

Institute of Computer Technology

B. Tech Computer Science and Engineering

Sub: Computer Networks

Course Code:-2CSE502

Sem-V(CS)

Class:-A

Practical:8

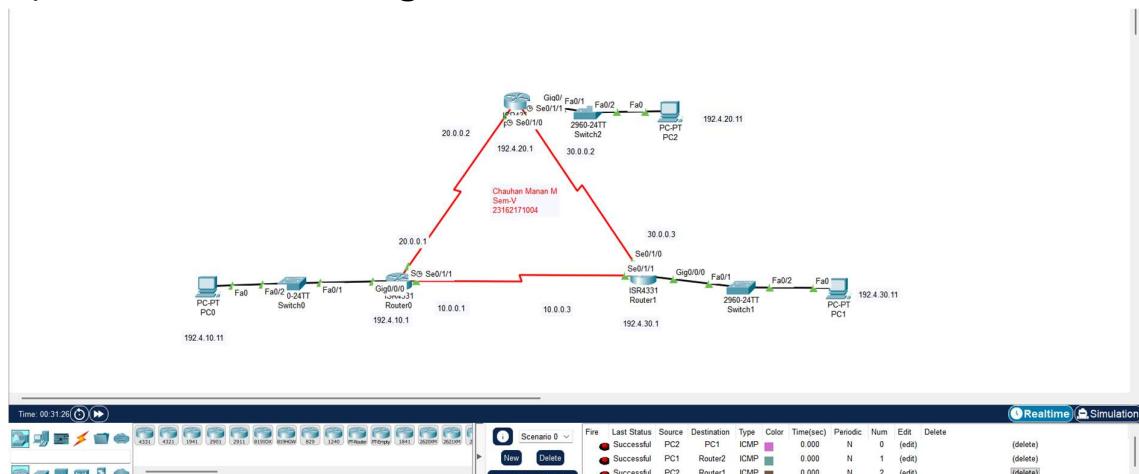
Aim: To design a network using Open Shortest Path First (OSPF) Protocol.

Scenario:

Consider that organization has three departments and as routing protocol Open Shortest Path First (OSPF) protocol is implemented. Configure network as shown in figure below and implement Open Shortest Path First (OSPF) routing protocol.

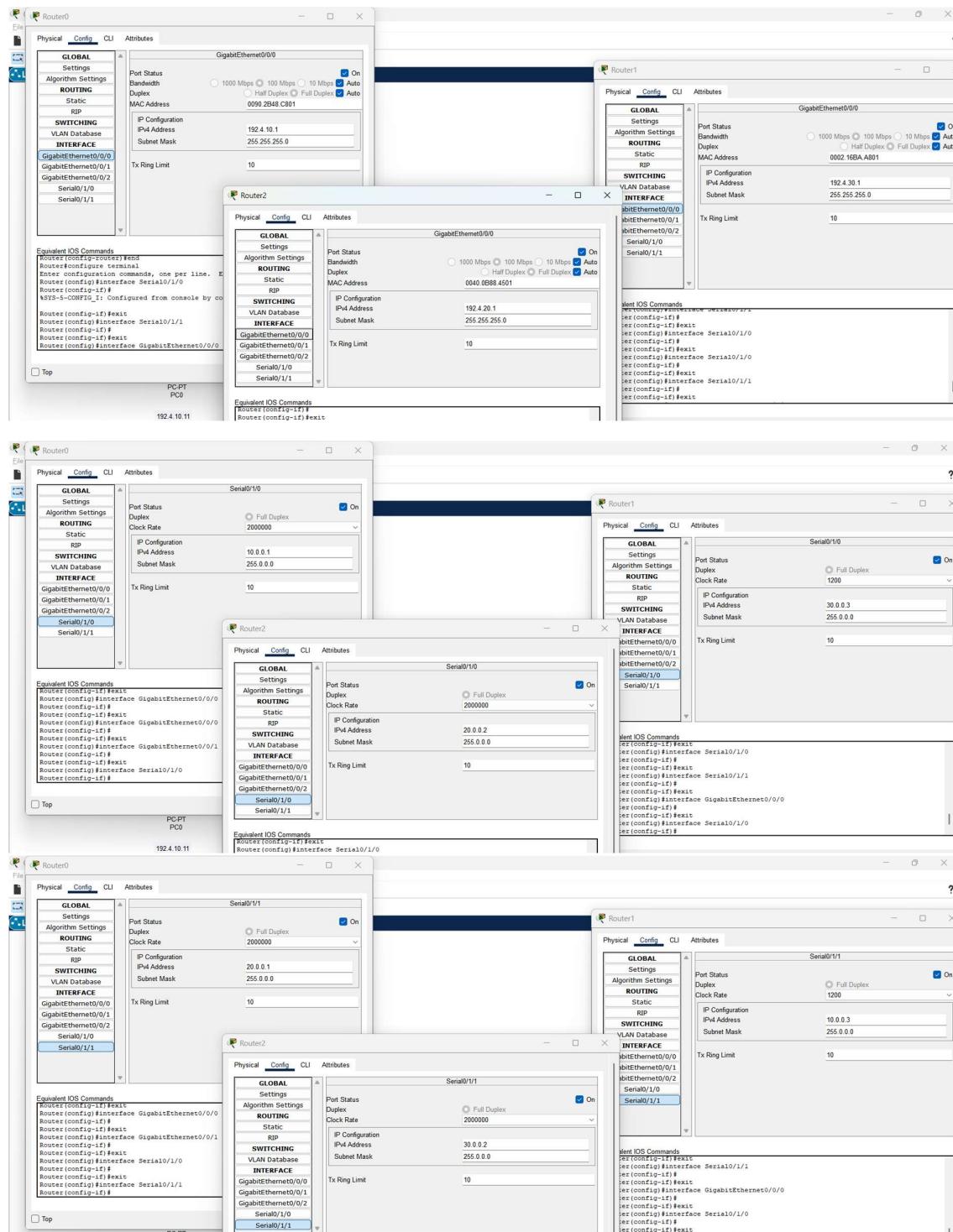
Procedure:

