<u>Name:</u> Urooba Gohar

<u>Roll No:</u> 22P-9216

<u>Section:</u> BSCS-5A

Lab 10

Configuring Dynamic (OSPF, EIGRP) and static routing on routers

Objectives:

How to configure dynamic routing protocols like OSPF and EIGRP on routers

How to configure static routing on routers

Verification and troubleshooting of routing protocols

Dynamic routing

Dynamic routing is known as a technique of finding the best path for the data to travel over a network in this process a router can transmit data through various routes and reach its destination based on conditions at that time of communication circuits.

OSPF (Open Shortest Path First)

OSPF is an interior gateway protocol (IGP) for routing Internet Protocol (IP) packets within a single routing domain, such as an autonomous system. It gathers link state information from available routers and constructs a topology map of the network. The topology is presented as a routing table to the internet layer which routes packets based solely on their destination IP address.

EIGRP (Enhanced Interior Gateway Routing Protocol)

Enhanced Interior Gateway Routing Protocol (EIGRP) is an advanced distance-vector routing protocol that is used on a computer network for automating routing decisions and configuration. EIGRP is used on a router to share routes with other routers within the same autonomous system. Unlike other well known routing protocols, such as RIP, EIGRP only sends incremental updates, reducing the workload on the router and the amount of data that needs to be transmitted.

Configuring OSPF on routers in Cisco packet tracer

First design the given topology and assign the appropriate ip's as shown in figure
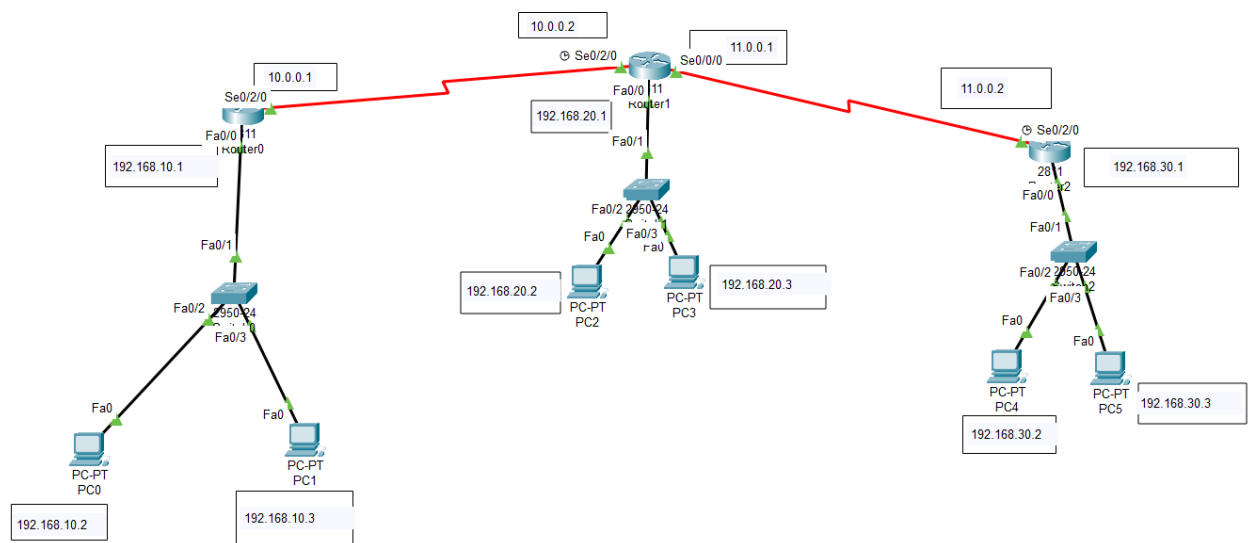

