a. Connectivity check commands?
   Ipconfig, tracert, ping
b. What is RAID (Redundant Array of Independent Disks)

It combines multiple physical hard drives into a single logical unit for data storage. It is done for redundancy, Fault tolerance, and performance improvement. It protects the data from hardware failure but not from Ransome or hack of the data.

RAID 0: striping (making blocks) Data is split and stored across two or more disks in multiple logical drives or maybe in single logical drives. Data not duplicated and speed much faster Minimum drive required 1

RAID 1: Mirroring data is duplicated on two or more disks. Minimum disk 2 if one drive fails still another working (high redundancy or fault tolerance) storage capacity is half of the mirror disk. If we have 1TB, 2TB, 3TB then storage capacity would be 1TB.

RAID 5 : data is stripped across multiple disk along with parity. Minimum disk required 3. Slower due to write parity data, data can be recovered from the parity if one drive fails. Storage Capacity = (Number of Disks -1)x Size of the Smallest Disk

RAID 6: Similar to RAID 5 but double parity, minimum disk 4, it survives the failure of two disk

RAID 10: RAID 1 (mirroring) and RAID 0 (stripping), minimum disk 4, Creates multiple mirror pairs, and then stripes data across those pairs. It can survive the failure of one disk. It requires the even number of the disk to create mirroring and storage capacity is half of the total storage of the disks

c. Explain the role of Windows Server:
   Its operating system used to manage enterprise-level IT task like user authentication (via Active directory), web hosting (IIS), and file sharing etc. It provides the tools for networking, security, and cloud integration.
d. What is a firewall?
   It's security system that controls and monitors the incoming and outgoing network traffic based on predefined security rule. Or it's barrier between a trusted internal network and untrusted external network to protect devices and data from unauthorized access, malware, and cyberattacks. Firewall can be hardware, software or a combination of both. SonicWall router, Windows Defender Firewall, Barracuda Networks Firewall (both)
e. What is TCP/IP

Transmission Control Protocol/Internet Protocol, it allows devices to communicate with each other over a network. It ensures reliable data delivery. It breaks the data into packets, sends them, and reassembles them at the destination. While IP handles the routing and addressing.

f. **What is DNS explain in detail?**

It's Domain Name System, it translates human-friendly domain name like google.com into IP address like 8.8.8.8 that computers use to identify each other on a network

How it works

When we type a website in the browser, and if the browser/OS cannot find the IP address in its cached memory, it sends the query to the next level, called the DNS resolver server (which is typically provided by our ISP). When the resolver receives the query, it checks its own cache for the IP address of the website. If it can't find the IP address, it forwards the query to the next level, which is the root server. The root server doesn't know the IP address but knows where to direct the query, so it sends it to the TLD (Top-Level Domain) server (for example, .com or .org). The resolver then queries the TLD server for the IP address of the website. While the TLD server doesn't have the exact IP address either, it knows where to find it and directs the query to the authoritative name server. Finally, the resolver asks the authoritative name server for the IP address of the specific website. The authoritative name server responds with the IP address, and the resolver passes this information to the computer, which can then retrieve the website.

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Recursive query happens between client and the DNS resolution whereas the iterative query happens between the DNS resolution and other DNS servers (root, TLD, and Authoritative)

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Root server these are the top or the root of the DNS hierarchy, there are 13 sets of these root servers strategically placed around the world and operated by 12 different organizations and each set of root servers has their own unique iP address

*When we type a website in our browser, computer sends a DNS query to a local DNS server (DNS resolver) to find the corresponding IP address

What is port?

A port is like a specific door or entrance on a computer. The IP address is like a street address and the port number is like the specific apartment or office within a building. E.g. webserver uses port 80 or 443, email server uses 25 etc.

What is safe mode, how do you get to it, and what is it used for?

Hit F8 to go to safe mode when the computer starts rebooting, we go to safe mode.

It's the diagnostic mode, the computer starts with only essential programs and services. We use this mode for troubleshooting issues like software conflict, driver problems, or malware infections. It is used to remove viruses.

What is the default gateway?

It's the IP address of network devices, typically a router, that acts as an access point for sending data from your local network to other networks, such as the internet. It serves as the 'gateway' through which devices communicate outside of their local subnet.

What is Active Directory?

It's the directory service developed by Microsoft. It provides centralized control over user accounts, computers, groups, security policies, and permissions in a windows domain environment. It enables authentication and authorization, and management of users and devices, ensuring secure and efficient network operations.

What is a Domain?