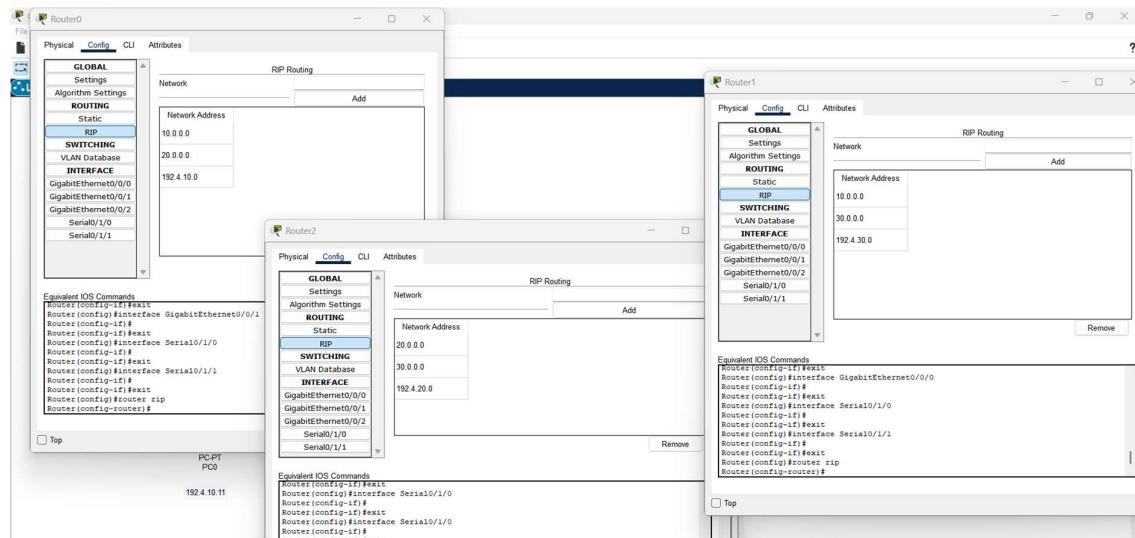
1) Create network as given below:-



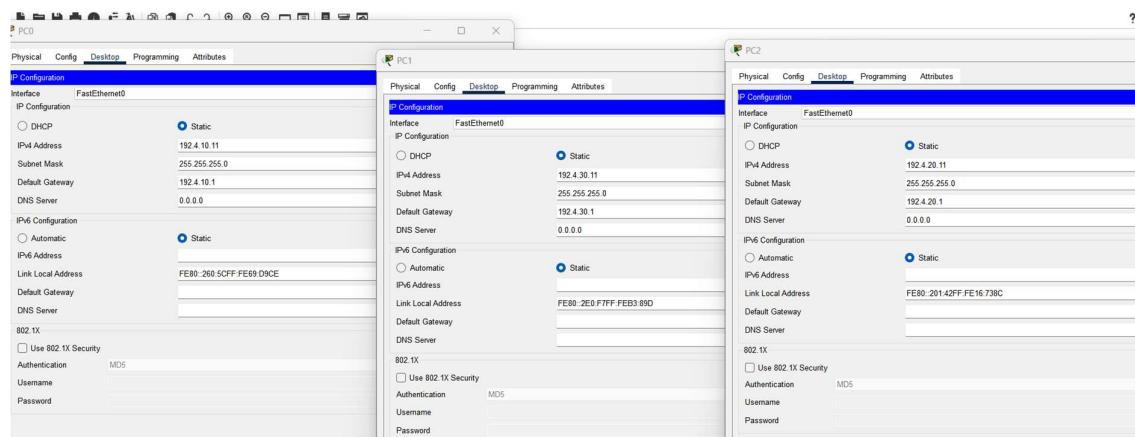
## 2) Configure IP address (All Devices, Routers)

Routers:-





## PC's Configuration:-



### 3) Configure open short path first routing table (OSPF in routers)

The screenshot shows a Cisco IOS CLI interface titled "Router0". The "CLI" tab is selected. The command-line history displays the configuration of OSPF and RIP protocols, along with various show commands to verify the configuration.

```
Router(config)#router ospf 1
Router(config-router)#network 192.4.10.0 0.0.0.255 area 0
^
% Invalid input detected at '^' marker.

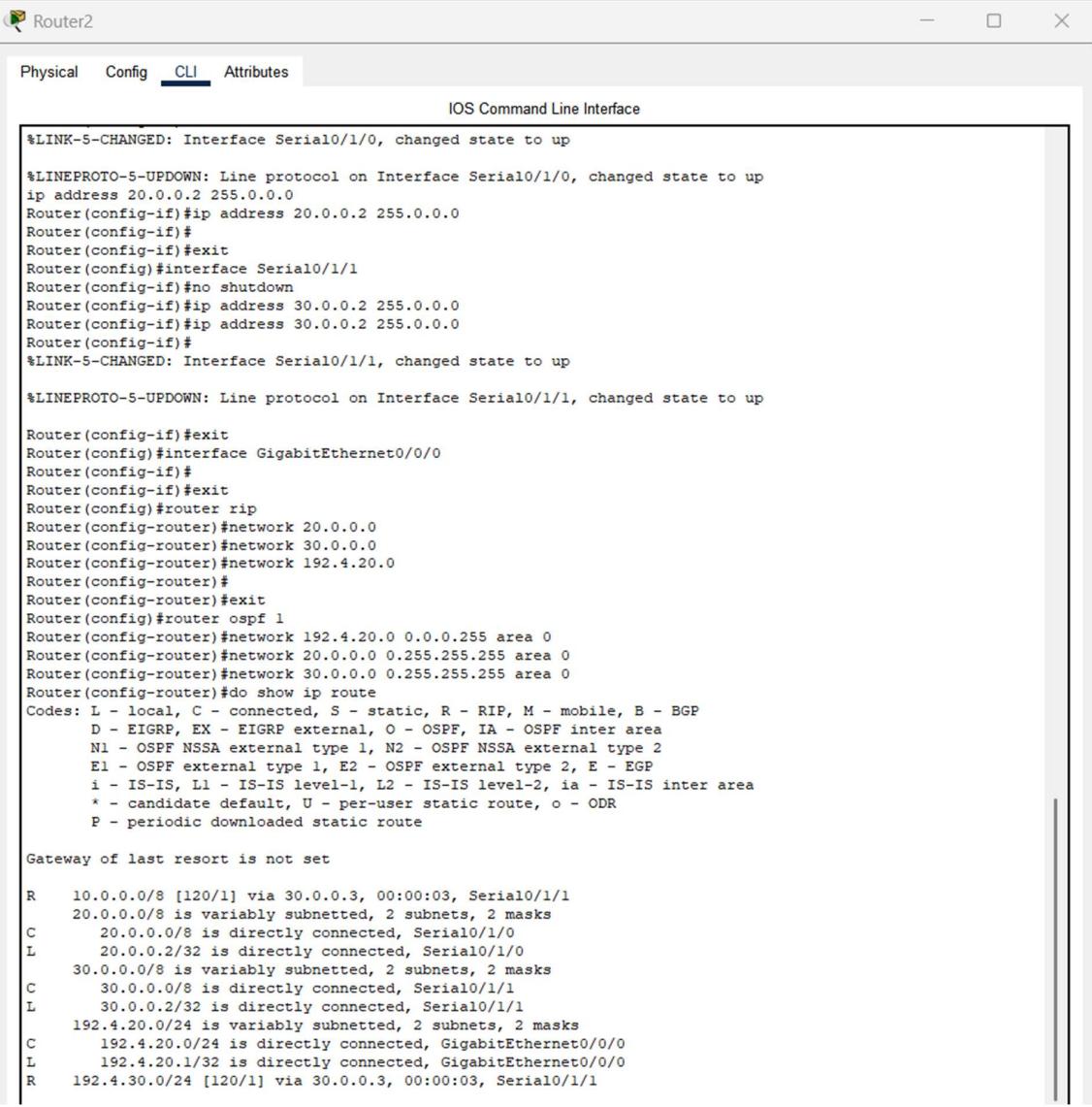
Router(config-router)#network 192.4.10.0 0.0.0.255 area 0
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 20.0.0.0 0.255.255.255 area 0
Router(config-router)#do show ip
show ip
% Incomplete command.
Router(config-router)#exit
Router(config)#do shoirw ip protocols
shoirw ip protocols
^
% Invalid input detected at '^' marker.

Router(config)#do show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 26 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 1, receive any version
    Interface      Send   Recv   Triggered RIP  Key-chain
    GigabitEthernet0/0/0  12 1
    Serial0/1/0     12 1
    Serial0/1/1     12 1
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    20.0.0.0
    192.4.10.0
  Passive Interface(s):
  Routing Information Sources:
    Gateway      Distance      Last Update
  Distance: (default is 120)

  Routing Protocol is "ospf 1"
    Outgoing update filter list for all interfaces is not set
    Incoming update filter list for all interfaces is not set
    Router ID 192.4.10.1
    Number of areas in this router is 1. 1 normal 0 stub 0 nssa
    Maximum path: 4
    Routing for Networks:
      192.4.10.0 0.0.0.255 area 0
      10.0.0.0 0.255.255.255 area 0
      20.0.0.0 0.255.255.255 area 0
    Routing Information Sources:
      Gateway      Distance      Last Update

Router(config)#
```

