**Part A**

**A1)**

1. topo.py is present in Part-A folder. Command to execute is python start.py.
2. Network topology figure is present in the Part-A folder.

**A2)**

1. Routing tables screenshots are present in Part-A folder.

Following steps are followed to configure the routing tables.

1. First, we enabled IP forwarding on each node / router:

H1 echo 1 > /proc/sys/net/ipv4/ip\_forward

H2 echo 1 > /proc/sys/net/ipv4/ip\_forward

R1 echo 1 > /proc/sys/net/ipv4/ip\_forward

R2 echo 1 > /proc/sys/net/ipv4/ip\_forward

R3 echo 1 > /proc/sys/net/ipv4/ip\_forward

R4 echo 1 > /proc/sys/net/ipv4/ip\_forward

1. Next, we added IP addresses at each interface of the routers to enable cross subnet communication:

R1 ip addr add 183.0.0.2/20 dev R1-eth1

R1 ip addr add 184.0.0.2/20 dev R1-eth2

R2 ip addr add 185.0.0.2/20 dev R2-eth1

R3 ip addr add 186.0.0.2/20 dev R3-eth1

R4 ip addr add 185.0.0.1/20 dev R4-eth1

R4 ip addr add 186.0.0.1/20 dev R4-eth2

1. And, we configure routes on all the nodes:

H1 ip route add 183.0.0.0/20 via 182.0.0.2 dev H1-eth0

H1 ip route add 184.0.0.0/20 via 182.0.0.2 dev H1-eth0

H1 ip route add 185.0.0.0/20 via 182.0.0.2 dev H1-eth0

H1 ip route add 186.0.0.0/20 via 182.0.0.2 dev H1-eth0

H1 ip route add 187.0.0.0/20 via 182.0.0.2 dev H1-eth0

H2 ip route add 182.0.0.0/20 via 187.0.0.2 dev H2-eth0

H2 ip route add 183.0.0.0/20 via 187.0.0.2 dev H2-eth0

H2 ip route add 184.0.0.0/20 via 187.0.0.2 dev H2-eth0

H2 ip route add 185.0.0.0/20 via 187.0.0.2 dev H2-eth0

H2 ip route add 186.0.0.0/20 via 187.0.0.2 dev H2-eth0

R1 ip route add 185.0.0.0/20 via 183.0.0.1 dev R1-eth1

R1 ip route add 186.0.0.0/20 via 184.0.0.1 dev R1-eth2

R1 ip route add 187.0.0.0/20 via 183.0.0.1 dev R1-eth1

R2 ip route add 182.0.0.0/20 via 183.0.0.2 dev R2-eth0

R2 ip route add 184.0.0.0/20 via 183.0.0.2 dev R2-eth0

R2 ip route add 186.0.0.0/20 via 185.0.0.1 dev R2-eth1

R2 ip route add 187.0.0.0/20 via 185.0.0.1 dev R2-eth1

R3 ip route add 182.0.0.0/20 via 184.0.0.2 dev R3-eth0

R3 ip route add 183.0.0.0/20 via 184.0.0.2 dev R3-eth0

R3 ip route add 185.0.0.0/20 via 186.0.0.1 dev R3-eth1

R3 ip route add 187.0.0.0/20 via 186.0.0.1 dev R3-eth1

R4 ip route add 182.0.0.0/20 via 186.0.0.2 dev R4-eth2

R4 ip route add 183.0.0.0/20 via 185.0.0.2 dev R4-eth1

R4 ip route add 184.0.0.0/20 via 186.0.0.2 dev R4-eth2

1. Finally, we set NAT on all routers:

R1 iptables -t nat -A POSTROUTING -o R1-eth1 -j MASQUERADE

R1 iptables -t nat -A POSTROUTING -o R1-eth2 -j MASQUERADE

R2 iptables -t nat -A POSTROUTING -o R2-eth1 -j MASQUERADE

R2 iptables -t nat -A POSTROUTING -o R2-eth0 -j MASQUERADE

R3 iptables -t nat -A POSTROUTING -o R3-eth1 -j MASQUERADE

R3 iptables -t nat -A POSTROUTING -o R3-eth0 -j MASQUERADE

R4 iptables -t nat -A POSTROUTING -o R4-eth0 -j MASQUERADE

R4 iptables -t nat -A POSTROUTING -o R4-eth1 -j MASQUERADE

R4 iptables -t nat -A POSTROUTING -o R4-eth2 -j MASQUERADE

Example: H2 ip route add 182.0.0.0/20 via 187.0.0.2 dev H2-eth0. With this command H2 will transfer packets to subnet 182.0.0.0/20 via HOP 187.0.0.2.

1. Traceroute screenshots are present in Part-A folder.