Experiment No: 05

Name of the Experiment: To configure Routing Information Protocol (RIP).

Apparatus:

- i.   Cisco Packet Tracer.
- ii.   Computer.
- iii.   Switch.
- iv.   Router (2901).
- v.   Copper Straight through cable.
- vi.   Gigabit Ethernet.

Procedure:

Step-1: Start

Step-2: Open Cisco Packet Tracer.

Step-3:

- (i)   Drag and Drop Routers, Switches and PCs.
- (ii)   Select cable and make sure a proper connections.
- (iii)   Thus we setup a cisco packet tracer according with this figure-5.1.
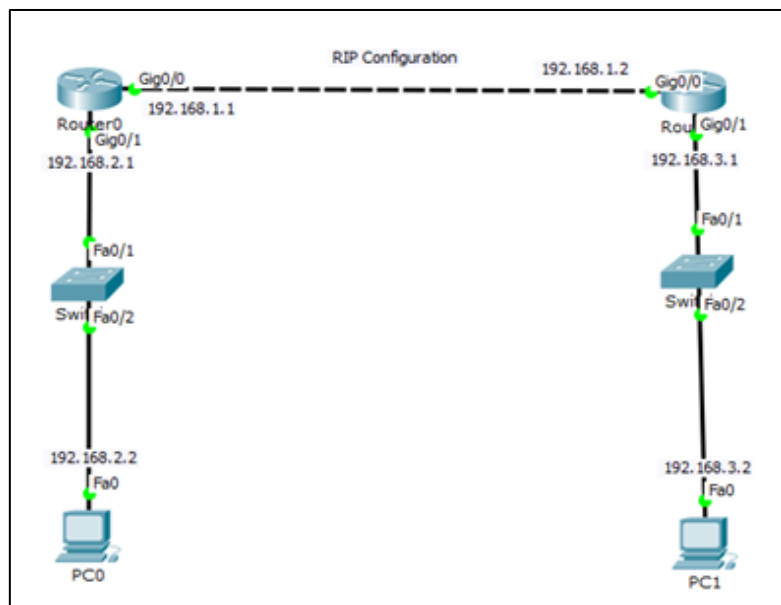

Figure-5.1: Setup Layout

Step-4: IP Address Configuration for PC0, PC1. PC0 computers are under router0 and PC1 computers are under router1.

Step-5: IP Configuration for PC0, PC1.

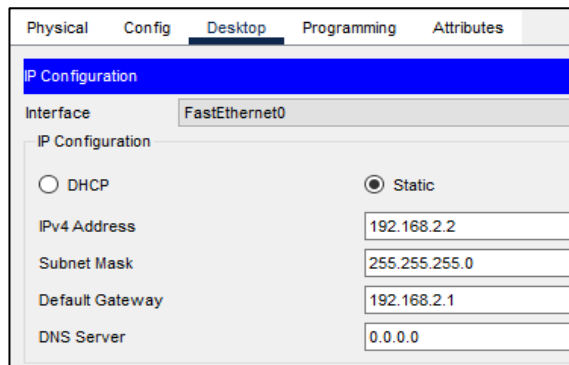Click PC1» Desktop » IP Configuration, and so on.

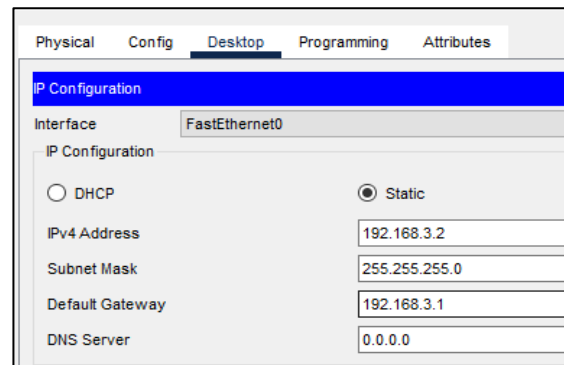|	
Figure-5.2: PC0 IP address and gateway setup.	**Figure-5.3:** PC1 IP address and gateway setup.

Step-6: Router Configuration-
   - ✓ Double click on router.
   - ✓ Click on CLI Tab.
   - ✓ First assign IP Address of on interface
   - ✓ Assign RIP command.
   - ✓ Mention RIP version
   - ✓ Finally save this configuration.
   - ✓ To set up routers, perform the following command.

