 10.10.10.2, 00:00:13, FastEthernet0/1
C    192.168.10.0/24 is directly connected, FastEthernet0/0
```

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RIP PROTOCOL OUTPUT :

```
router0#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 9 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface             Send  Recv  Triggered RIP  Key-chain
  FastEthernet0/0       22
  FastEthernet0/1       22
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
          10.0.0.0
          192.168.10.0
Passive Interface(s):
Routing Information Sources:
          Gateway         Distance      Last Update
          10.10.10.2            120      00:00:02
Distance: (default is 120)
```

CONCLUSION : The above network topology has been executed successfully and RIP version 2 dynamic routing has been demonstrated.

PRACTICAL NO 03

Q1. Demonstrate DHCP Server in Cisco Packet Tracer.

AIM :- To configure a router as DHCP server to automatically assign IP addresses to clients.

Devices Required:

- 1 Router (1841 or any model)
- 1 Switch (2960 or any model)
- 2-4 PCs

Connections:

- **Router FastEthernet0/0 to Switch FastEthernet0/1 (Straight-through cable)**
- **PC0 to Switch FastEthernet0/2 (Straight-through cable)**
- **PC1 to Switch FastEthernet0/3 (Straight-through cable)**

Topology :

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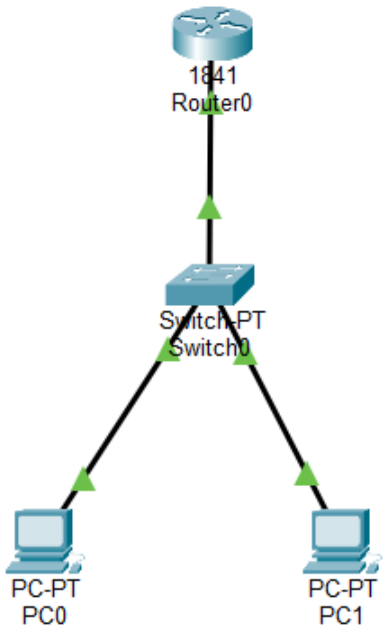

Code :

Router Configuration Commands:

Router>enable
Router#configure terminal
Router(config)#hostname DHCP-Router

```
DHCP-Router(config)#interface FastEthernet0/0
DHCP-Router(config-if)#ip address 10.0.0.1 255.255.255.0
DHCP-Router(config-if)#no shutdown
DHCP-Router(config-if)#exit
```

DHCP Pool Configuration:

```
DHCP-Router(config)#ip dhcp pool STUDENT_NETWORK
DHCP-Router(dhcp-config)#network 10.0.0.0 255.255.255.0
DHCP-Router(dhcp-config)#default-router 10.0.0.1
DHCP-Router(dhcp-config)#dns-server 8.8.8.8
DHCP-Router(dhcp-config)#exit
```

Exclude IP Addresses:

```
DHCP-Router(config)#ip dhcp excluded-address 10.0.0.1 10.0.0.10
DHCP-Router(config)#exit
DHCP-Router#copy running-config startup-config
```

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PC Configuration:

- On each PC, go to Desktop tab → IP Configuration
- Select DHCP option

Verification cammand :

On Router:

```
DHCP-Router#show ip dhcp pool
DHCP-Router#show ip dhcp binding
DHCP-Router#show ip interface brief
```

On both PCs (Command Prompt):

```
C:\>ipconfig
C:\>ipconfig /all
C:\>ping 10.0.0.1
```

Output Results:

PC0 - ipconfig:

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..: collegelab.local
   Link-local IPv6 Address.....: FE80::250:FFF:FEBC:55D2
   IPv6 Address.....: ::
   IPv4 Address.....: 10.0.0.11
   Subnet Mask.....: 255.255.255.0
   Default Gateway.....: ::
                                     10.0.0.1
```

PC1 - ipconfig:

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..: collegelab.local
   Link-local IPv6 Address.....: FE80::20C:85FF:FE14:5DE7
   IPv6 Address.....: ::
   IPv4 Address.....: 10.0.0.12
   Subnet Mask.....: 255.255.255.0
   Default Gateway.....: ::
                                     10.0.0.1
```

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Router - DHCP Bindings (WORKING COMMAND):

```
DHCP-router#show ip dhcp binding
IP address       Client-ID/              Lease expiration        Type
                 Hardware address
10.0.0.11        0050.0FBC.55D2          --                      Automatic
10.0.0.12        000C.8514.5DE7          --                      Automatic
```

Router - DHCP Pool Status (WORKING COMMAND):

```
DHCP-router#show ip dhcp pool

Pool STUDENT_NETWORK :
 Utilization mark (high/low)    : 100 / 0
 Subnet size (first/next)       : 0 / 0
 Total addresses                : 254
 Leased addresses               : 2
 Excluded addresses             : 1
 Pending event                  : none

 1 subnet is currently in the pool
 Current index        IP address range                    Leased/Excluded/Total
 10.0.0.1             10.0.0.1        - 10.0.0.254        2    / 1     / 254
```

`

Router - Interface Status:

```
DHCP-router#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        10.0.0.1        YES manual up                    up
FastEthernet0/1        unassigned      YES unset  administratively down down
Serial0/0/0            unassigned      YES unset  administratively down down
Serial0/0/1            unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
```

Connectivity Test - PC0 to Router:

```
C:\>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time<1ms TTL=255
Reply from 10.0.0.1: bytes=32 time<1ms TTL=255
Reply from 10.0.0.1: bytes=32 time<1ms TTL=255
Reply from 10.0.0.1: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

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Conclusion: The DHCP server has been successfully configured on the router using commands compatible with Cisco Packet Tracer.

Q2.Demonstrate DNS Server in Packet Tracer.

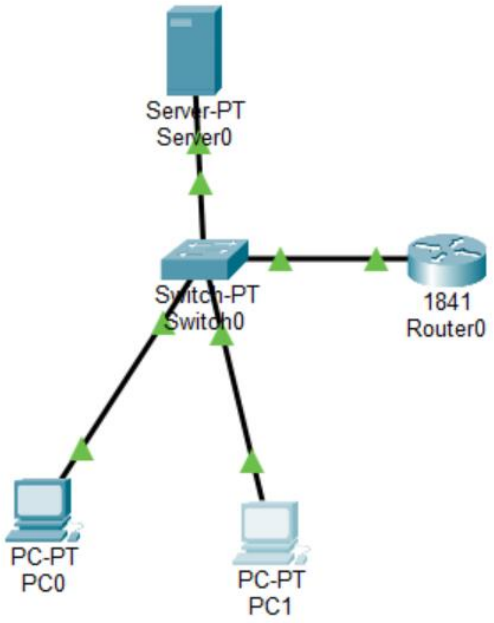
Aim:- To configure a DNS server to resolve domain names to IP addresses and test name resolution in the network.

