<u>**Practical Number 1**</u>

Objective: Familiarization of Network Environment. Understanding and using Network Utilities.

1. Ipconfig:

Definition:

Displays the basic IP address configuration of a computer's network interfaces. It is mainly used to view the current TCP/IP network settings.

Syntax: ipconfig (windows)

Ifconfig (linux)

Output:

```
C:\WINDOWS\system32\cmd.  ×     +   ∨

D:\PRIYANSHU>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 4:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::1612:3f71:f619:bbd1%2
   IPv4 Address. . . . . . . . . . . : 192.168.137.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : hgu_lan
   IPv6 Address. . . . . . . . . . . : 2001:4490:48dd:3857:c618:cf0e:1329:3da4
   Temporary IPv6 Address. . . . . . : 2001:4490:48dd:3857:89c3:bfe5:f735:a465
   Link-local IPv6 Address . . . . . : fe80::627:f0c3:e7d0:63b9%14
   IPv4 Address. . . . . . . . . . . : 192.168.1.40
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::bab7:dbff:fe9d:3a14%14
                                       192.168.1.1

D:\PRIYANSHU>
```

2. ipconfig /all

Definition:

Displays detailed information about all network adapters, including MAC address, DHCP status, DNS servers, and more. It provides a complete network configuration overview.

Syntax: ipconfig /all (windows)

        Ifconfig /all (linux)

Output:

3. a) ping

Definition:

Sends ICMP Echo Requests to a specific IP address or hostname to check network connectivity and measure response time. Useful for diagnosing internet or network issues.

Syntax: ping [IP address or domain]

       ping google.com

Output:

```
D:\PRIYANSHU>ping google.com

Pinging google.com [2404:6800:4007:80f::200e] with 32 bytes of data:
Reply from 2404:6800:4007:80f::200e: time=81ms
Reply from 2404:6800:4007:80f::200e: time=88ms
Reply from 2404:6800:4007:80f::200e: time=97ms
Reply from 2404:6800:4007:80f::200e: time=55ms

Ping statistics for 2404:6800:4007:80f::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 55ms, Maximum = 97ms, Average = 80ms

D:\PRIYANSHU>
```

b) Loopback (ping 127.0.0.1)

Definition:

Sends ping requests to the local machine using the loopback address (127.0.0.1). It helps verify that the TCP/IP stack is installed and working properly.

Syntax: ping 127.0.0.1

Output:

```
D:\PRIYANSHU>ping 127.0.0.1

Pinging 127.0.0.1 with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 127.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

D:\PRIYANSHU>
```

4. tracert

Definition:

Traces the route taken by packets to reach a destination by listing all intermediate routers. Useful for finding where network delays or failures occur.

Syntax: tracert [domain or IP address]

tracert google.com

Output:

```
D:\PRIYANSHU>tracert 127.0.0.1

Tracing route to platform.wondershare.com [127.0.0.1]
over a maximum of 30 hops:

  1    <1 ms     <1 ms     <1 ms  platform.wondershare.com [127.0.0.1]

Trace complete.

D:\PRIYANSHU>
```

5. nslookup

Definition:

Queries DNS to find the IP address corresponding to a domain name or vice versa. Helps

troubleshoot DNS-related issues.

Syntax: nslookup [domain]

nslookup google.com

Output:

```
D:\PRIYANSHU>nslookup google.com
Server:   UnKnown
Address:   2001:4490:3ffe:13::44

Non-authoritative answer:
Name:     google.com
Addresses:  2404:6800:4007:80f::200e
          142.250.76.78



D:\PRIYANSHU>
```

6. a) netstat -a

Definition:

Displays all active TCP and UDP connections and the ports on which the computer is listening. It helps monitor network activity.

Syntax: netstat -a

Output:

```
D:\PRIYANSHU>netstat -a

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:445            LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:1521           LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:2869           LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:3306           LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:5040           LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:7250           LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:8080           LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:9095           LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:33060          LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:49664          LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:49665          LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:49666          LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:49667          LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:49668          LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:49685          LAPTOP-5QH7NCPF:0       LISTENING
  TCP    0.0.0.0:49814          LAPTOP-5QH7NCPF:0       LISTENING
  TCP    127.0.0.1:5354         LAPTOP-5QH7NCPF:0       LISTENING
  TCP    127.0.0.1:9093         LAPTOP-5QH7NCPF:0       LISTENING
  TCP    127.0.0.1:17400        LAPTOP-5QH7NCPF:0       LISTENING
  TCP    127.0.0.1:49671        platform:49672         ESTABLISHED
  TCP    127.0.0.1:49672        platform:49671         ESTABLISHED
  TCP    127.0.0.1:49673        platform:49674         ESTABLISHED
  TCP    127.0.0.1:49674        platform:49673         ESTABLISHED
  TCP    127.0.0.1:49681        LAPTOP-5QH7NCPF:0       LISTENING
  TCP    192.168.1.40:139       LAPTOP-5QH7NCPF:0       LISTENING
```

b) netstat -n

Definition:

