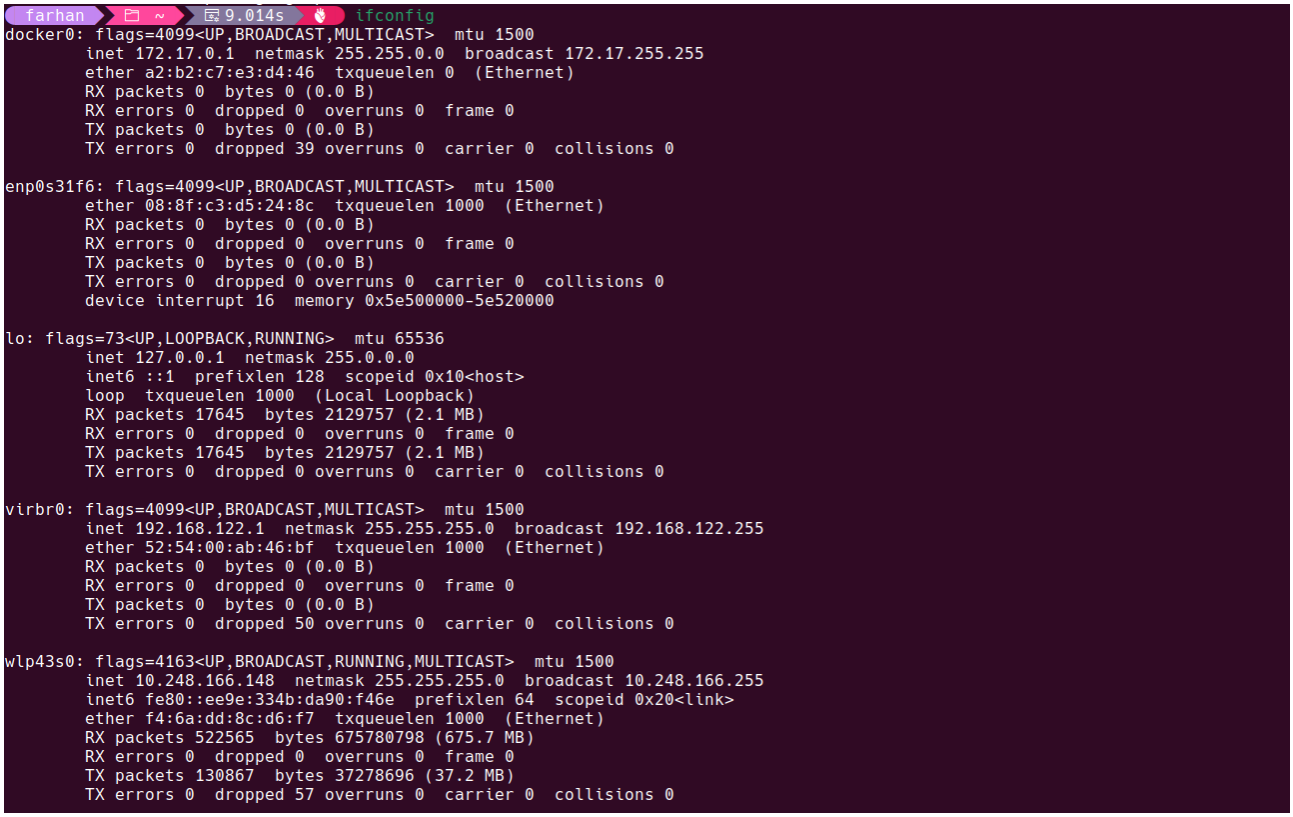
# COMPUTER NETWORKS

## ASSIGNMENT NO-1

Q 1)

Ans a) The output on running ifconfig on my device is as follows:-




As seen the image the ifconfig command describes various network interfaces of the device such as wlp43s0 which is the WiFi network interface and on top of that it also gives us information about the activities of the network interfaces for example the no. of packets shared . As we can see my device has a wireless connection , Ethernet connection , a connection created by docker so as to connect the docker application to the internet. We can also see that except wlp43s0 no other interface is receiving any kind of data so we can say sat only wlp43s0 is active at the moment.