IP Configuration Router0:

```
Router>en
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface gig 0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface gig 0/1
Router(config-if)#ip add 192.168.2.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
```

IP Configuration Router1:

```
Router>en
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface gig 0/0
```

```
Router(config-if)#ip address 192.168.1.2 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface gig 0/1
Router(config-if)#ip add 192.168.3.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
```

RIP Configuration Router0:

```
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router RIP
Router(config-router)#version 2 [same for all routers]
Router(config-router)#network 192.168.1.0
Router(config-router)#net 192.168.2.0
Router(config-router)#exit
Router(config)#exit
Router#
Router#wr
Building configuration...
[OK]
```

RIP Configuration Router1:

```
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router RIP
Router(config-router)#version 2 [same for all routers]
Router(config-router)#network 192.168.1.0
Router(config-router)#net 192.168.3.0
Router(config-router)#exit
Router(config)#exit
Router#
Router#wr
Building configuration...
[OK]
```

Simulation Process Router0:

```
Router#show ip route
Codes: L - local, C - connected, S - static, 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

192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.1.0/24 is directly connected, GigabitEthernet0/0
L 192.168.1.1/32 is directly connected, GigabitEthernet0/0
192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.2.0/24 is directly connected, GigabitEthernet0/1
L 192.168.2.1/32 is directly connected, GigabitEthernet0/1
R 192.168.3.0/24 [120/1] via 192.168.1.2, 00:00:26, GigabitEthernet0/0
```

Simulation Process Router1:

```
Router#show ip route
Codes: L - local, C - connected, S - static, 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

192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.1.0/24 is directly connected, GigabitEthernet0/0
L 192.168.1.2/32 is directly connected, GigabitEthernet0/0
R 192.168.2.0/24 [120/1] via 192.168.1.1, 00:00:13, GigabitEthernet0/0
192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.3.0/24 is directly connected, GigabitEthernet0/1
L 192.168.3.1/32 is directly connected, GigabitEthernet0/1
```

Step-7: Open Command Prompt of PC0 and send Ping to PC1.

Output:

```
Packet Tracer PC Command Line 1.0

C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:
Reply from 192.168.3.2: bytes=32 time<1ms TTL=126
Reply from 192.168.3.2: bytes=32 time=10ms TTL=126
Reply from 192.168.3.2: bytes=32 time=1ms TTL=126
Reply from 192.168.3.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 3ms
```

Experiment No: 06

Name of the Experiment: To Configure Open Shortest Path First (OSPF) Routing Protocol.

Apparatus:

   i.   Cisco Packet Tracer.
  ii.   Computer.
 iii.   Switch.
 iv.   Router (2901).
  v.   Copper Straight through cable.

Procedure:

Step-1: Start

Step-2: Open Cisco Packet Tracer.

Step-3:

     (i) Drag and Drop Routers, Switches and PCs.
     (ii) Select cable and make sure a proper connections.
     (iii) Thus, we setup a cisco packet tracer according with this figure-6.1.
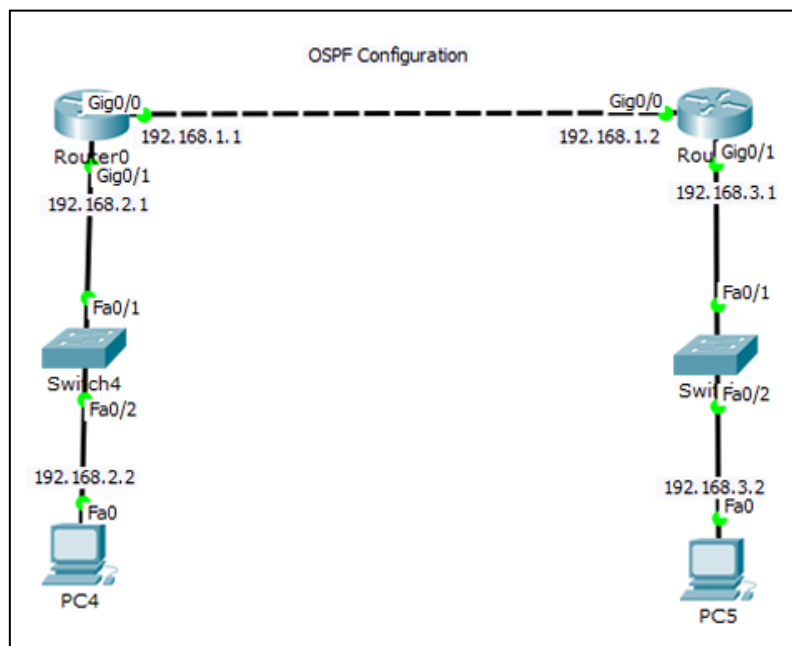

Figure-6.1: Setup Layout

Step-4: IP Address Configuration for PC4, PC5. PC4 computers are under router0 and PC5 computers are under router1.