Similar to netstat -a, but shows addresses and port numbers in numeric form, avoiding DNS name resolution for faster output.

Syntax: netstat -n

Output:

```
D:\PRIYANSHU>netstat -n

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:49671        127.0.0.1:49672        ESTABLISHED
  TCP    127.0.0.1:49672        127.0.0.1:49671        ESTABLISHED
  TCP    127.0.0.1:49673        127.0.0.1:49674        ESTABLISHED
  TCP    127.0.0.1:49674        127.0.0.1:49673        ESTABLISHED
  TCP    192.168.1.40:49932     117.239.91.111:443     CLOSE_WAIT
  TCP    192.168.1.40:49933     117.239.91.111:443     CLOSE_WAIT
  TCP    192.168.1.40:49934     117.239.91.111:443     CLOSE_WAIT
  TCP    192.168.1.40:49935     117.239.91.111:443     CLOSE_WAIT
  TCP    192.168.1.40:49936     117.239.91.111:443     CLOSE_WAIT
  TCP    192.168.1.40:50294     140.82.112.26:443      ESTABLISHED
  TCP    192.168.1.40:50381     52.187.79.109:443      ESTABLISHED
  TCP    192.168.1.40:50403     23.34.253.157:443      CLOSE_WAIT
  TCP    192.168.1.40:50450     51.132.193.105:443     ESTABLISHED
  TCP    192.168.1.40:50459     13.89.179.9:443        ESTABLISHED
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:49700  [2603:1040:a06:6::1]:443  ESTABLISHED
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:49874  [2404:6800:4003:c00::bc]:5228  ESTABLISHED
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50340  [2600:140f:5200::75ef:5b5c]:443  CLOSE_WAIT
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50354  [2620:1ec:bdf::254]:443  CLOSE_WAIT
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50397  [2603:1046:900:68::2]:443  ESTABLISHED
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50398  [2603:1046:900:68::2]:443  ESTABLISHED
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50401  [2600:1417:75:cbb::3114]:443  CLOSE_WAIT
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50402  [2600:1417:75:cbb::3114]:443  CLOSE_WAIT
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50436  [2603:1046:c04:141f::2]:443  ESTABLISHED
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50444  [2603:1046:c04:839::2]:443  ESTABLISHED
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50445  [2603:1046:c04:839::2]:443  ESTABLISHED
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50446  [2603:1046:c04:839::2]:443  ESTABLISHED
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50447  [2603:1046:c04:839::2]:443  ESTABLISHED
  TCP    [2001:4490:48dd:3857:89c3:bfe5:f735:a465]:50458  [2620:1ec:33::11]:443  ESTABLISHED
  TCP    [fe80::1612:3f71:f619:bbd1%2]:1521  [fe80::1612:3f71:f619:bbd1%2]:49808  ESTABLISHED
  TCP    [fe80::1612:3f71:f619:bbd1%2]:49808  [fe80::1612:3f71:f619:bbd1%2]:1521  ESTABLISHED

D:\PRIYANSHU>
```

7. arp (address resolution protocol)

Definition:

Displays and modifies the Address Resolution Protocol (ARP) cache, which maps IP addresses to MAC addresses on the local network.

Syntax: arp -a

Output:

```
D:\PRIYANSHU>arp -a

Interface: 192.168.137.1 --- 0x2
  Internet Address      Physical Address      Type
  192.168.137.255       ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

Interface: 192.168.1.40 --- 0xe
  Internet Address      Physical Address      Type
  192.168.1.1           b8-b7-db-9d-3a-14     dynamic
  192.168.1.255         ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

D:\PRIYANSHU>
```

8. telnet

Definition:

Establishes a command-line connection to a remote device over a specified port. Mainly used for testing remote services like mail or web servers.

Syntax: telnet [hostname or IP] [port]

telnet google.com 80

9. tasklist

Definition:

Lists all currently running processes and applications on the system. Helps in monitoring and managing system resource usage.