Devices Needed:

- 1 Server (DNS Server)
- 1 Router
- 1 Switch

- 2 PCs (Clients)

TOPOLOGY:-



Code:

Configure DNS Records:

Name: www.company.com
Type: A Record
Address: 192.168.1.5 # Points to Server itself
-> Add

Name: ftp.company.com
Type: A Record
Address: 192.168.1.5 # Points to Server itself
-> Add

Name: mail.company.com
Type: A Record
Address: 192.168.1.5 # Points to Server itself
-> Add

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Server IP Configuration:

- IP Address: 192.168.1.5
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1
- DNS Server: 192.168.1.5

Router Configuration:

Router>enable
Router#configure terminal
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#exit
Router#copy running-config startup-config

PC0 Configuration:

- IP Address: 192.168.1.10
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1
- DNS Server: 192.168.1.5

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PC1 Configuration:

- IP Address: 192.168.1.11
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1
- DNS Server: 192.168.1.5

In PC Command Prompt

PC0:

C:\>nslookup www.company.com
C:\>nslookup ftp.company.com
C:\>nslookup mail.company.com
C:\>ping www.company.com
C:\>ping ftp.company.com

PC1:

C:\>nslookup www.company.com
C:\>nslookup mail.company.com
C:\>ping www.company.com
C:\>ping mail.company.com

Output:

PC0 nslookup Results:

C:\>nslookup www.company.com

```
C:\>nslookup www.company.com

Server: [192.168.1.5]
Address:  192.168.1.5

Non-authoritative answer:
Name:    www.company.com
Address:   192.168.1.5
```

C:\>nslookup ftp.company.com

```
C:\>nslookup ftp.company.com

Server: [192.168.1.5]
Address:  192.168.1.5

Non-authoritative answer:
Name:    ftp.company.com
Address:   192.168.1.5
```

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C:\>nslookup mail.company.com

```
C:\>nslookup mail.company.com

Server: [192.168.1.5]
Address:  192.168.1.5

Non-authoritative answer:
Name:    mail.company.com
Address:   192.168.1.5
```

PC0 Ping Results:

C:\>ping www.company.com

```
C:\>ping www.company.com

Pinging 192.168.1.5 with 32 bytes of data:

Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time=1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

PC1 nslookup Results:

C:\>nslookup mail.company.com

```
C:\>nslookup mail.company.com

Server: [192.168.1.5]
Address:  192.168.1.5

Non-authoritative answer:
Name:    mail.company.com
Address:   192.168.1.5
```

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C:\>nslookup www.company.com

```
C:\>nslookup www.company.com

Server: [192.168.1.5]
Address:  192.168.1.5

Non-authoritative answer:
Name:    www.company.com
Address:   192.168.1.5
```

PC2 Ping Results:

C:\>ping mail.company.com

```
C:\>ping mail.company.com

Pinging 192.168.1.5 with 32 bytes of data:

Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Conclusion: The DNS server has been configured successfully.

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Q3. Demonstrate FTP Server in Packet Tracer.

Aim: To configure an FTP server and test file transfer between server and clients in the network.

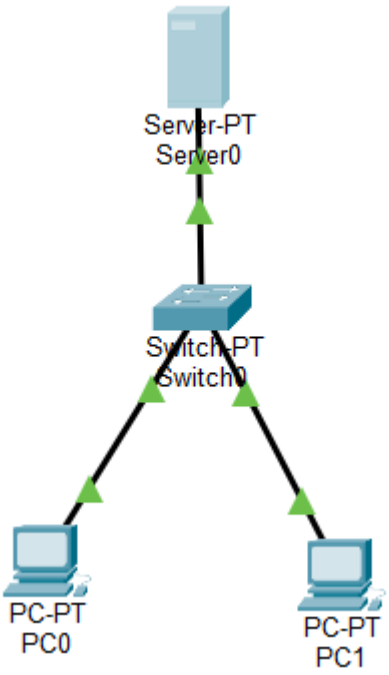
Devices Needed:

- 1 Server (FTP Server)
- 1 Switch
- 2 PCs (FTP Clients)

Connection :

- Connect all devices to the switch using copper straight-through cables

Topology:



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Code:

Server Configuration (FTP):

1. Click on Server → Services tab → FTP
2. FTP Server Settings:
   - ✓ FTP Service: ON
3. Add User Account:
   - ✓ Username: admin
   - ✓ Password: cisco
   - ✓ Check all permissions: Read/Write/List/Delete/Rename
   - ✓ Click Add

Server IP Configuration:

- IP Address: 192.168.1.5
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

PC1 Configuration:

- IP Address: 192.168.1.10
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

PC2 Configuration:

- IP Address: 192.168.1.11
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

Create Test File on PC1

1. Click on PC1 → Desktop tab → Text Editor
2. Type: This is a test file for FTP transfer
3. Save as: upload_test.txt

Verification: In PC Command Prompt

PC1 FTP Commands:

C:\>ftp 192.168.1.5
Username: admin
Password: cisco
ftp> dir
ftp> put upload_test.txt
ftp> dir
ftp> get welcome.txt
ftp> delete notes.txt
ftp> quit

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PC2 FTP Commands:

C:\>ftp 192.168.1.5
Username: admin
Password: cisco
ftp> dir
ftp> get upload_test.txt
ftp> rename upload_test.txt downloaded_file.txt
ftp> dir
ftp> quit

Ping Test (Both PCs):

C:\>ping 192.168.1.5

Output:

PC1 FTP Session:

```
C:\>ftp 192.168.1.5
Trying to connect...192.168.1.5
Connected to 192.168.1.5
220- Welcome to PT Ftp server
Username:admin
331- Username ok, need password
Password:*****
230- Logged in
(passive mode On)
ftp>dir
```

```
33   : notes_text.txt                          24
34   : pt1000-i-mz.122-28.bin                  5571584
35   : pt3000-i6q4l2-mz.121-22.EA4.bin         3117390
36   : upload_text.txt                         37
37   : welcome_text.txt                        26
```

```
ftp>put upload_text.txt

Writing file upload_text.txt to 192.168.1.5:
File transfer in progress...

[Transfer complete - 36 bytes]

36 bytes copied in 0.021 secs (1714 bytes/sec)
ftp>put welcome_text.txt
```