At the bottom right of the window, there are "Copy" and "Paste" buttons.

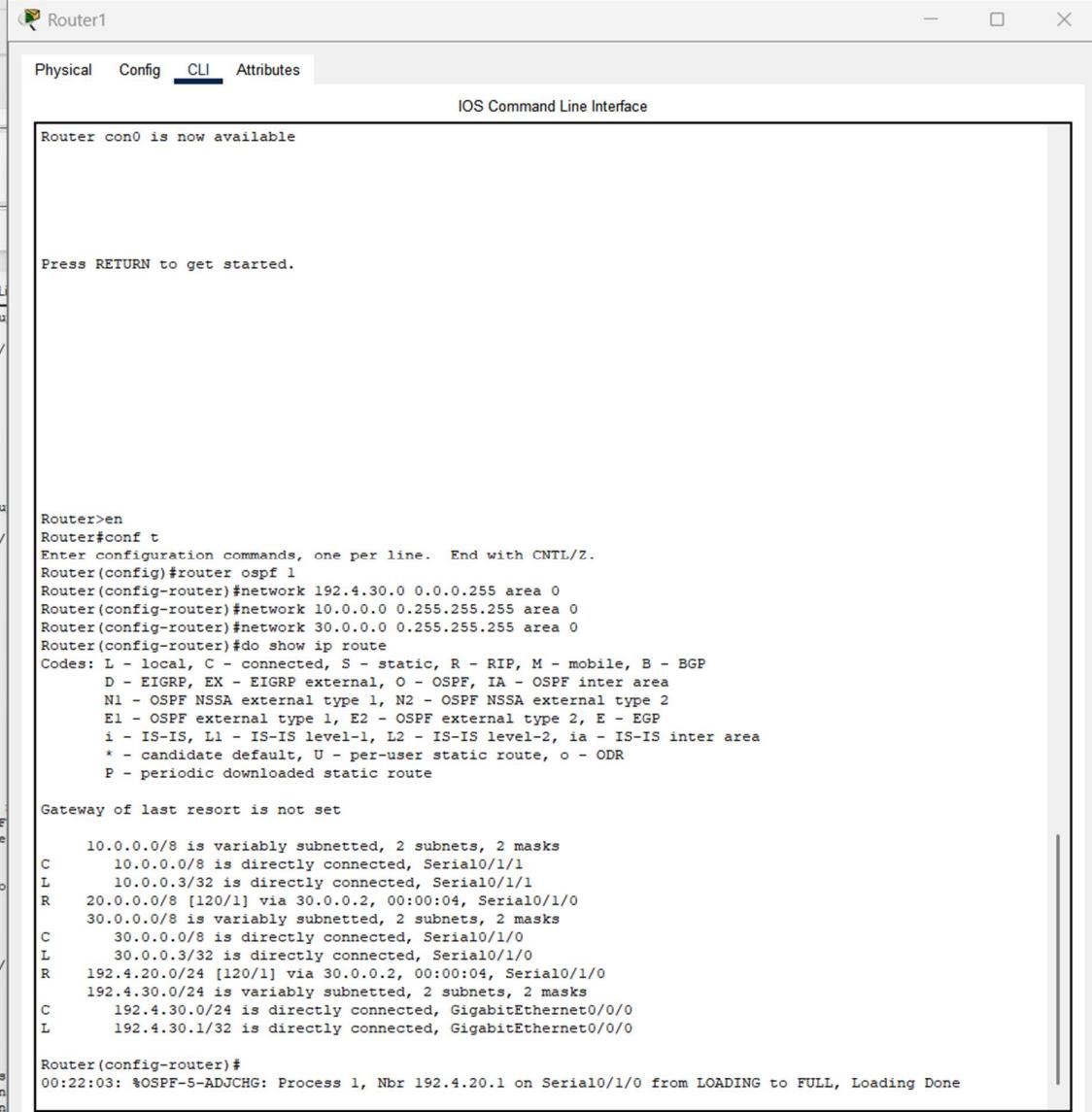


The image shows a window titled "Router2" with the tab "CLI" selected. The window displays the "IOS Command Line Interface". The output of the command "show ip route" is shown, which includes various route entries and their details. The window has standard operating system controls at the top right.

```
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
ip address 20.0.0.2 255.0.0.0
Router(config-if)#ip address 20.0.0.2 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/1
Router(config-if)#no shutdown
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#network 192.4.20.0
Router(config-router)#
Router(config-router)#exit
Router(config)#router ospf 1
Router(config-router)#network 192.4.20.0 0.0.0.255 area 0
Router(config-router)#network 20.0.0.0 0.255.255.255 area 0
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#do show ip route
Codes: L - local, C - connected, S - static, 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

R    10.0.0.0/8 [120/1] via 30.0.0.3, 00:00:03, Serial0/1/1
      20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    20.0.0.0/8 is directly connected, Serial0/1/0
L    20.0.0.2/32 is directly connected, Serial0/1/0
      30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    30.0.0.0/8 is directly connected, Serial0/1/1
L    30.0.0.2/32 is directly connected, Serial0/1/1
      192.4.20.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.4.20.0/24 is directly connected, GigabitEthernet0/0/0
L    192.4.20.1/32 is directly connected, GigabitEthernet0/0/0
R    192.4.30.0/24 [120/1] via 30.0.0.3, 00:00:03, Serial0/1/1