Ans b) Some of the options of ifconfig are as follows:-

1)txquelen – It is used to decide the queue length before processing it further and sending to the next routers it decides how many maximum packets can stay in the queue at a given point of time .
2)up and down- It is used to switch off/on a network manually as per the requirement .The commands used are as follows - sudo ifconfig wlp43s0 down,sudo ifconfig wlp43s0 up.
3)mtu-MTU stands for maximum transmission unit which describers the maximum size of a packet .It can help in stablizing a connection or improving it in case of high-latency scenarios.
4)-s – It stands for short list and summarises each network removing residual information from each of them . It gives output as shown below .

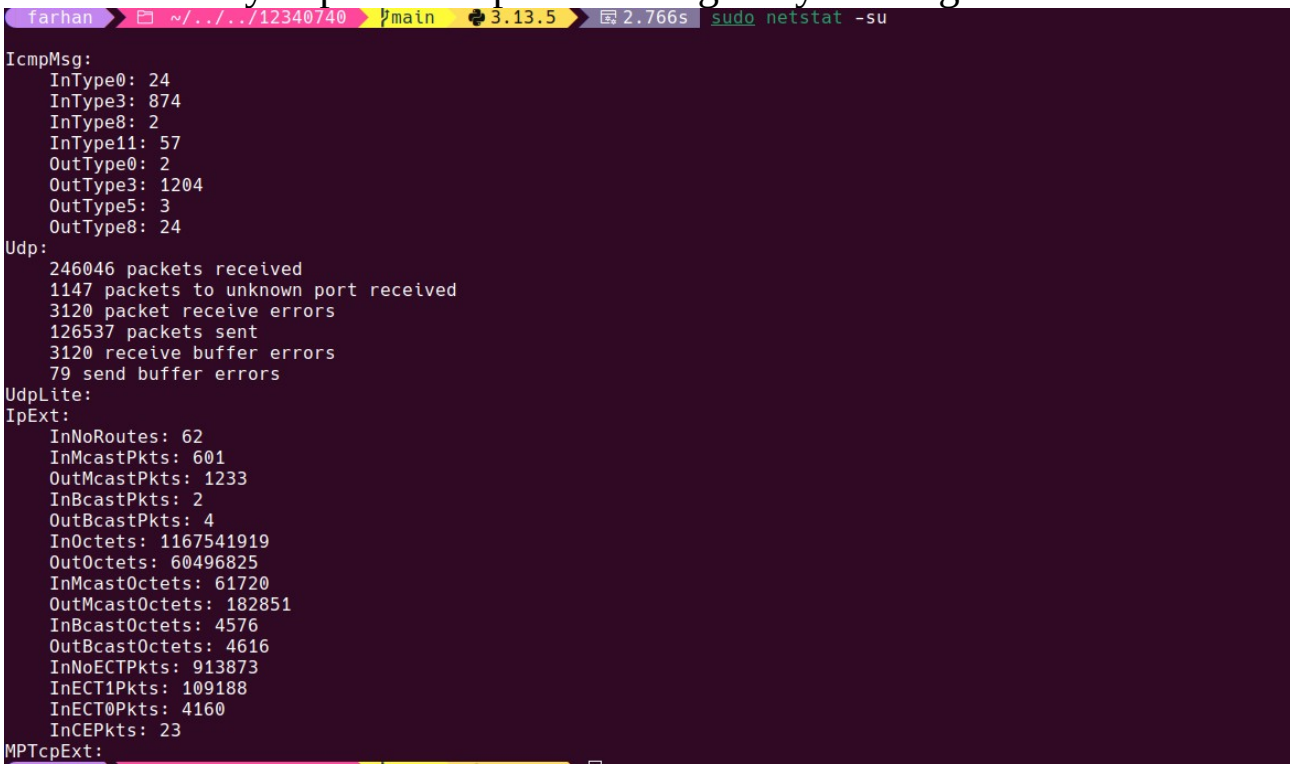
```
farhan  ~  ifconfig -s
Iface      MTU    RX-OK RX-ERR RX-DRP RX-OVR    TX-OK TX-ERR TX-DRP TX-OVR Flg
docker0   1500        0      0      0 0             0      0     40      0 BMU
enp0s31f6 1500        0      0      0 0             0      0      0      0 BMU
lo       65536    19172      0      0 0         19172      0      0      0 LRU
virbr0    1500        0      0      0 0             0      0     51      0 BMU
wlp43s0   1500   544925      0      0 0        145738      0     66      0 BMRU
```