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```
ftp>dir

Listing /ftp directory from 192.168.1.5:
0    : asa842-k8.bin                                5571584
1    : asa923-k8.bin                                30468096
2    : c1841-advipservicesk9-mz.124-15.T1.bin       33591768
3    : c1841-ipbase-mz.123-14.T7.bin                13832032
4    : c1841-ipbasek9-mz.124-12.bin                 16599160
5    : c1900-universalk9-mz.SPA.155-3.M4a.bin       33591768
6    : c2600-advipservicesk9-mz.124-15.T1.bin       33591768
7    : c2600-i-mz.122-28.bin                        5571584
8    : c2600-ipbasek9-mz.124-8.bin                  13169700
9    : c2800nm-advipservicesk9-mz.124-15.T1.bin     50938004
10   : c2800nm-advipservicesk9-mz.151-4.M4.bin      33591768
11   : c2800nm-ipbase-mz.123-14.T7.bin              5571584
12   : c2800nm-ipbasek9-mz.124-8.bin                15522644
13   : c2900-universalk9-mz.SPA.155-3.M4a.bin       33591768
14   : c2950-i6q4l2-mz.121-22.EA4.bin               3058048
15   : c2950-i6q4l2-mz.121-22.EA8.bin               3117390
16   : c2960-lanbase-mz.122-25.FX.bin               4414921
17   : c2960-lanbase-mz.122-25.SEE1.bin             4670455
18   : c2960-lanbasek9-mz.150-2.SE4.bin             4670455
19   : c3560-advipservicesk9-mz.122-37.SE1.bin      8662192
20   : c3560-advipservicesk9-mz.122-46.SE.bin       10713279
21   : c800-universalk9-mz.SPA.152-4.M4.bin         33591768
22   : c800-universalk9-mz.SPA.154-3.M6a.bin        83029236
23   : cat3k_caa-universalk9.16.03.02.SPA.bin       505532849
24   : cgr1000-universalk9-mz.SPA.154-2.CG          159487552
25   : cgr1000-universalk9-mz.SPA.156-3.CG          184530138
26   : ie9k_iosxe.17.09.04.SPA.bin                  596133776
27   : ir800-universalk9-bundle.SPA.156-3.M.bin     160968869
28   : ir800-universalk9-mz.SPA.155-3.M             61750062
29   : ir800-universalk9-mz.SPA.156-3.M             63753767
30   : ir800_yocto-1.7.2.tar                        2877440
31   : ir800_yocto-1.7.2_python-2.7.3.tar           6912000
32   : ir8340-mono-universalk9_iot.17.08.01a.SPA.pkg 685645824
33   : notes_text.txt                               24
34   : pt1000-i-mz.122-28.bin                       5571584
35   : pt3000-i6q4l2-mz.121-22.EA4.bin              3117390
36   : upload_text.txt                              36
37   : welcome.txt                                  25
38   : welcome_text.txt                             26
```

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```
ftp>get welcome.txt

Reading file welcome.txt from 192.168.1.5:
File transfer in progress...

[Transfer complete - 25 bytes]

25 bytes copied in 0 secs
```

```
ftp>delete notes.txt

Deleting file notes.txt from 192.168.1.5: ftp>
[Deleted file notes.txt successfully ]
```

```
ftp>quit

221- Service closing control connection.
```

Ping Test Results:

```
C:\>ping 192.168.1.5

Pinging 192.168.1.5 with 32 bytes of data:

Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time=1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

PC2 FTP Session:

```
C:\>ftp 192.168.1.5
Trying to connect...192.168.1.5
Connected to 192.168.1.5
220- Welcome to PT Ftp server
Username:admin
331- Username ok, need password
Password:*****
230- Logged in
(passive mode On)
ftp>dir

Listing /ftp directory from 192.168.1.5:
```

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```
31   : ir800_yocto-1.7.2_python-2.7.3.tar                    6912000
32   : ir8340-mono-universalk9_iot.17.08.01a.SPA.pkg         685645824
33   : notes_text.txt                                        24
34   : pt1000-i-mz.122-28.bin                                5571584
35   : pt3000-i6q4l2-mz.121-22.EA4.bin                       3117390
36   : upload_text.txt                                       36
37   : welcome.txt                                           25
38   : welcome_text.txt                                      26
```

```
ftp>get upload_text.txt

Reading file upload_text.txt from 192.168.1.5:
File transfer in progress...

[Transfer complete - 37 bytes]

37 bytes copied in 0 secs
```

```
ftp>rename upload_text.txt downloaded_text.txt

Renaming upload_text.txt
ftp>
[OK Renamed file successfully from upload_text.txt to downloaded_text.txt]
```

```
ftp>dir

Listing /ftp directory from 192.168.1.5:
0    : asa842-k8.bin                                    5571584
1    : asa923-k8.bin                                    30468096
2    : c1841-advipservicesk9-mz.124-15.T1.bin           33591768
3    : c1841-ipbase-mz.123-14.T7.bin                    13832032
```

```
25   : cgr1000-universalk9-mz.SPA.156-3.CG              184530138
26   : downloaded_text.txt                              37
27   : ie9k_iosxe.17.09.04.SPA.bin                      596133776
28   : ir800-universalk9-bundle.SPA.156-3.M.bin         160968869
29   : ir800-universalk9-mz.SPA.155-3.M                 61750062
30   : ir800-universalk9-mz.SPA.156-3.M                 63753767
31   : ir800_yocto-1.7.2.tar                            2877440
32   : ir800_yocto-1.7.2_python-2.7.3.tar               6912000
33   : ir8340-mono-universalk9_iot.17.08.01a.SPA.pkg    685645824
34   : notes_text.txt                                   24
35   : pt1000-i-mz.122-28.bin                           5571584
36   : pt3000-i6q4l2-mz.121-22.EA4.bin                  3117390
37   : welcome.txt                                      25
38   : welcome_text.txt                                 26
```

```
ftp>quit

221- Service closing control connection.
```