Step-5: IP Configuration for PC4, PC5.

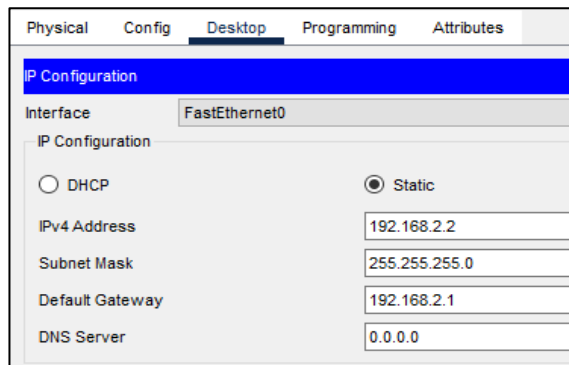Click PC4» Desktop » IP Configuration, and so on.

Physical Config **Desktop** Programming Attributes	Physical Config **Desktop** Programming Attributes
IP Configuration	**IP Configuration**
Interface FastEthernet0	Interface FastEthernet0
IP Configuration	IP Configuration
○ DHCP ◉ Static	○ DHCP ◉ Static
IPv4 Address 192.168.2.2	IPv4 Address 192.168.3.2
Subnet Mask 255.255.255.0	Subnet Mask 255.255.255.0
Default Gateway 192.168.2.1	Default Gateway 192.168.3.1
DNS Server 0.0.0.0	DNS Server 0.0.0.0

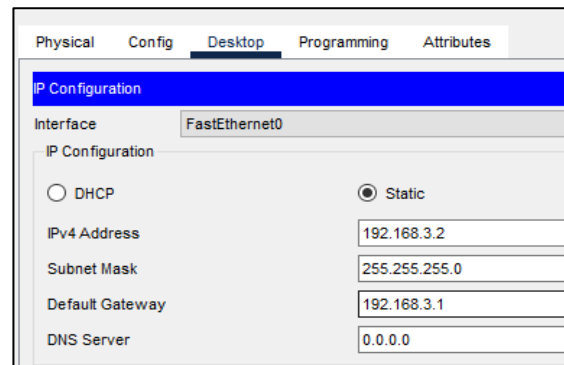**Figure-6.2:** PC4 IP address and gateway setup.   **Figure-6.3:** PC5 IP address and gateway setup.

Step-6: Router Configuration-
- ✓ Double click on router.
- ✓ Click on CLI Tab.
- ✓ First assign IP Address of on interface
- ✓ Assign OSPF command. (OSPF then numerical value such as 1,2,3)
- ✓ Mention Network then Wild card mask then area.
- ✓ Finally save this configuration.
- ✓ To set up routers, perform the following command.

IP Configuration Router0:

```
Router>en
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface gig 0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
Router(config-if)#exit
Router(config)#interface gig 0/1
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#no shutdown
```

IP Configuration Router1:

```
Router>en
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface gig 0/0
Router(config-if)#ip address 192.168.1.2 255.255.255.0
Router(config-if)#no shutdown
```

```
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface gig 0/1
Router(config-if)#ip add 192.168.3.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
```

OSPF Configuration Router0:

```
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router(config-router)#network 192.168.2.0 0.0.0.255 area 0
Router(config-router)#exit
Router(config)#exit
Router#
Router#wr
Building configuration...
[OK]
```

OSPF Configuration Router1:

```
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router(config-router)#network 192.168.3.0 0.0.0.255 area 0
Router(config-router)#exit
Router(config)#exit
Router#
Router#wr
Building configuration...
[OK]
```

Simulation Process Router0:

```
Router#show ip route
Codes: L - local, C - connected, S - static, 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

    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
```

```
L      192.168.1.1/32 is directly connected, GigabitEthernet0/0
    192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.2.0/24 is directly connected, GigabitEthernet0/1
L      192.168.2.1/32 is directly connected, GigabitEthernet0/1
O   192.168.3.0/24 [110/2] via 192.168.1.2, 00:05:49, GigabitEthernet0/0
```