Q2)
Ans a) The netstat stands for network statistics .It is used to display network connections, routing tables, interface statistics, and other network-related information on a system. It gives information about active servers and domain sockets.
Ans b) The active ports on my system are as follows:-

```
Place your right thumb on the fingerprint reader
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 127.0.0.1:6463          0.0.0.0:*               LISTEN      6819/exe
tcp        0      0 127.0.0.1:3306          0.0.0.0:*               LISTEN      1590/mysqld
tcp        0      0 127.0.0.1:33060         0.0.0.0:*               LISTEN      1590/mysqld
tcp        0      0 192.168.122.1:53        0.0.0.0:*               LISTEN      1667/dnsmasq
tcp        0      0 127.0.0.54:53           0.0.0.0:*               LISTEN      854/systemd-resolve
tcp        0      0 127.0.0.1:631           0.0.0.0:*               LISTEN      1491/cupsd
tcp        0      0 127.0.0.53:53           0.0.0.0:*               LISTEN      854/systemd-resolve
tcp        0      0 127.0.0.1:5432          0.0.0.0:*               LISTEN      1569/postgres
tcp        0      0 10.10.213.100:47210     35.186.224.39:443       ESTABLISHED 6758/exe
tcp        0      0 10.10.213.100:48762     57.144.125.32:5222      ESTABLISHED 4653/brave --type=u
tcp        0      0 10.10.213.100:58974     35.186.224.35:443       ESTABLISHED 4653/brave --type=u
tcp        0      0 10.10.213.100:37992     162.159.136.234:443     ESTABLISHED 6758/exe
tcp6       0      0 :::1716                 :::*                    LISTEN      3134/kdeconnectd
tcp6       0      0 ::1:631                 :::*                    LISTEN      1491/cupsd
udp        0      0 0.0.0.0:43193           0.0.0.0:*                           936/avahi-daemon: r
udp        0      0 192.168.122.1:53        0.0.0.0:*                           1667/dnsmasq
udp        0      0 127.0.0.54:53           0.0.0.0:*                           854/systemd-resolve
udp        0      0 127.0.0.53:53           0.0.0.0:*                           854/systemd-resolve
udp        0      0 0.0.0.0:67              0.0.0.0:*                           1667/dnsmasq
udp        0      0 10.10.213.100:68        10.200.10.250:67        ESTABLISHED 1193/NetworkManager
udp        0      0 224.0.0.251:5353        0.0.0.0:*                           4574/brave
udp        0      0 0.0.0.0:5353            0.0.0.0:*                           936/avahi-daemon: r
udp        0      0 10.10.213.100:46777     142.250.192.106:443     ESTABLISHED 4653/brave --type=u
udp6       0      0 :::49818                :::*                                936/avahi-daemon: r
udp6       0      0 :::5353                 :::*                                936/avahi-daemon: r
udp6       0      0 :::1716                 :::*                                3134/kdeconnectd
```

The port for my browser(brave) is 5353 and pid is 4574. Only tcp udp ports are found in my pc.

Ans c) The command for it is netstat -su where s is for the statistics and u limits it to only udp. The output which I got  by running it was  follows:-




Q3)

Ans a) Ping is a network utility command used to test the rechablity of a host of an IP network by sending ICMP echo request packets and measuring time taken to receive those replies.