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Ping Test Results:

```
C:\>ping 192.168.1.5

Pinging 192.168.1.5 with 32 bytes of data:

Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Conclusion: The FTP server has been configured successfully.

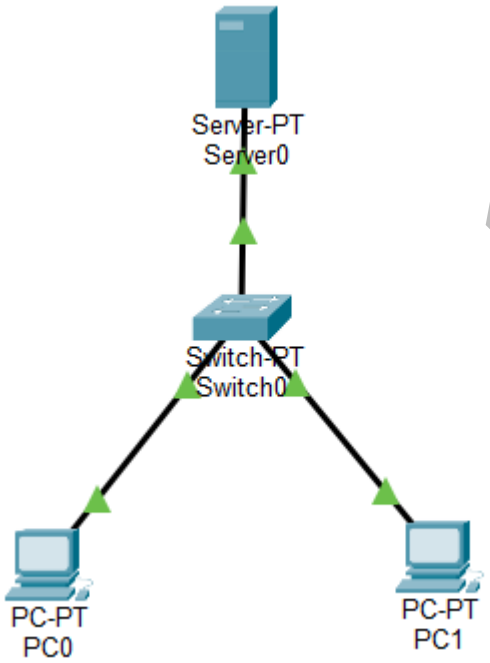
Q4. Demonstrate HTTP Server in Packet Tracer.

Aim: To configure a web server and test web page access from clients using web browsers.

Steps:

1) In packet tracer place 1 Server-PT and 2 PC-PT and 1 Switch.
2) Connect Server-PT with Switch via FastEthernet0 using straight-through copper cord.
3) Connect PC-PT0 and PC-PT1 with Switch via FastEthernet0 using straight-through copper cords.
4) Set the IP address of Server-PT and both PCs in IP configuration.
5) Configure HTTP service on Server-PT and create web pages.
6) Test web access from both PCs.

Topology:



18001

Code:

Server-PT Configuration:

- IP Address: 192.168.1.10
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

HTTP Service Configuration:

- HTTP Service: ON
- Created web pages: index.html, about.html, courses.html

Web Page Code:

index.html:

html

```
<!DOCTYPE html>
<html>
<head>
<title>My College Website</title>
</head>
<body>
<h1>Welcome to College Server</h1>
<p>This website is hosted on Server-PT in Packet Tracer.</p>
<a href="about.html">About College</a> |
<a href="courses.html">Courses</a>
</body>
</html>
```

18001

about.html:

html

```
<!DOCTYPE html>
<html>
<head>
<title>About Our College</title>
</head>
<body>
<h1>About Our Institution</h1>
<p>Established in 1990, we provide quality technical education.</p>
<p><b>Departments:</b> Computer, IT, Electronics, Mechanical</p>
<a href="index.html">Home</a> |
<a href="courses.html">Our Courses</a>
</body>
</html>
```

courses.html:

```
html
<!DOCTYPE html>
<html>
<head>
<title>College Courses</title>
</head>
<body>
<h1>Available Courses</h1>
<ul>
<li>Computer Engineering</li>
<li>Information Technology</li>
<li>Electronics & Telecommunication</li>
<li>Mechanical Engineering</li>
</ul>
<a href="index.html">Home</a> |
<a href="about.html">About College</a>
</body>
</html>
```

18001

PC-PT0 Configuration:

- IP Address: 192.168.1.20
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

PC-PT1 Configuration:

- IP Address: 192.168.1.30
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

Verification: In Both PCs Web Browser

PC-PT0:

- Open Web Browser
- Enter URL: http://192.168.1.10
- Enter URL: http://192.168.1.10/about.html
- Enter URL: http://192.168.1.10/courses.html

PC-PT1:

- Open Web Browser
- Enter URL: http://192.168.1.10
- Enter URL: http://192.168.1.10/about.html
- Enter URL: http://192.168.1.10/courses.html

Connectivity Test:

C:\>ping 192.168.1.10

Output:

Ping Test Results:

Pc0 :

```
C:\>ping 192.168.1.10

Pinging 192.168.1.10 with 32 bytes of data:

Reply from 192.168.1.10: bytes=32 time<1ms TTL=128
Reply from 192.168.1.10: bytes=32 time<1ms TTL=128
Reply from 192.168.1.10: bytes=32 time=8ms TTL=128
Reply from 192.168.1.10: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 2ms
```

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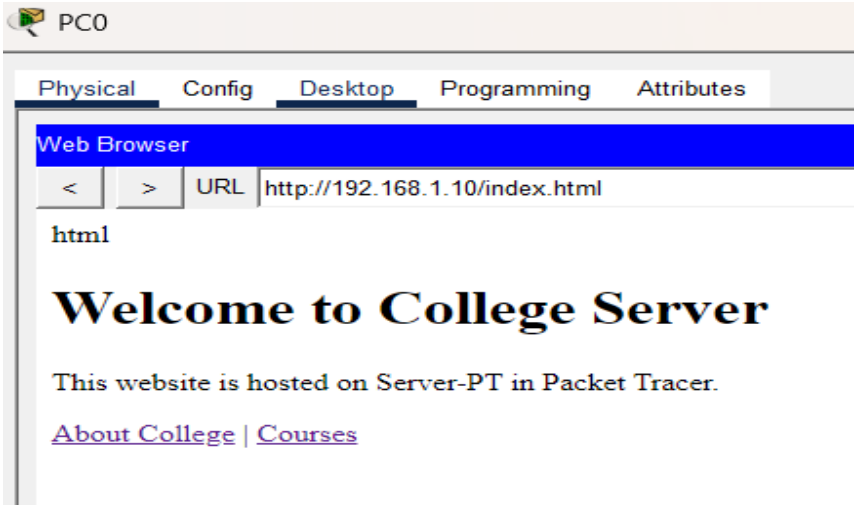
Pc1 :

```
C:\>ping 192.168.1.10

Pinging 192.168.1.10 with 32 bytes of data:

Reply from 192.168.1.10: bytes=32 time<1ms TTL=128
Reply from 192.168.1.10: bytes=32 time=1ms TTL=128
Reply from 192.168.1.10: bytes=32 time<1ms TTL=128
Reply from 192.168.1.10: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

