Module : 22 Cloud Computing Fundamentals

1) Cloud computing is like having a virtual, high-powered computer that you can access from anywhere. It allows individuals and businesses to use and store data, run applications, and more, all through the internet rather than relying on local hardware.

2) Cloud computing deployment models.

- Public Cloud: Services are delivered over the internet by third-party providers like Amazon Web Services (AWS), Microsoft Azure, or Google Cloud Platform. This model offers high scalability and cost-effectiveness but shares resources with other organizations.

- Private Cloud: The infrastructure is used exclusively by one organization, offering greater control and security. It can be hosted on-site or by a third-party provider.

- Hybrid Cloud: Combines both public and private clouds, allowing data and applications to be shared between them. This model offers flexibility and

optimized infrastructure by using the best of both worlds.

- Community Cloud: Shared by several organizations with common goals or requirements. This model can be managed internally or by a third party and allows collaboration while maintaining higher privacy levels than the public cloud.

3) 8 components of cloud computing.

- Front-End Interface: The part of the cloud service that users interact with, such as a web browser or a mobile app.

- Back-End Architecture: Comprises the servers, storage, and databases that power the cloud services. This is where the processing and storage of data happen.

- Cloud Storage: A scalable and often distributed storage system where data is stored and accessed as needed.

- Virtualization: A technology that allows multiple virtual instances of resources (like servers or storage) to run on a single physical machine, improving efficiency and scalability.

- Networking: Connects all the components within the cloud and enables communication between them, as well as between the cloud and the end-users.

- Service Models:
- Infrastructure as a Service (IaaS): Provides virtualized computing resources over the internet, such as virtual machines and storage.
- Platform as a Service (PaaS): Offers a development platform including tools and libraries to build, deploy, and manage applications.
- Software as a Service (SaaS)**:** Delivers software applications over the internet, which users can access through a web browser.
- Management and Security: Tools and protocols to manage and secure the cloud environment, ensuring data integrity, privacy, and compliance with regulations.
- APIs and Middleware: Enable different software applications and services to communicate and interact with each other, providing seamless integration and functionality.

4) Advantages of Cloud Computing:

- Cost Efficiency: Reduces the need for expensive hardware and maintenance by using a pay-as-you-go model.
- Scalability: Easily adjust resources based on demand, ensuring optimal performance and cost savings.
- Accessibility: Access data and applications from anywhere with an internet connection, enabling remote work.
- Flexibility: Offers a variety of services and solutions to meet different business needs.
- Disaster Recovery: Provides robust backup and recovery options to protect against data loss.
- Automatic Updates: Cloud providers handle maintenance and updates, ensuring you always have the latest features and security patches.
- Collaboration: Facilitates collaboration by allowing multiple users to work on the same project or document simultaneously.
- Security: Many cloud providers offer advanced security measures to protect your data.

- Disadvantages of Cloud Computing:
- Internet Dependency: Requires a reliable internet connection for access, which can be a limitation in areas with poor connectivity.
- Security Risks: Although cloud providers implement strong security measures, storing data off-site can still pose security and privacy concerns.
- Downtime: Potential for service outages, which can disrupt access to data and applications.
- Limited Control: Users may have less control over the infrastructure and data, relying on the cloud provider for management.
- Data Transfer Costs: Transferring large amounts of data to and from the cloud can incur additional costs.
- Compatibility Issues: Some legacy systems and applications may not be compatible with cloud-based solutions.