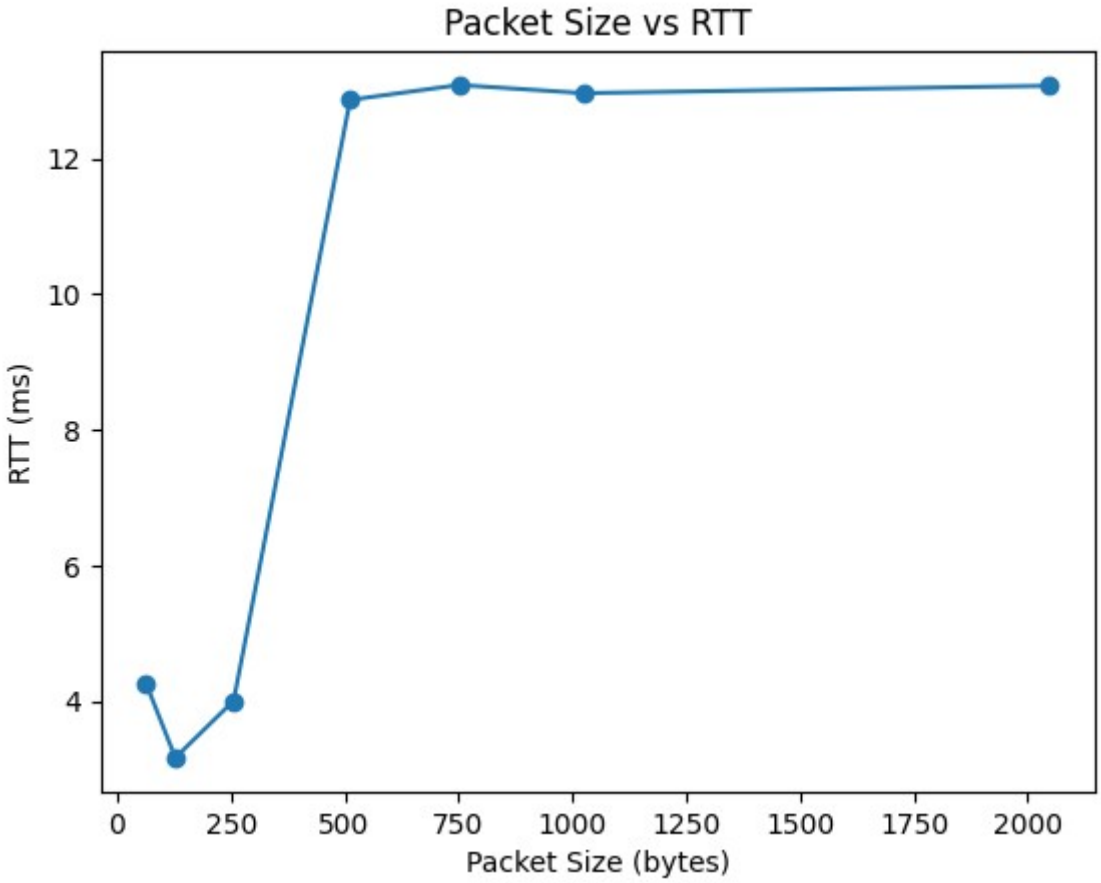
Ans b)

| Site | ip | distance | RTT | Time |
|---|---|---|---|---|
| reddit.com | 151.101.1.140 | 15470 | 18.32 | 07:07:00 PM |
| openai.com | 104.18.33.45 | 15470 | 7.405 | 07:18:00 PM |
| lenovo.com | 104.69.42.39 | 3299 | 243.699 | 07:20:00 PM |
| reddit.com | 151.101.1.140 | 15470 | 18.54 | 01:18:00 AM |
| openai.com | 104.18.33.45 | 15470 | 7.388 | 01:18:00 AM |
| lenovo.com | 104.69.42.39 | 3299 | 268.065 | 01:18:00 AM |
| reddit.com | 151.101.1.140 | 15470 | 18.571 | 10:38:00 AM |
| openai.com | 104.18.33.45 | 15470 | 7.93 | 10:41:00 AM |
| lenovo.com | 104.69.42.39 | 3299 | 241.915 | 10:43:00 AM |
| reddit.com | 151.101.1.140 | 15470 | 19.85 | 07:08:00 PM |
| openai.com | 104.18.33.45 | 15470 | 7.343 | 07:09:00 PM |
| lenovo.com | 104.69.42.39 | 3299 | 250.783 | 07:09:00 PM |

We can see that for companies like reddit and open ai the rtt is quite stable irrespective of time  because of global cdn and lenovo.com has a change of 18-20 ms wrt time we can see that in afternoon the time increases due to more traffic compared to night time.