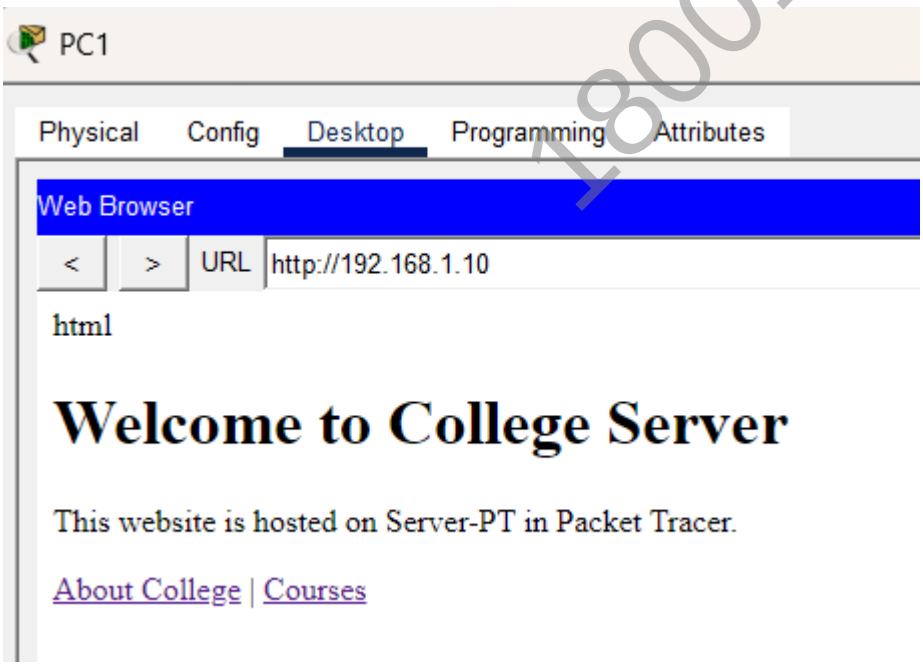
Web Browser Output:

Homepage (http://192.168.1.10) :

Pc0 :



Pc1 :

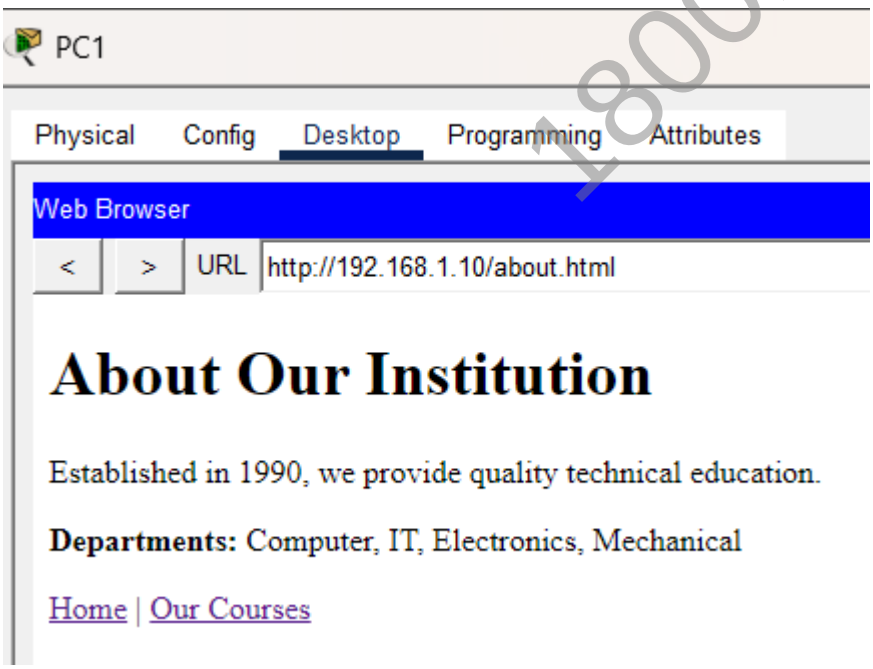


18001

About Page (http://192.168.1.10/about.html):

Pc0 :

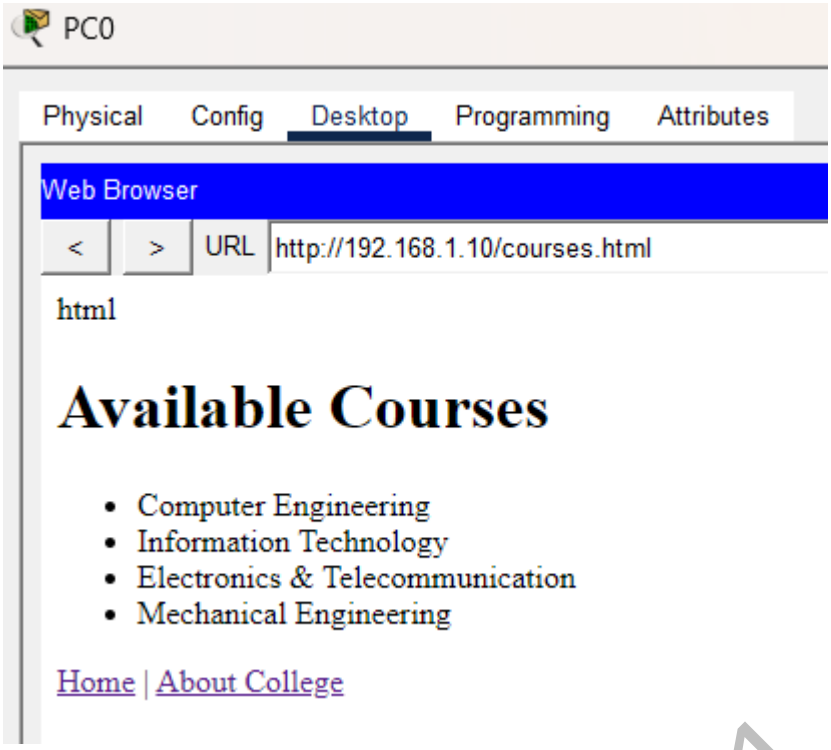
Pc1 :



