Part-1:

1. What is the difference between TCP and UDP?

TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) are both transport protocols used for communication for computers to talk to each other over a network, but they work in different ways. TCP is connection oriented protocol that makes sure that all the data sent gets to the other computer, prior to this connection must be established before data is transferred, while UDP connectionless protocol, just sends the data without checking connection, if it got there or not.

2. What is the difference between a hub, switch and a router?

A hub, switch, and router are all devices that help computers talk to each other over a network. Hub is a device that connects multiple devices together and passes data between them. Switch is similar to a hub, but it uses more advanced technology to make it in terms of network performance and security. Router connects different networks together and routes data between them.

3. What is a layer 3 switch?

A layer 3 switch is a special type of switch that can do more advanced tasks like routing/switching which is directing data on a network and as well. It operates at the network layer (layer 3) of the OSI model.

4. What is the difference between ip4 and ipv6?

IPv4 (Internet Protocol version 4) and IPv6 (Internet Protocol version 6) are both versions of the Internet Protocol used to identify devices on a network. IPv4 uses 32-bit addresses, while IPv6 uses 128-bit addresses. An additional feature IPv6 is improved security for more devices.

5. What is the purpose of subnet mask in ipv4?

A subnet mask in IPv4 is used to divide a network into smaller subnetworks. It tells which parts of an IP address are for the network and which are for the device.

Ex: 10.118.215.1/24

24 = 255.255.255.0 // subnet mask

6. What is the prefix in ipv4 addressing? Explain with examples?

In IPv4 addressing, the prefix refers to the number of bits used for the network portion of the IP address. For example, a prefix of /24 indicates the first 24 bits of the IP address are used for the network portion, and the remaining 8 bits are used for the host portion.

Ex: IP: 10.18.24.53

10.18.24 // refers to network portion

53 // refers to host portion

7. What is the purpose of default gateway, DNS, and DHCP?

Default gateway is a device that connects a local network to a larger network like internet. DNS stands for Domain Name System is used to translate domain names into IP addresses ex: google.com is the DNS name and its IP address is 8.8.8.8 which is primary DNS. DHCP stands for Dynamic Host Configuration Protocol, its job is to automatically assign IP addresses to devices on a network.

8. What is a MAC address and a port address?

MAC stands for Media access control, an address also called as Physical Address that is a unique number assigned to each device on a network. Meanwhile port address is a number used to identify a specific process or service on a device.

9. What is the difference between LAN and WAN?

LAN Stands for Local Area Network, which is a network that connects devices in a small space area, such as a home or office. WAN stands for Wide Area Network, which is a network that connects devices over a larger space area, such as a city or country.

10. What are some typical LAN topologies?

Some typical LAN topologies include bus, star, ring and mesh.

11. What is a loopback address?

The loopback address is a special IP address - 127.0.0.1 , used to refer to the localhost, this allows a device to communicate with itself and test its network configurations.

12. What is the purpose of icmp and arp protocol?

ICMP stands for Internet Control Message Protocol that is used to send error messages and information about network status and conditions. ARP stands for Address resolution protocol which is used to map a network address (like an IP address) to a physical (MAC) address on a local network.

Part-2:

pwd: Stands for present working directory. The command will let us know which directory we are working in with path starting from /root.

Ls: This command lists the items present in the folder. It doesn't show hidden items

mkdir: Stands for makedirectory. This command creates directory/folder following with the name provided

cd: Stands for change directory. Uses to move into desired directory/folder

netstat: Stands for network statistics. Commands gives us the information of incoming, outgoing connections traffic, network status and usage statistics. To summarize, this command acts as monitoring tool to know the basic information of networks.

ifcongif: Stands for interface configuration. Primarily used to display all the addresses that are assigned to interface of a system. Shows packets drops if any with internet linked to. We also use the command to assign IP address to interfaces, configure interface parameters manually.

Citation: https://www.geeksforgeeks.org/ifconfig-command-in-linux-with-examples/

https://docs.oracle.com/cd/E19253-01/816-4554/ipconfig-141/index.html

route: Command used to access kernel IP routing table to view IP address and manipulate if needed.

hostname: Command is used to get to the name of device/system. In simple words, it is a nick name of the system which is connected to computer network.

ping: ping is the command that is used to know if the internet is working, if machine is connected to network. We can use it with domain name, ipaddress. Outputs the packets continuously if the machine is connected to network like in screenshot below. 127.0.0.1 is the loopback address used in the command which test the machine itself and its network configurations.

```
Loading...

Welcome to JS/Linux (i586)

Use 'vflogin username' to connect to your account.
You can create a new account at https://vfsync.org/signup .
Use 'export_file filename' to export a file to your computer.
Imported files are written to the home directory.

localhost:~# pwd
/root
localhost:~# ls
bench.py    hello.c     hello.js    readme.txt
localhost:~# mkdir test
localhost:~# cd test
localhost:~/test# netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         10.5.0.1        0.0.0.0         UG        0 0          0 eth0
10.5.0.0        *               255.255.0.0     U         0 0          0 eth0
localhost:~/test# ifconfig
eth0      Link encap:Ethernet  HWaddr 02:38:64:C6:5D:1A
          inet addr:10.5.28.224  Bcast:10.5.255.255  Mask:255.255.0.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:244 errors:0 dropped:0 overruns:0 frame:0
          TX packets:10 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:22676 (22.1 KiB)  TX bytes:1963 (1.9 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

```
localhost:~/test# route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         10.5.0.1        0.0.0.0         UG    202    0        0 eth0
10.5.0.0        *               255.255.0.0     U     202    0        0 eth0
localhost:~/test# hostname
localhost
localhost:~/test# ping 127.0.0.1
PING 127.0.0.1 (127.0.0.1): 56 data bytes
64 bytes from 127.0.0.1: seq=0 ttl=64 time=0.600 ms
64 bytes from 127.0.0.1: seq=1 ttl=64 time=0.800 ms
64 bytes from 127.0.0.1: seq=2 ttl=64 time=0.000 ms
64 bytes from 127.0.0.1: seq=3 ttl=64 time=0.800 ms
64 bytes from 127.0.0.1: seq=4 ttl=64 time=0.900 ms
64 bytes from 127.0.0.1: seq=5 ttl=64 time=0.900 ms
64 bytes from 127.0.0.1: seq=6 ttl=64 time=0.800 ms
64 bytes from 127.0.0.1: seq=7 ttl=64 time=0.800 ms
^[64 bytes from 127.0.0.1: seq=8 ttl=64 time=0.900 ms
64 bytes from 127.0.0.1: seq=9 ttl=64 time=0.800 ms
64 bytes from 127.0.0.1: seq=10 ttl=64 time=0.000 ms
64 bytes from 127.0.0.1: seq=11 ttl=64 time=0.800 ms
^C
--- 127.0.0.1 ping statistics ---
12 packets transmitted, 12 packets received, 0% packet loss
round-trip min/avg/max = 0.000/0.675/0.900 ms
localhost:~/test#
```