Simulation Process Router1:

```
Router#show ip route
Codes: L - local, C - connected, S - static, 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

192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.1.0/24 is directly connected, GigabitEthernet0/0
L 192.168.1.2/32 is directly connected, GigabitEthernet0/0
O 192.168.2.0/24 [110/2] via 192.168.1.1, 00:06:50, GigabitEthernet0/0
192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.3.0/24 is directly connected, GigabitEthernet0/1
L 192.168.3.1/32 is directly connected, GigabitEthernet0/1
```

Step-7: Open Command Prompt of PC4 and send Ping to PC5.

Output:

```
Packet Tracer PC Command Line 1.0

C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time<1ms TTL=126
Reply from 192.168.3.2: bytes=32 time=10ms TTL=126
Reply from 192.168.3.2: bytes=32 time<1ms TTL=126
Reply from 192.168.3.2: bytes=32 time=10ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 5ms
```

Experiment No: 07

Name of the Experiment: To Configure Virtual Local Area Network (VLAN) Protocol.

Apparatus:

i.   Cisco Packet Tracer.
ii.   Computer.
iii.   Switch (2960).
iv.   Copper Straight through cable.

Procedure:

Step-1: Start
Step-2: Open Cisco Packet Tracer.
Step-3:

i.   Drag and Drop Switches and PCs.
ii.   Select cable and make sure a proper connections.
iii.   Thus, we setup a cisco packet tracer according with this figure-7.1.
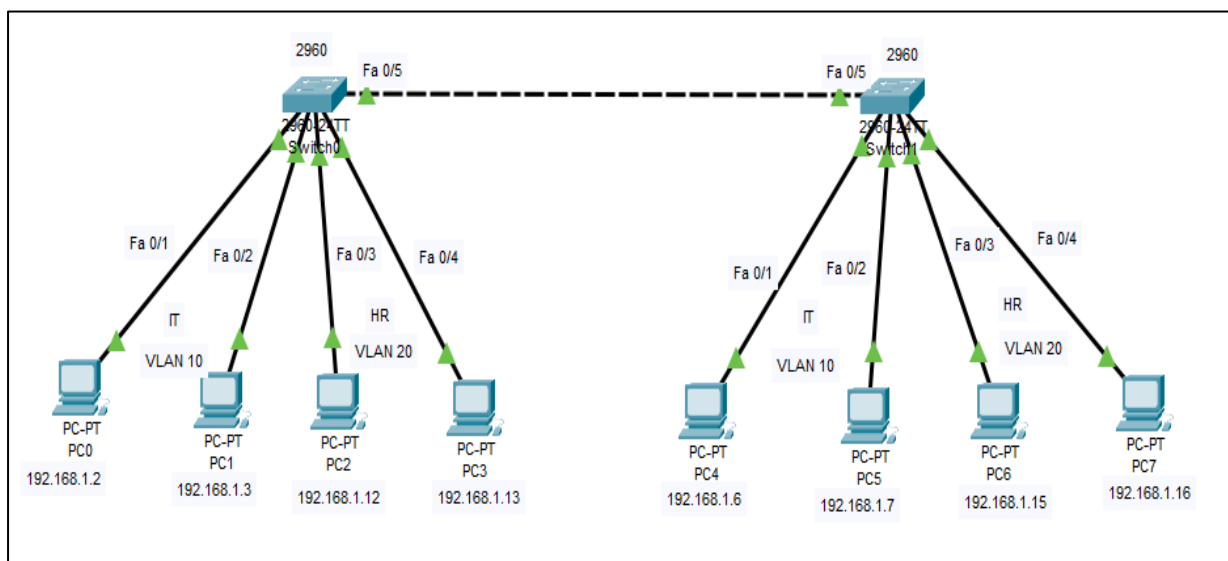

Figure-7.1: Setup Layout

Step-4: IP Address Configuration for PC0, PC1, PC2, PC3, PC4, PC5, PC6, and PC7. PC0, PC1, PC2, and PC3 computers are under Switch0 and PC4, PC5, PC6, and PC7 computers are under Switch1.

Step-5: IP Configuration for PC0, PC1, PC2, PC3, PC4, PC5, PC6, and PC7.