```



The screenshot shows the Cisco IOS Command Line Interface (CLI) running on a router named 'Router1'. The interface is titled 'Router1' and has tabs for Physical, Config, CLI (which is selected), and Attributes. The main window displays the following text:

```
Router con0 is now available

Press RETURN to get started.

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.4.30.0 0.0.0.255 area 0
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#do 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

  10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
    C      10.0.0.0/8 is directly connected, Serial0/1/1
    L      10.0.0.3/32 is directly connected, Serial0/1/1
  R  20.0.0.0/8 [120/1] via 30.0.0.2, 00:00:04, Serial0/1/0
      30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
    C      30.0.0.0/8 is directly connected, Serial0/1/0
    L      30.0.0.3/32 is directly connected, Serial0/1/0
  R  192.4.20.0/24 [120/1] via 30.0.0.2, 00:00:04, Serial0/1/0
      192.4.30.0/24 is variably subnetted, 2 subnets, 2 masks
    C      192.4.30.0/24 is directly connected, GigabitEthernet0/0/0
    L      192.4.30.1/32 is directly connected, GigabitEthernet0/0/0

Router(config-router)#
00:22:03: %OSPF-5-ADJCHG: Process 1, Nbr 192.4.20.1 on Serial0/1/0 from LOADING to FULL, Loading Done
```

## Conclusion:-

The network was successfully configured using the OSPF routing protocol. After assigning IP addresses and enabling OSPF on all routers, they exchanged routing information and established connectivity between all departments. This shows that OSPF allows efficient and automatic route selection in a multi-network environment.