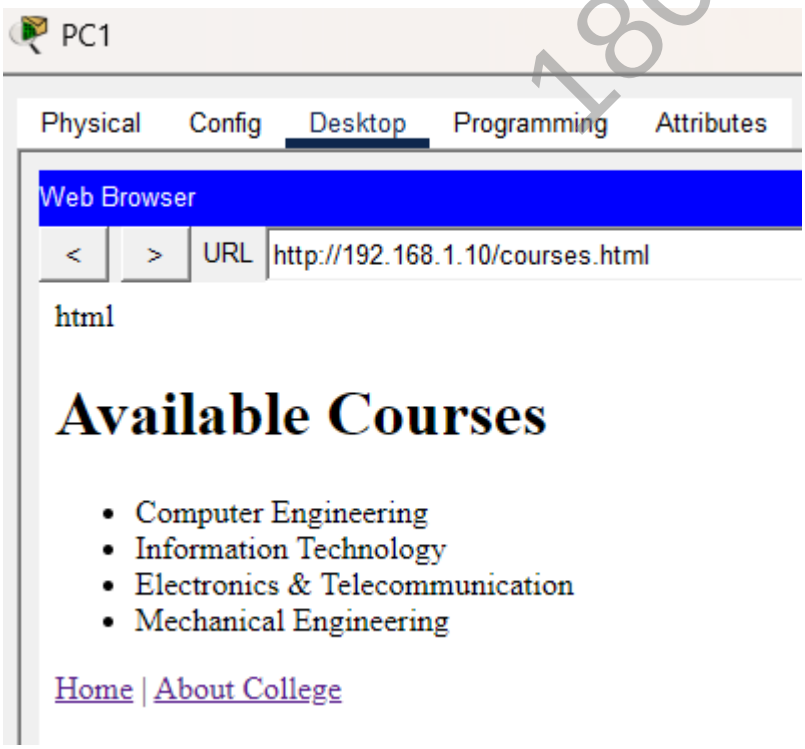
18001

Courses Page (http://192.168.1.10/courses.html):

Pc0 :



Pc1 :



18001

Conclusion: The HTTP web server has been configured successfully on Server-PT.

Q5. Demonstrate Telnet in Packet Tracer.

Aim: To configure Telnet on routers to enable remote administration and test remote connectivity between devices.

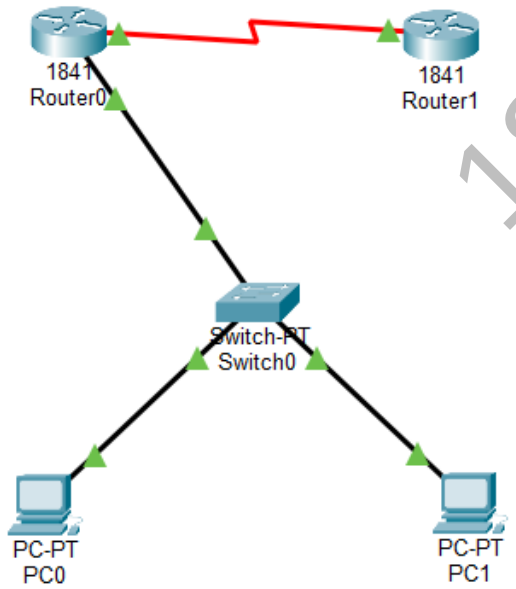
Devices Needed:

- 2 Routers
- 1 Switch
- 2 PCs (Telnet Clients)

Connection Guide:

- Connect Router0 and Router1 via serial cable (Serial DCE)
- Connect Router0 to Switch via FastEthernet
- Connect PCs to Switch via copper straight-through cables

Topology:



18001

Code:

Router1 Configuration:

```
Router>enable
Router#configure terminal
Router(config)#hostname Router0
Router0(config)#interface FastEthernet0/0
Router0(config-if)#ip address 192.168.1.1 255.255.255.0
```

```
Router0(config-if)#no shutdown
Router0(config-if)#exit
Router0(config)#interface Serial0/0/0
Router0(config-if)#ip address 10.0.0.1 255.255.255.252
Router0(config-if)#clock rate 64000
Router0(config-if)#no shutdown
Router0(config-if)#exit
Router0(config)#line vty 0 4
Router0(config-line)#password cisco
Router0(config-line)#login
Router0(config-line)#exit
Router0(config)#enable secret class
Router0(config)#ip route 0.0.0.0 0.0.0.0 10.0.0.2
Router0(config)#exit
Router0#copy running-config startup-config
```

Router2 Configuration:

```
Router>enable
Router#configure terminal
Router(config)#hostname Router1
Router1(config)#interface Serial0/0/0
Router1(config-if)#ip address 10.0.0.2 255.255.255.252
Router1(config-if)#no shutdown
Router1(config-if)#exit
Router1(config)#interface FastEthernet0/0
Router1(config-if)#ip address 172.16.1.1 255.255.255.0
Router1(config-if)#no shutdown
Router1(config-if)#exit
Router1(config)#line vty 0 4
Router1(config-line)#password cisco
Router1(config-line)#login
Router1(config-line)#exit
Router1(config)#enable secret class
Router1(config)#ip route 192.168.1.0 255.255.255.0 10.0.0.1
```

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Router1(config)#exit
Router1#copy running-config startup-config

PC1 Configuration:

- IP Address: 192.168.1.10
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

PC2 Configuration:

- IP Address: 192.168.1.11
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

Verification: In PC Command Prompt

PC1 Telnet Tests:

C:\>ping 192.168.1.1
C:\>ping 10.0.0.2
C:\>ping 172.16.1.1
C:\>telnet 192.168.1.1
C:\>telnet 10.0.0.2

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PC2 Telnet Tests:

C:\>ping 192.168.1.1
C:\>ping 10.0.0.2
C:\>ping 172.16.1.1
C:\>telnet 192.168.1.1
C:\>telnet 172.16.1.1

Router Verification Commands:

Router#show users
Router#show line vty 0
Router#show running-config | include vty

Output:

PC1 Telnet to Router1:

telnet 192.168.1.1

```
C:\>telnet 192.168.1.1
Trying 192.168.1.1 ...Open


User Access Verification

Password:
Password:
router0>enable
Password:
router0#show users
    Line       User       Host(s)              Idle       Location
*196 vty 0                 idle                 00:00:00 192.168.1.10

  Interface    User               Mode         Idle     Peer Address
router0#exit

[Connection to 192.168.1.1 closed by foreign host]
```

PC1 Telnet to Router2:

C:\>telnet 10.0.0.2

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```
C:\>telnet 10.0.0.2
Trying 10.0.0.2 ...Open


User Access Verification

Password:
router1>enable
Password:
router1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        172.16.1.1      YES manual down                  down
FastEthernet0/1        unassigned      YES unset  administratively down down
Serial0/0/0            10.0.0.2        YES manual up                    up
Serial0/0/1            unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
router1#

[Connection to 10.0.0.2 closed by foreign host]
```

PC2 Telnet to Router1:

C:\>telnet 192.168.1.1

```
C:\>telnet 192.168.1.1
Trying 192.168.1.1 ...Open


User Access Verification

Password:
router0>enable
Password:
router0#show running-config | include vty
line vty 0 4
router0#show running-config | include vty
line vty 0 4
router0#exit

[Connection to 192.168.1.1 closed by foreign host]
```

Ping Test Results:

```
C:\>ping 172.16.1.1

Pinging 172.16.1.1 with 32 bytes of data:

Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.
Reply from 10.0.0.2: Destination host unreachable.