Figure 01

Click on router 0 and enter into cli and type below commands for OSPF configuration. After typing these commands press ctrl+z to save the settings

```
Router>
Router>enable
Router#show ip route connected
 C   10.0.0.0/8   is directly connected, Serial0/2/0
 C   192.168.10.0/24   is directly connected, FastEthernet0/0

Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf
% Incomplete command.
Router(config)#router ospf 1
Router(config-router)#network 10.0.0.0 0.255.255.255 ?
  area  Set the OSPF area ID
Router(config-router)#network 10.0.0.0 0.255.255.255
% Incomplete command.
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 192.168.10.0 0.0.0.255 area 0
Router(config-router)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
Router#show ?
  aaa                Show AAA values
  access-lists       List access lists
  arp                Arp table
  cdp                CDP information
  class-map          Show QoS Class Map
  clock              Display the system clock
  controllers        Interface controllers status
  crypto             Encryption module
  debugging          State of each debugging option
  dhcp               Dynamic Host Configuration Protocol status
```

Now enter into router 1 cli and type below commands

```
Router>
Router>
Router>conf t
          ^
% Invalid input detected at '^' marker.

Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ?
  bgp    Border Gateway Protocol (BGP)
  eigrp  Enhanced Interior Gateway Routing Protocol (EIGRP)
  ospf   Open Shortest Path First (OSPF)
  rip    Routing Information Protocol (RIP)
Router(config)#router
% Incomplete command.
Router(config)#router ospf 2
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
00:56:34: %OSPF-5-ADJCHG: Process 2, Nbr 192.168.10.1 on Serial0/2/0 from LOADING to FULL, Loading
Done

Router(config-router)#network 11.0.0.0 0.255.255.255 area 0
Router(config-router)#network 192.168.20.0 0.0.0.255 area 0
Router(config-router)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
```

Now click on router 2 and type below commands

```
Press RETURN to get started!


Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 3
Router(config-router)#network 11.0.0.0 0.255.255.255 area 0
Router(config-router)#network 11.0 0.255.255.255 area 0
01:00:59: %OSPF-5-ADJCHG: Process 3, Nbr 192.168.20.1 on Serial0/2/0 from LOADING to FULL, Loading
Don
                               ^
% Invalid input detected at '^' marker.

Router(config-router)#network 192.168.30.0 0.0.0.255 area 0
Router(config-router)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
```

Show ip route

Command we can check that ospf is configured on routers

Now ospf is configured on all the routers and all the devices should be able to ping each other

Configuring EIGRP on routers in Cisco packet tracer

Draw the topology shown in figure 01

Click on router 0 and type below commands to configure eigrp protocol

```
%LINK-5-CHANGED: Interface Serial0/2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to up

00:00:10: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.20.1 on Serial0/2/0 from LOADING to FULL, Loadin
Done


Router>
Router>
Router>en
Router#show ip route connected
 C    10.0.0.0/8  is directly connected, Serial0/2/0
 C    192.168.10.0/24  is directly connected, FastEthernet0/0

Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router eigrp ?
  <1-65535>  Autonomous system number
Router(config)#router eigrp 50
Router(config-router)#network 192.168.10.0 0.255.255.255
Router(config-router)#network 10.0.0.0
Router(config-router)#
```

Same do configuration for router 1 and router 2

Make sure that Autonomous system number of eigrp is same on all routers

After configuring EIGRP on all routers check the connectivity of all devices

STATIC ROUTING

Static routing is a form of routing that occurs when a router uses a manually-configured routing entry, rather than information from dynamic routing traffic. In many cases, static routes are manually configured by a network administrator by adding in entries into a routing table, though this may not always be the case. Unlike dynamic routing, static routes are fixed and do not change if the network is changed or reconfigured. Static routing and dynamic routing are not mutually exclusive. Both dynamic routing and static routing are usually used on a router to maximise routing efficiency and to provide backups in case dynamic routing information fails to be exchanged.

