**Module -1 Introduction To Cloud Computing**

1- What is cloud computing?

Cloud computing is the delivery of computing services over the internet (“the cloud”) to offer faster innovation, flexible resources, and economies of scale.

2-Describe cloud computing deploy model.

* **1. Public Cloud**

Definition:  
A cloud environment owned and operated by a third-party provider that delivers computing resources (like servers and storage) over the internet.

**2. Private Cloud**

Definition:  
A cloud environment dedicated to a single organization. It can be hosted on-premises or by a third-party provider.

**3. Hybrid Cloud**

Definition:  
A combination of public and private clouds that allows data and applications to move between them.

**3-What are components of cloud computing?**

1. Front-End Components

These are the parts the user interacts with—typically via web browsers or apps.

* User Interface (UI): The graphical interface through which users access cloud services.
* Client Devices: Devices like laptops, smartphones, or desktops that connect to the cloud.

2. Back-End Components

This is the cloud infrastructure that supports and runs the services.

* Servers: Physical or virtual machines that run applications and store data.
* Storage Systems: Cloud storage (e.g., block, file, or object storage) where data is stored.
* Databases: Systems for managing and retrieving structured or unstructured data.
* Virtualization: Technology that allows multiple virtual machines to run on a single physical machine.
* Hypervisors: Software that creates and manages virtual machines (e.g., VMware, Hyper-V, KVM).
* Application Services: The actual applications or software run in the cloud (e.g., databases, messaging services, analytics).
* Service Management: Tools and platforms for managing cloud resources and monitoring performance.
* Security: Includes firewalls, identity access management (IAM), encryption, and compliance tools.

3. Network

The communication link between front-end and back-end.

* Internet/Cloud Network: Enables data transmission between users and cloud infrastructure.
* APIs (Application Programming Interfaces): Interfaces that allow applications and services to interact and integrate with each other.
* Load Balancers: Distribute traffic across servers to optimize performance and reliability.

4. Cloud Service Models (Built on These Components):

* IaaS (Infrastructure as a Service) – Provides basic infrastructure like VMs, storage, and networks.
* PaaS (Platform as a Service) – Provides development tools, database management, and deployment frameworks.
* SaaS (Software as a Service) – Delivers complete applications over the internet (e.g., Google Workspace).

**4-cloud computing advantage and disadvantage Advantages of Cloud Computing**.

* **Advantages of Cloud Computing**

1. Cost Efficiency

* No need to invest in physical hardware or data centers.
* Pay-as-you-go pricing model lowers upfront costs.

2. Scalability

* Easily scale resources up or down based on demand.
* Ideal for businesses with variable workloads.

3. Accessibility

* Access services and data from anywhere with an internet connection.
* Supports remote work and global collaboration.

4. Disaster Recovery & Backup

* Cloud providers offer built-in backup and recovery solutions.
* Reduces downtime and data loss risks.

5. Automatic Updates

* Providers handle software, hardware, and security updates.
* Saves time and reduces maintenance burden.

6. Performance and Speed

* Global data centers and content delivery networks (CDNs) provide fast service delivery.
* Allows quicker deployment of applications and services.

7. Security (when properly managed)

* Top cloud providers invest heavily in security (e.g., encryption, IAM, compliance).
* Advanced monitoring and threat detection tools are available.

8. Environmental Benefits

* Shared resources reduce energy consumption and carbon footprint compared to traditional on-prem systems.
* **Disadvantages of Cloud Computing**

1. Internet Dependency

* Requires a stable internet connection.
* Downtime or poor connectivity can affect access to services.

2. Limited Control

* Users have limited control over infrastructure and data handling (especially in SaaS and PaaS).

3. Security & Privacy Concerns

* Sensitive data stored offsite could be vulnerable to breaches or unauthorized access.
* Compliance with data regulations (like GDPR, HIPAA) requires careful planning.

4. Ongoing Costs

* Long-term use may become expensive if not optimized.
* Unexpected charges can occur due to bandwidth or storage overuse.

5. Vendor Lock-In

* Moving data or applications between providers can be complex and costly.
* Proprietary tools and platforms reduce portability.

6. Downtime Risks

* Even large cloud providers can experience outages (e.g., AWS or Azure downtime events).