Ping statistics for 172.16.1.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

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Router Show Users Output:

```
router0#show users
    Line       User       Host(s)              Idle       Location
*196 vty 0                 idle                 00:00:00 192.168.1.10

  Interface    User               Mode         Idle     Peer Address
router0#exit
```

Conclusion: Telnet has been configured successfully on both routers.

PRACTICAL NO 04

STUDY OF CRYPTOGRAPHY SUBSTITUTION TECHNIQUES

AIM :- To study and Implement Substitution Techniques in a Cryptography using python to perform Encryption & Description of a message.

PRORAM :-

```
def encrypt(text, shift):
    result = ""
    for char in text:
        if char.isalpha():
            base = 'A' if char.isupper() else 'a'
            result += chr((ord(char) - ord(base) + shift) % 26 + ord(base))
        else:
            result += char
    return result

def decrypt(text, shift):
    return encrypt(text, -shift)

text = input("Enter plain text: ")
shift = int(input("Enter shift value: "))

encrypted_text = encrypt(text, shift)
print("Encrypted Text:", encrypted_text)

decrypted_text = decrypt(encrypted_text, shift)
print("Decrypted Text:", decrypted_text)
```

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OUTPUT :-

```
Enter plain text: hello
Enter shift value: 3
Encrypted Text: khoor
Decrypted Text: hello
```

CONCLUSION :-

The substitution technique replaces each letter in the plaintext with another letter based on a fixed shift value.
Through this practical, we learned how Caesar Cipher works and how basic encryption and decryption are implemented in Python.

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PRACTICAL NO 05

STUDY OF SYMMETRIC KEY - DES & AES

AIM :- To Study and Implement Symmetric Key Cryptography using DES & AES Algorithm in Python.

ALORITHM OF (DES) :-

1. Import DES module.
2. Create a secret key and pad the message to match the block size.
3. Encrypt the plain text.
4. Decrypt the cipher-text.
5. Display the results.

PROGRAM :-

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```
!pip install pycryptodome
from Crypto.Cipher import DES
from Crypto.Util.Padding import pad, unpad
key = b'12345678'
cipher = DES.new(key, DES.MODE_ECB)
plaintext = input("Enter message: ")
padded_text = pad(plaintext.encode(), DES.block_size)
encrypted_text = cipher.encrypt(padded_text)
print("Encrypted Text:", encrypted_text)
decrypted_text = unpad(cipher.decrypt(encrypted_text), DES.block_size)
print("Decrypted Text:", decrypted_text.decode())
```

OUTPUT :-

```
Enter message: HELLO WORLD
Encrypted Text: b'\xf9\xd8S\xc2\\\xabt\r\xf9K\xfe\x97\x93\x94~\xc9'
Decrypted Text: HELLO WORLD
```

ALORITHM OF (AES) :-

1. Import AES module.
2. Create a 16-byte secret key and pad the message.
3. Encrypt and then decrypt using AES.
4. Display the output.

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PROGRAM :-

```
from Crypto.Cipher import AES
from Crypto.Util.Padding import pad, unpad

key = b'thisismysecretky'
cipher = AES.new(key, AES.MODE_ECB)

plaintext = input("Enter message: ")

padded_text = pad(plaintext.encode(), AES.block_size)
encrypted_text = cipher.encrypt(padded_text)
print("Encrypted Text:", encrypted_text)
decrypted_text = unpad(cipher.decrypt(encrypted_text), AES.block_size)
print("Decrypted Text:", decrypted_text.decode())
```

OUTPUT :-

```
Enter message: SECRET MESSAGE
Encrypted Text: b'\xd6]0\xe7\xc4\xd2.$\xfc\x1b\xf5\x97\xcb\x0fb,'
Decrypted Text: SECRET MESSAGE
```

CONCLUSION :-

In symmetric key cryptography, the same key is used for both encryption and decryption. DES and AES are two important symmetric algorithms, with AES being more secure and faster due to its larger key size and modern design.

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PRACTICAL NO 06

STUDY OF ASYMETRIC KEY (DH & RSA)

AIM :- To Study and Implement Asymmetric Key Cryptography using DH & RSA Algorithms in Python.

ALORITHM OF DH :-

1. Select a large prime number P and a primitive root G.
2. Each user selects a private key (random number).
   Let user A choose private key a.
   Let user B choose private key b.
3. Compute the public key:
   A = G^a mod P
   B = G^b mod P
4. Exchange public keys between both users.
5. Compute the shared secret key:
   Key_1 = B^a mod P
   Key_2 = A^b mod P
6. Both keys will be identical.

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PROGRAM :-

```
P = 23  # prime number
G = 9   # primitive root
a = 4  # Alice's private key
b = 3  # Bob's private key
A = (G ** a) % P
B = (G ** b) % P
key1 = (B ** a) % P  # Alice's key
key2 = (A ** b) % P  # Bob's key
```

```
print("Publicly Shared Values:")
print("P:", P, "G:", G)
print("Public Key of Alice (A):", A)
print("Public Key of Bob (B):", B)
print("\nSecret Keys:")
print("Alice's Secret Key:", key1)
print("Bob's Secret Key:", key2)
```

OUTPUT :-

```
Publicly Shared Values:
P: 23 G: 9
Public Key of Alice (A): 6
Public Key of Bob (B): 16

Secret Keys:
Alice's Secret Key: 9
Bob's Secret Key: 9
```

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ALORITHM OF RSA :-

1. Choose two prime numbers p and q.
2. Compute n = p × q.
3. Compute Euler's totient function
   ϕ(n) = (p − 1) × (q − 1).
4. Choose public key e such that
   1 < e < ϕ(n) and gcd(e, ϕ(n)) = 1.
5. Compute private key d such that
   (d × e) mod ϕ(n) = 1.
6. For encryption:
   C = (M^e) mod n.
7. For decryption:
   M = (C^d) mod n.

PROGRAM :-