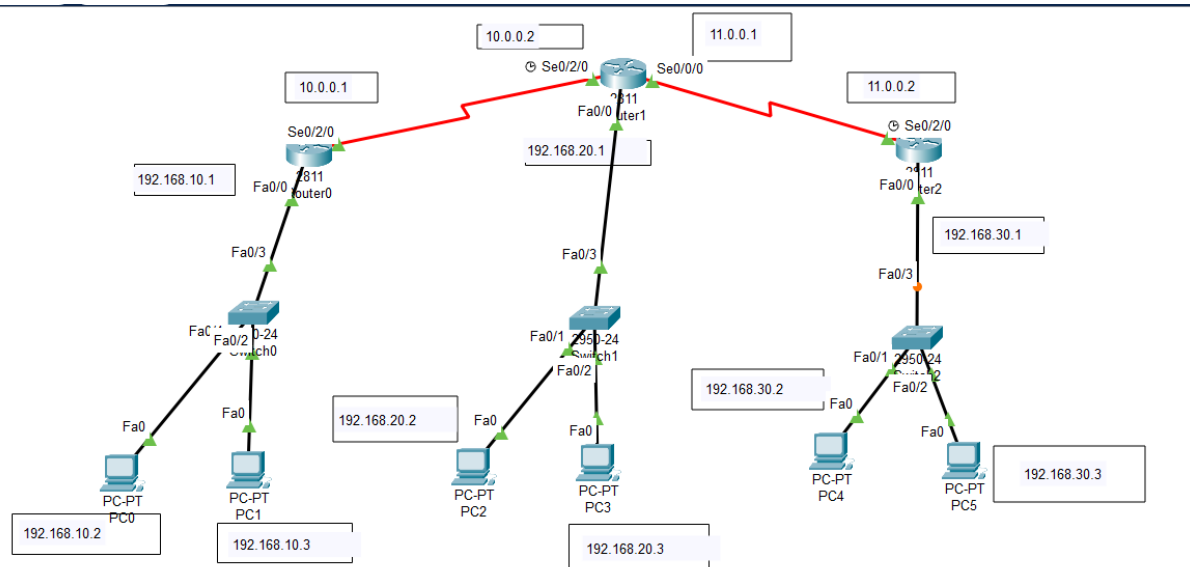**Configuring Static routing on routers in Cisco packet tracer**

Figure 02

Design the given network as shown in the figure.