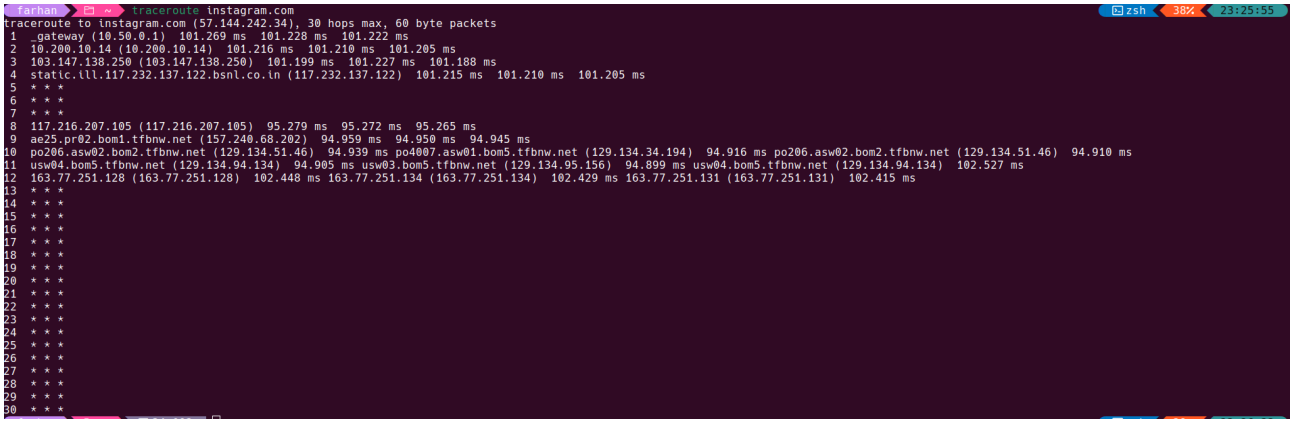
Ans c) The site used was 8.8.8.8 (google) the data recorded was as follows:-

ip package size RTT Time
8.8.8.8 64 4.254 06:11:00 PM
8.8.8.8 128 3.161 06:11:00 PM
8.8.8.8 256 4 06:11:00 PM
8.8.8.8 512 12.865 06:11:00 PM
8.8.8.8 751 13.085 06:11:00 PM
8.8.8.8 1024 12.964 06:11:00 PM
8.8.8.8 1300 13.073 06:11:00 PM




Ans d) From our observations we get that as we increase packet size rtt increase and during the afternoon hours the rtt increase where rtt is low during midnight.

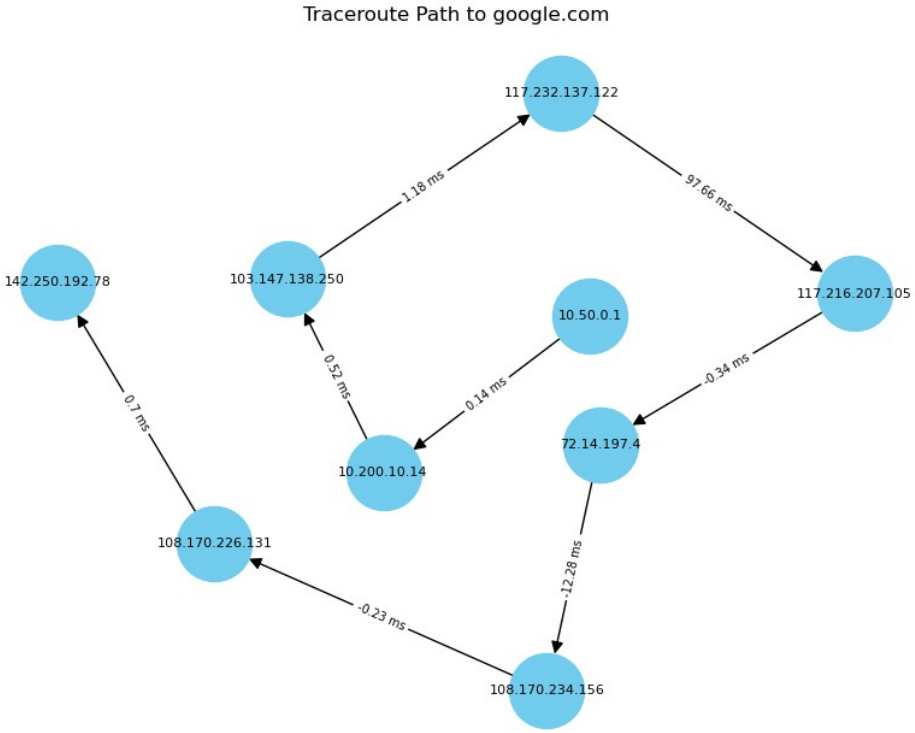
Q4)
Ans a)Traceroute provides data about how a packet travels from source to destination .It lists each intermediate device between the source and destination , it also displays transit delays of packets across these devices.It also provides various other things like time to live ,round trip time,hostname .
Ans b) Many times traceroute shows * * * as the output for some of the devices for ex as shown below: -