Syntax: tasklist

Output:

```
D:\PRIYANSHU>tasklist

Image Name                     PID Session Name        Session#    Mem Usage
========================= ======== ================ =========== ============
System Idle Process              0 Services                   0          8 K
System                           4 Services                   0        148 K
Registry                       148 Services                   0     57,376 K
smss.exe                       544 Services                   0      1,272 K
csrss.exe                      808 Services                   0      6,564 K
wininit.exe                    916 Services                   0      7,940 K
csrss.exe                      924 Console                    1      7,180 K
services.exe                   992 Services                   0     16,976 K
lsass.exe                     1016 Services                   0     30,252 K
winlogon.exe                   788 Console                    1     12,460 K
svchost.exe                   1112 Services                   0     35,284 K
fontdrvhost.exe               1164 Services                   0      4,124 K
fontdrvhost.exe               1172 Console                    1      6,968 K
svchost.exe                   1236 Services                   0     18,096 K
svchost.exe                   1300 Services                   0     11,776 K
svchost.exe                   1388 Services                   0     12,292 K
svchost.exe                   1412 Services                   0     11,156 K
svchost.exe                   1444 Services                   0     11,080 K
svchost.exe                   1520 Services                   0     11,124 K
svchost.exe                   1592 Services                   0     18,500 K
dwm.exe                       1704 Console                    1  3,25,684 K
svchost.exe                   1864 Services                   0     19,124 K
svchost.exe                   1936 Services                   0     12,296 K
svchost.exe                   2020 Services                   0     13,244 K
svchost.exe                   2036 Services                   0     10,512 K
svchost.exe                   1440 Services                   0     11,844 K
svchost.exe                   2152 Services                   0      7,492 K
svchost.exe                   2252 Services                   0      8,012 K
ARWSRVC.EXE                   2348 Services                   0     24,608 K
SCSECSVC.EXE                  2360 Services                   0     14,720 K
NVDisplay.Container.exe       2464 Services                   0     47,044 K
svchost.exe                   2484 Services                   0     20,856 K
svchost.exe                   2516 Services                   0     23,972 K
BSSISS.EXE                    2532 Services                   0      6,288 K
svchost.exe                   2548 Services                   0      7,068 K
svchost.exe                   2556 Services                   0      9,120 K
svchost.exe                   2656 Services                   0      9,008 K
```

10. help

Definition:

Prints list of available commands or displays detailed information about a specific command and its usage.

Syntax: help

> **help [command]**

Output:

```
D:\PRIYANSHU>help
For more information on a specific command, type HELP command-name
ASSOC          Displays or modifies file extension associations.
ATTRIB         Displays or changes file attributes.
BREAK          Sets or clears extended CTRL+C checking.
BCDEDIT        Sets properties in boot database to control boot loading.
CACLS          Displays or modifies access control lists (ACLs) of files.
CALL           Calls one batch program from another.
CD             Displays the name of or changes the current directory.
CHCP           Displays or sets the active code page number.
CHDIR          Displays the name of or changes the current directory.
CHKDSK         Checks a disk and displays a status report.
CHKNTFS        Displays or modifies the checking of disk at boot time.
CLS            Clears the screen.
CMD            Starts a new instance of the Windows command interpreter.
COLOR          Sets the default console foreground and background colors.
COMP           Compares the contents of two files or sets of files.
COMPACT        Displays or alters the compression of files on NTFS partitions.
CONVERT        Converts FAT volumes to NTFS.  You cannot convert the
               current drive.
COPY           Copies one or more files to another location.
DATE           Displays or sets the date.
DEL            Deletes one or more files.
DIR            Displays a list of files and subdirectories in a directory.
DISKPART       Displays or configures Disk Partition properties.
DOSKEY         Edits command lines, recalls Windows commands, and
               creates macros.
DRIVERQUERY    Displays current device driver status and properties.
ECHO           Displays messages, or turns command echoing on or off.
ENDLOCAL       Ends localization of environment changes in a batch file.
ERASE          Deletes one or more files.
EXIT           Quits the CMD.EXE program (command interpreter).
FC             Compares two files or sets of files, and displays the
               differences between them.
FIND           Searches for a text string in a file or files.
FINDSTR        Searches for strings in files.
FOR            Runs a specified command for each file in a set of files.
FORMAT         Formats a disk for use with Windows.
FSUTIL         Displays or configures the file system properties.
FTYPE          Displays or modifies file types used in file extension
               associations.
```