It's a group of computers, devices, and resources in a network that share a common database and security polices, all managed centrally.

Where is the database located in Active Directory?

This is under the file name NTDS.DIT and located in C:\Windows\NTDS\NTDS.dit => this contains all the information about user account, groups, computer accounts, Organizational Units (Ous) and other objects in the AD forest

Other files EDB.log stores the transactions logs of changes to the database. Allows AD to recover from failures.

Windows\SYSVOL => group policy data, scripts, and other public files that need to be replicated across the domain controllers.

What is lingering object:

When an object is deleted from one domain controller but still exists in replication system of another domain controller with same Active Directory environment. This happens when replication between domain controllers is delayed or fails

What are some commonly used LAN cables?

Cat5: speed up to 100 Mbps and bandwidth 100 MHz and distance up to 100 m. Cat5e; improved of Cat5, speed up to 1Gbps and bandwidth 100 MHz and distance 100m. The modification is due to more twist in Cat5e which makes more resistance to the crosstalk. Cat6; speed up to 1 Gbps bandwidth 250 MHz and up to 100 m, can achieved 10 Gbps up to 37m, it has spline to reduce crosstalk. Cat6a; speed up to 10 Gbps for 100m and bandwidth 500 MHz and it has Foil shielding to reduce electromagnetic interference. Cat7 speed up to 10 Gbps and bandwidth 600 MHz and distance up to 100m. Cat7a; 10 Gbps up to 100m and bandwidth 1000 MHz and 40 Gbps up to distance 50m and 1000 Gbps up to 15 m. Cat 8 (8.1 or 8.2); speed up to 40 Gbps, bandwidth 2000 MHz up to 30 m.

Twisted Pair Cables:

UTP (Unshielded TP); consists of 4 pairs of color-coded wires twisted around each other. The twisting prevents the electromagnetic interference (crosstalk)

STP (Shielded TP): Like UTP but it has foil shield that covers the wires. The foil shield adds a layer to prevent electromagnetic interference leaking into and out of the cables.

All the wires are connected by the RJ45 connector

Common TP used in LAN:

Straight (patch) cable and Crossover cables

Two standard cables: 568A and 568B

568A: White-Green & Green, White-Orange & Blue, White-Blue & Orange, White-Brown & Brwon

568B: White-Orange & Orange, White-Green & Blue, White-Blue & Green, White-Brown & Brown

These cables are used to connect the dissimilar devices

Crossover Cables: it is used to connect two similar devices, One with A standard and other with B standard connections.

*Full hardware diagnostic.

Check for physical damage, ensure proper connections, advanced: memory diagnostic; search for windows memory diagnostic & restart now and check for the problems, check Distk (CHKDSK); go to the command prompt 'chkdsk /f' to scan and fix disk errors. Check hardware issues in device manager and update the devices

You can run third-party diagnostics tools, run stress tests, check network hardware, test peripherals such as keyboard, mouse, monitor, external devices, performance of firmware and driver updates, check for error logs, run full system reset or reinstallations

What is blue screen of Death (BSOD)?

It's a critical error that appears on windows computers when the OS encounters a fatal system error.

What is DHCP (Dynamic Host Configuration Protocol)?

It is used to automatically allocate IP address & other network parameters (like subnet mask, default gateway, and DNS servers) to all computers or devices connected to a network. There is DORA (Discover, Offer, Request, & Acknowledgement);

Computers connected to the network send the discover message to DHCP server and the server offers available IP addresses and other configuration parameters. Then the computer sends the request message to the DHCP server indicating that the offer is accepted. Then finally the server acknowledges by granting the parameters.

What is DNS?

It translates the domain name into IP address.

What is VPN?

VPN stands for **Virtual Private Network**. If someone wants to work from home, their computer must connect to the office network. To do this, they need to create a virtual private network at home and connect to the company's network through it. This connection ensures that the data transferred is encrypted and secure.

What is group policy?

It's feature that allows administrators to centrally manage and configure the settings of the users and devices in a network, as for example if a user can turn off the computer or not

can be defined in a group policy. Each department will have their own group policy such as HR will have their own group policy and so on.

What is a .PST file?

It is an extension for outlook data files that stores emails, contacts, calendar events and other data locally on a computer making it easier to back up or transfer your outlook data.

What is the difference between switch and hub?

A Hub is a basic networking device that broadcasts data to all connected devices, regardless of destination. It operates in the physical layer of OSI model. Where, a switch is more advanced than hub. It operates in the data link layer and sends data only to the device that needs it, based on the MAC address.