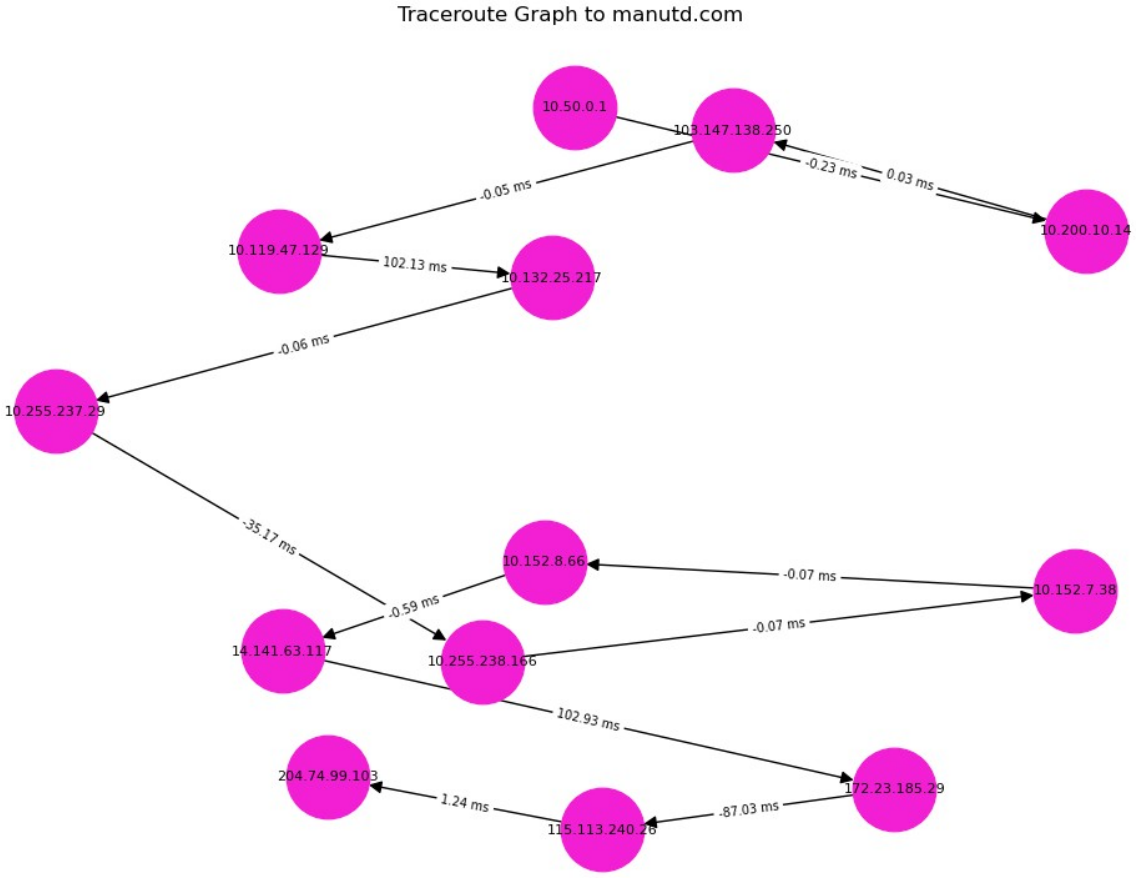

This sometimes depicts that the network is down but thats not the case generally this done deliberately by the provider with the reasons being as follows:-
1)Many routers are configured to not send ICMP responses for security or load reasons.It helps in avoiding ddos attacks and reduces cpu usage .
2)Many enterprise firewalls treat traceroute packets (Ucp,tcp etc based) as suspicious and drop them.
3)Routers prioritize forwarding over tasks like sending ICMP responses .Thus resulting in the asteriks.