For static routing do the following settings on each router separately

For router 0

Router0

Physical | Config | CLI | Attributes

GLOBAL
- Settings
- Algorithm Settings

ROUTING
- Static
- RIP

SWITCHING
- VLAN Database

INTERFACE
- FastEthernet0/0
- FastEthernet0/1
- Serial0/2/0

Static Routes

Network	11.0.0.0
Mask	255.0.0.0
Next Hop	10.0.0.2

Add

Network Address

192.168.20.0/24 via 10.0.0.2

11.0.0.0/8 via 10.0.0.2

Router0

Physical | Config | CLI | Attributes

GLOBAL
- Settings
- Algorithm Settings

ROUTING
- Static
- RIP

SWITCHING
- VLAN Database

INTERFACE
- FastEthernet0/0
- FastEthernet0/1
- Serial0/2/0

Static Routes

Network	192.168.30.0
Mask	255.255.255.0
Next Hop	10.0.0.2

Network Address

192.168.20.0/24 via 10.0.0.2

11.0.0.0/8 via 10.0.0.2

192.168.30.0/24 via 10.0.0.2

For router 01

For router 2

Router2

Physical · **Config** · **CLI** · **Attributes**

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/2/0

Static Routes

Network: 192.168.20.0

Mask: 255.255.255.0

Next Hop: 11.0.0.1

Network Address

192.168.20.0/24 via 11.0.0.1

Router2

Physical · **Config** · **CLI** · **Attributes**

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/2/0

Static Routes

Network: 10.0.0.0

Mask: 255.0.0.0

Next Hop: 11.0.0.1

Network Address

192.168.20.0/24 via 11.0.0.1

10.0.0.0/8 via 11.0.0.1

Router2 — Config tab

GLOBAL
- Settings
- Algorithm Settings

ROUTING
- Static
- RIP

SWITCHING
- VLAN Database

INTERFACE
- FastEthernet0/0
- FastEthernet0/1
- Serial0/2/0

Static Rout

Network: 192.168.10.0
Mask: 255.255.255.0
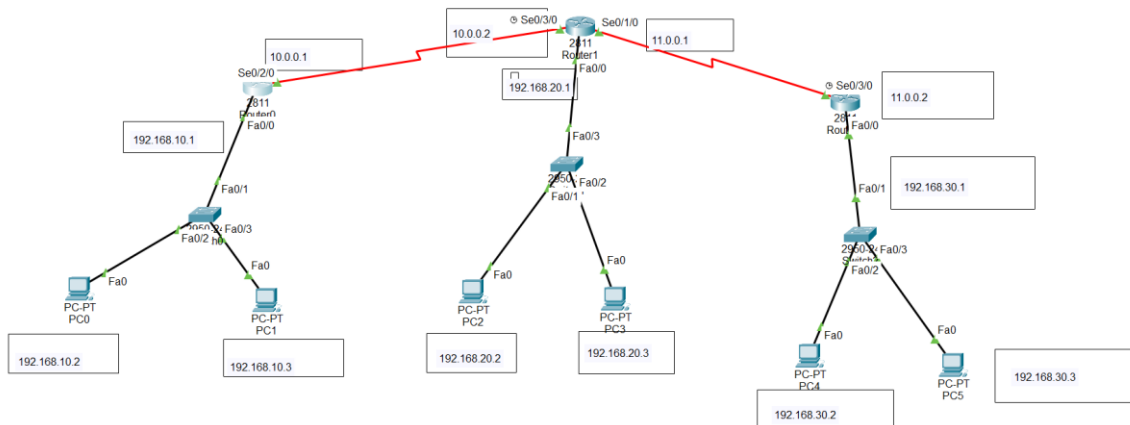Next Hop: 11.0.0.1

Network Address

192.168.20.0/24 via 11.0.0.1

10.0.0.0/8 via 11.0.0.1
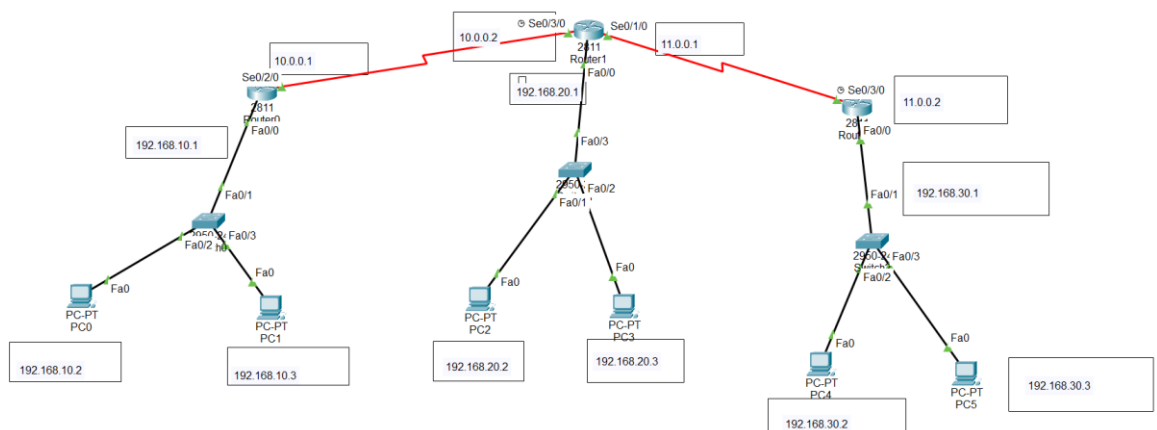
192.168.10.0/24 via 11.0.0.1

TASKS

1. Configure OSPF routing protocol in network topology given in figure 1 [2.5 marks]

Ans:

2. Configure EIGRP routing protocol in network topology given in figure 1 [2.5 marks]
   Ans:

3. Configure static routing protocol in network topology given in figure 2 [5 marks]
   Ans: