**Session 1: vSphere Networking**

**1. What are the Core Elements of the VMkernel Networking Layer?**

* **VMkernel Adapters (vmk):** Provide network connectivity for ESXi services like vMotion, iSCSI, NFS, and management.
* **Virtual Switches (vSwitch):** Enable communication between VMs and physical network.
* **Port Groups:** Define how VMs or services connect to the virtual switch.
* **NIC Teaming:** Provides redundancy and load balancing.

**2. What is the Difference Between Virtual Switch and Physical Switch?**

* **Virtual Switch:** Operates inside the ESXi host, connecting VMs to each other and to the physical NIC.
* **Physical Switch:** Hardware device that connects physical servers and network devices. **Key Difference:** Virtual switches handle traffic within the hypervisor; physical switches handle traffic between physical devices.

**3. What are the types of Port Groups in ESX/ESXi?**

* **VM Port Group:** Connects virtual machines to the network.
* **VMkernel Port Group:** Used for ESXi services like vMotion, iSCSI, NFS, and management.
* **Service Console Port Group (Legacy):** Used in older ESX versions for management.

**Session 2: vSphere Storage**

**4. What are the benefits of storage virtualization?**

* **Improved resource utilization** by pooling storage.
* **Simplified management** through centralized control.
* **Scalability** for growing workloads.
* **High availability** and disaster recovery options.

**5. Explain the concept of LUN masking in storage virtualization.**

LUN masking restricts access to specific Logical Unit Numbers (LUNs) so only authorized hosts can see and use them, enhancing security and preventing accidental data corruption.

**6. What is thin provisioning in storage virtualization?**

Thin provisioning allocates storage on-demand rather than reserving full capacity upfront, reducing wasted space and improving efficiency.

**7. What is the difference between Fibre Channel and iSCSI?**

* **Fibre Channel:** High-speed network protocol for SAN, uses dedicated hardware.
* **iSCSI:** Uses TCP/IP over Ethernet to transport SCSI commands. **Key Difference:** Fibre Channel is faster and more expensive; iSCSI is cost-effective and uses existing IP networks.

**8. What is data deduplication in storage virtualization?**

Data deduplication eliminates duplicate copies of data, storing only unique blocks and referencing them, reducing storage requirements significantly.

**Session 3: Virtual Machine Management**

**9. Explain the concept of a virtual disk. What are the different virtual disk formats?**

A virtual disk is a file that emulates a physical disk for a VM.  
**Formats:**

* **Thick Provisioned:** Full space allocated upfront.
* **Thin Provisioned:** Space allocated as needed.
* **Sparse:** Similar to thin but optimized for snapshots.

**10. Explain the concept of snapshots in virtual machine management.**

Snapshots capture the state of a VM at a specific point in time, including disk, memory, and settings. Useful for backups and testing but should not be kept long-term due to performance impact.

**11. What is a virtual machine template?**

A template is a master copy of a VM used to create new VMs with predefined configurations, saving time and ensuring consistency.

**12. What is the difference between a virtual machine and a virtual appliance?**

* **Virtual Machine:** A generic VM that runs an OS and applications.
* **Virtual Appliance:** A pre-configured VM with an application and OS optimized for a specific purpose.