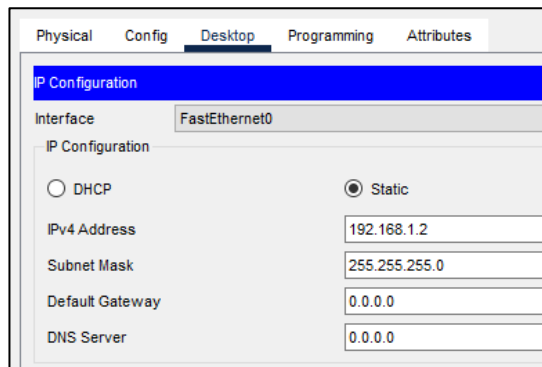Click PC0» Desktop » IP Configuration, and so on.

Physical Config **Desktop** Programming Attributes	Physical Config **Desktop** Programming Attributes
IP Configuration	**IP Configuration**
Interface FastEthernet0	Interface FastEthernet0
IP Configuration	IP Configuration
○ DHCP ◉ Static	○ DHCP ◉ Static
IPv4 Address 192.168.1.2	IPv4 Address 192.168.1.6
Subnet Mask 255.255.255.0	Subnet Mask 255.255.255.0
Default Gateway 0.0.0.0	Default Gateway 0.0.0.0
DNS Server 0.0.0.0	DNS Server 0.0.0.0

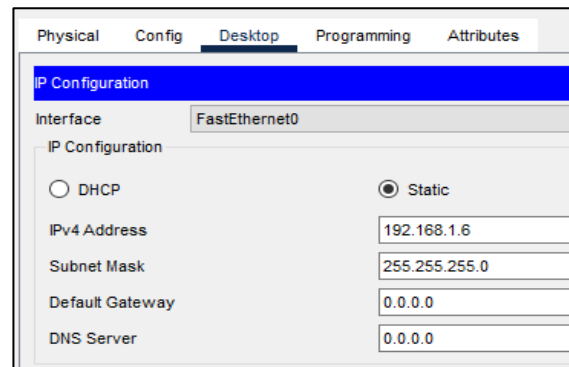**Figure-7.2:** PC0 IP address and gateway setup.   **Figure-7.3:** PC4 IP address and gateway setup.

Step-6: Switch Configuration-
- ✓ Double click on switch.
- ✓ Click on CLI Tab.
- ✓ To set up switch, perform the following command.

CLI Configuration (Switch0 and Switch2):

```
Switch>en
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#VLAN 10
Switch(config-vlan)#name IT
Switch(config-vlan)#exit
Switch(config)#VLAN 20
Switch(config-vlan)#name HR
Switch(config-vlan)#exit
Switch(config)#exit
Switch#show VLAN brief
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport access VLAN 10
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#switchport access VLAN 10
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport access VLAN 20
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/4
Switch(config-if)#switchport access VLAN 20
Switch(config-if)#exit
Switch(config)#exit
Switch#show VLAN brief
```

VLAN Configuration (Switch0 and Switch1):

```
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet 0/5
Switch(config-if)#switchport mode trunk

Switch(config-if)#exit
Switch(config)#interface range fastEthernet 0/1-fastEthernet 0/4
Switch(config-if-range)#switch mode access
Switch(config-if-range)#exit
```

Simulation Process Switch0 and Switch1:

```
Switch#show VLAN brief

VLAN Name                        Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                     active    Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                           Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                           Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                           Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                           Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                           Gig0/1, Gig0/2
10   IT                          active    Fa0/1, Fa0/2
20   HR                          active    Fa0/3, Fa0/4
1002 fddi-default                active
1003 token-ring-default          active
1004 fddinet-default             active
1005 trnet-default               active
```

Step-7: Open Command Prompt of PC0 and send Ping to PC4 and PC7.

Output:

Cisco Packet Tracer PC Command Line 1.0

******** PC0 to PC4 (Transfer Packet) ********
C:\>ping 192.168.1.6

Pinging 192.168.1.6 with 32 bytes of data:

Reply from 192.168.1.6: bytes=32 time<1ms TTL=128
Reply from 192.168.1.6: bytes=32 time=1ms TTL=128
Reply from 192.168.1.6: bytes=32 time<1ms TTL=128
Reply from 192.168.1.6: bytes=32 time=1ms TTL=128

Ping statistics for 192.168.1.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

******** PC0 to PC7 (Does not Transfer Packet) ********
C:\>ping 192.168.1.16

Pinging 192.168.1.16 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.1.16:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),