```
def gcd(a, b):
    while b != 0:
        a, b = b, a % b
    return a

p = 7
q = 17
n = p * q
phi = (p - 1) * (q - 1)

e = 5
while gcd(e, phi) != 1:
    e += 1

d = pow(e, -1, phi)

print("Public Key (e, n):", (e, n))
print("Private Key (d, n):", (d, n))

msg = int(input("Enter message (as number): "))
cipher = pow(msg, e, n)
print("Encrypted Message:", cipher)

decrypted = pow(cipher, d, n)
print("Decrypted Message:", decrypted)
```

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OUTPUT :-

```
Public Key (e, n): (5, 119)
Private Key (d, n): (77, 119)
Enter message (as number): 12
Encrypted Message: 3
Decrypted Message: 12
```

CONCLUSION :-

Asymmetric cryptography uses two different keys for secure communication. In this practical DH was used to generate secret keys, and RSA was used for message encryption and decryption, demonstrating secure data exchange.

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PRACTICAL NO 07

STUDY OF MD5 ALGORITHM

AIM :- To study and implement the MD5 (Message Digest 5) hashing algorithm using Python.

ALGORITHM OF MD5 :-

1. Import the hash-lib library.
2. Accept a message from the user.
3. Encode the message to bytes.
4. Use hash-lib.md5() to compute the hash.
5. Display the hexadecimal digest.

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PROGRAM :-

```
import hashlib
text = input("Enter text to hash: ")
md5_hash = hashlib.md5(text.encode())
print("MD5 Hash Value:", md5_hash.hexdigest())
```

OUTPUT :-

```
Enter text to hash: HELLO
MD5 Hash Value: eb61eead90e3b899c6bcbe27ac581660
```

CONCLUSION :-

MD5 is a simple and efficient hashing technique that converts input data into a fixed-length digest.
It ensures data integrity by verifying whether data has been altered during transmission or storage.

PRACTICAL NO 08

STUDY OF HASH FUNCTION

AIM :- To study and implement the RSHash (Robert Sedgwicks Hash) function using Python.

PROGRAM :-

```
def RSHash(string):
    a = 63689
    b = 378551
    hash_val = 0
    for ch in string:
        hash_val = hash_val * a + ord(ch)
        a = a * b
    return hash_val % (2**32)  # limit hash to 32 bits
text = input("Enter any text: ")
print("RSHash Value:", RSHash(text))
```

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OUTPUT :-

```
Enter any text: HELLO
RSHash Value: 2180216946
```

CONCLUSION :-

RSHash is a simple and efficient hash function that generates a fixed-size numerical value for any input string.It is widely used for data lookup, hashing, and indexing, though it is not suitable for secure cryptographic applications.

PRACTICAL NO 09

TO CREATE, EXPORT AND VALIDATE A DIGITAL CERTIFICATE.

AIM :- To write a code to Create, Export and Validate a digital Certificate.

ALGORITHM :-

1. Download and Install opensol.
2. Add its bin path in environmental variable .
3. Open command prompt.

PROGRAM :-

```
C:\User\Payal\Desktop>openssl req -x509 -days 365 -newkey rsa:2048 -keyout private-key.pem -out certificate.pem
Enter PEM Pass: 123456
Country Name (2 letter code) []: IN
State or Province Name (full name) []: Maharashtra
Locality Name []: Mumbai
Organization Name []: SIWS
Organizational Unit Name []: IT
Common Name []: TMD
Email Address []: amalepayal044@gmail.com
C:\User\Payal\Desktop> openssl pkcs12 -export -in certificate.pem -inkey private-key.pem -out TMD.pfx
Enter Export Password: 123456
Verifying - Enter Export Password: 123456
C:\User\Payal\Desktop> openssl pkcs12 -in TMD.pfx -clcerts -nokeys -out public-key.pem
Enter Import Password: 123456
Import the certificate
```

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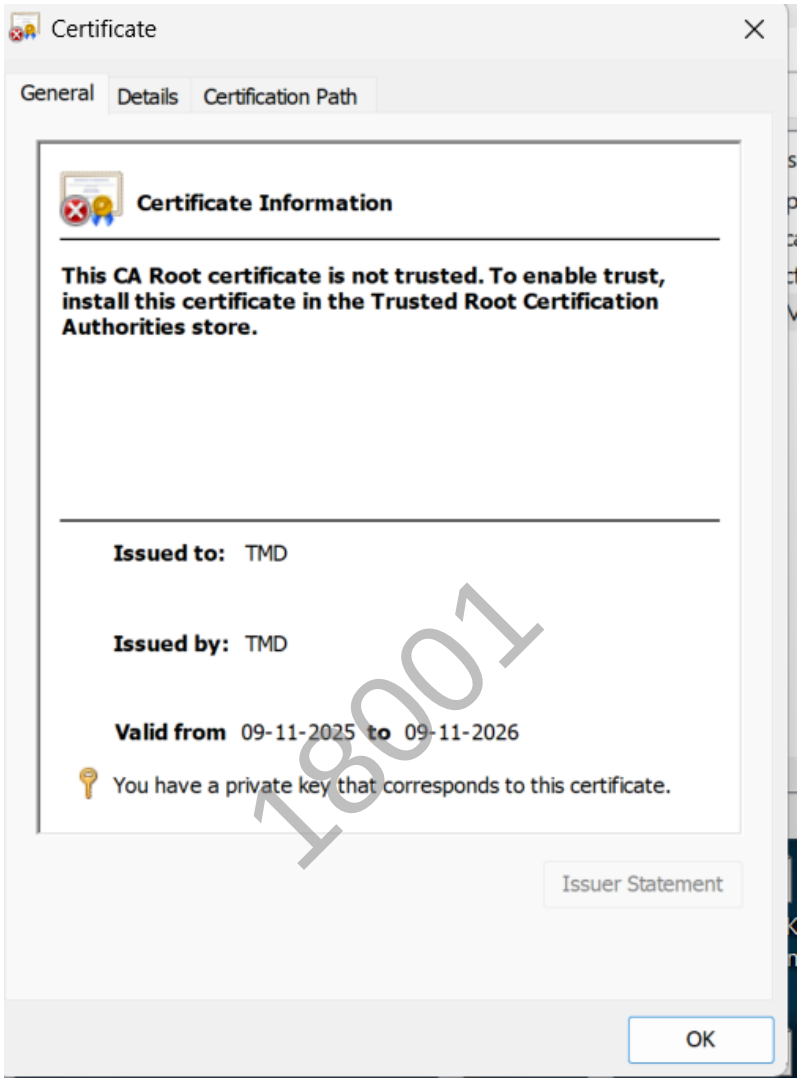
OUTPUT :-



CONCLUSION :- The above creation is done.

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