Ans c)Yes it is possible to find the route to specific hosts which fail to respond to the ping experiment.
The reason being that the ping only tests reachability of the end host I.e the destination whereas the traceroute provides info about the path being followed to reach the end host so if there is a case whereas the traceroute gives information about each router / device in between the client and the end host so if only the end host is not reachable by the ping I.e it blocks the icmp echo then we would be able to idnetify path using traceroute another scenariow would be if ICMP time limit is exceeded (ping fails in this case ) then also trace route would work.

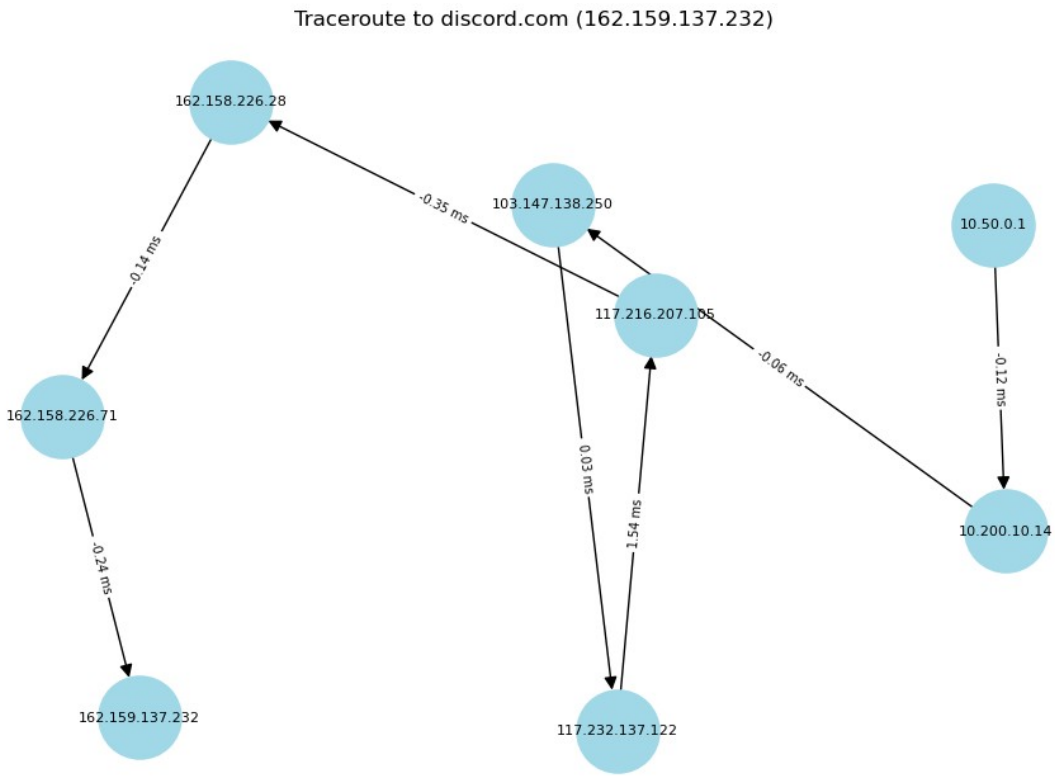
Ans d) 1)google.com




b)manutd.com




c)discord.com




Q5)

Ans a)Nmap is a network scanner used to discover hosts services provided by them their activity status on a network . This is done by sending packets and analising the responses.

Ans b) The open ports of iitbhilai.ac.in are as follows:-

```
farhan ~ 44.431s nmap -sV iitbhilai.ac.in
Starting Nmap 7.94SVN ( https://nmap.org ) at 2026-01-10 12:20 IST
Nmap scan report for iitbhilai.ac.in (192.168.10.115)
Host is up (0.021s latency).
Not shown: 996 closed tcp ports (conn-refused)
PORT     STATE SERVICE    VERSION
22/tcp   open  ssh        OpenSSH 7.4 (protocol 2.0)
80/tcp   open  http       Apache httpd 2.4.6 ((CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16)
443/tcp  open  ssl/http   Apache httpd 2.4.6 ((CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16)
5666/tcp open  tcpwrapped

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 12.93 seconds
```

The open ports are as follows:-

PORT SERVICE VERSION

22/tcp ssh OpenSSH 7.4 (protocol 2.0)

80/tcp http Apache httpd 2.4.6

443/tcp ssl/http Apache httpd 2.4.6

5666/tcp open tcpwrapped

Ther services are as follows:-

1) ssh- SSH stands for secure shell protocol which as the name suggests is a security protocol for operating network services over an unsecured

network. It is generally used to access a device remotely and execute commands in its terminal.22/tcp  provides ssh service.

2)http-HTTP stands for hypertext transfer protocol which is an application layer protocol and is used to request and deliver web content over the Internet.88/tcp provides this service.

3)https-HTTPS stands for HyperText Transfer Protocol Secure .It is the same as HTTP but provides security /encryption over the http protocol.443/tcp follows this.

4)nrpe-NRPE stands for nagois remote plugin executor .It offers remote alerting and monitoring of system and alerts when things go wrong and again when they are resolved.

Ans c) The os of iitbhilai.ac.in could be found using the following command:-  sudo nmap -O iitbhilai.ac.in
The output is as follows:-


although the output says no exact os matches found we do have something in the output P=x86_64-pc-linux-gnu from which we can conclude that the os is linux.
Ans d) 1)lenovo.com
  a)services and version

```
Starting Nmap 7.94SVN ( https://nmap.org ) at 2026-01-10 12:46 IST
Nmap scan report for lenovo.com (23.47.239.18)
Host is up (0.036s latency).
rDNS record for 23.47.239.18: a23-47-239-18.deploy.static.akamaitechnologies.com
Not shown: 998 filtered tcp ports (no-response)
PORT    STATE SERVICE
80/tcp  open  http
443/tcp open  https
Warning: OSScan results may be unreliable because we could not find at least 1 open and 1 closed port
Device type: general purpose
Running (JUST GUESSING): OpenBSD 4.X (86%)
OS CPE: cpe:/o:openbsd:openbsd:4.0
Aggressive OS guesses: OpenBSD 4.0 (86%)
No exact OS matches for host (test conditions non-ideal).

OS detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 14.88 seconds
```

b) Operating system

```
Starting Nmap 7.94SVN ( https://nmap.org ) at 2026-01-10 23:20 IST
Nmap scan report for lenovo.com (23.47.239.18)
Host is up (0.095s latency).
rDNS record for 23.47.239.18: a23-47-239-18.deploy.static.akamaitechnologies.com
Not shown: 998 filtered tcp ports (no-response)
PORT    STATE SERVICE
80/tcp  open  http
443/tcp open  https
Warning: OSScan results may be unreliable because we could not find at least 1 open and 1 closed port
OS fingerprint not ideal because: Missing a closed TCP port so results incomplete
No OS matches for host

OS detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 12.69 seconds
```

2) openai.com

a) services and version

```
farhan ~ 27.741s nmap -sV openai.com
Starting Nmap 7.94SVN ( https://nmap.org ) at 2026-01-10 12:39 IST
Nmap scan report for openai.com (104.18.33.45)
Host is up (0.064s latency).
Other addresses for openai.com (not scanned): 172.64.154.211
Not shown: 996 filtered tcp ports (no-response)
PORT     STATE SERVICE  VERSION
80/tcp   open  http     Cloudflare http proxy
443/tcp  open  ssl/http Cloudflare http proxy
8080/tcp open  http     Cloudflare http proxy
8443/tcp open  ssl/http Cloudflare http proxy

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 25.93 seconds
```

b)Operating system

```
[sudo] password for farhan:
Starting Nmap 7.94SVN ( https://nmap.org ) at 2026-01-10 12:42 IST
Nmap scan report for openai.com (104.18.33.45)
Host is up (0.053s latency).
Other addresses for openai.com (not scanned): 172.64.154.211
Not shown: 996 filtered tcp ports (no-response)
PORT     STATE SERVICE
80/tcp   open  http
443/tcp  open  https
8080/tcp open  http-proxy
8443/tcp open  https-alt
Warning: OSScan results may be unreliable because we could not find at least 1 open and 1 closed port
OS fingerprint not ideal because: Missing a closed TCP port so results incomplete
No OS matches for host

OS detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 17.48 seconds
```