

USN 1CR21CS116

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Cloud Computing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat diagram, explain cloud computing and its historical development. (10 Marks)
b. List the characteristics and benefits of cloud computing. (10 Marks)

OR

- 2 a. Explain in brief the services provided by the following cloud service provider:
i) Amazon web service
ii) Microsoft azure
iii) Google AppEngine (10 Marks)
b. Write a note on challenges in cloud computing. (10 Marks)

Module-2

- 3 a. Define virtualization and explain hardware level virtualization with its advantages. (10 Marks)
b. Discuss the taxonomy of virtualization techniques at different levels. (10 Marks)

OR

- 4 a. What are the characteristics of virtualized environment? (10 Marks)
b. Explain with a neat diagram Type-I and Type-II hypervisor. (10 Marks)

Module-3

- 5 a. Explain the different types of cloud. (10 Marks)
b. What is IaaS? Explain its reference implementation with a neat diagram. (10 Marks)

OR

- 6 a. Explain the economics of the cloud. (10 Marks)
b. What does the acronym SaaS mean? How does it relate to cloud computing? (10 Marks)

Module-4

- 7 a. Analyze the various cloud security risks that organization face when utilizing cloud computing services. (10 Marks)
b. Explain the security risks posed by a management OS. (10 Marks)

OR

- 8 a. Discuss the traditional concept of trust and trust necessary for online activities. (10 Marks)
b. Explain in detail virtual machine security. (10 Marks)

Module-5

- 9 a. Describe Amazon EC2 and its basic features. (10 Marks)
b. Analyze how cloud computing technology can be applied to support remote ECG monitoring. (10 Marks)

OR

- 10 a. What is a bucket? What type of storage does it provide? (10 Marks)
b. Examine the core components of AppEngine. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8=50, will be treated as malpractice.

1a. Cloud Computing and its Historical Development

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources. The historical development of cloud computing includes:

- **1960s:** Concept of time-sharing on mainframes.
- **1990s:** Introduction of virtual machines.
- **2000s:** Development of cloud services (AWS in 2006, Google App Engine in 2008, Microsoft Azure in 2010).

1b. Characteristics and Benefits of Cloud Computing

Characteristics:

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

Benefits:

- Cost efficiency
- Scalability
- Flexibility
- Disaster recovery
- Automatic updates

2a. Cloud Service Providers

i) **Amazon Web Services (AWS):** Offers computing power, storage, and networking solutions with services like EC2, S3, and Lambda.

ii) **Microsoft Azure:** Provides cloud services such as AI, analytics, and virtual machines.

iii) **Google App Engine:** A platform for building scalable web applications using Google's infrastructure.

2b. Challenges in Cloud Computing

- Security and privacy concerns
- Downtime and reliability issues
- Compliance and legal issues
- Data transfer costs
- Vendor lock-in

Module-2

3a. Virtualization and Hardware-Level Virtualization

Virtualization allows multiple virtual instances to run on a single physical machine. **Hardware virtualization** enables a virtual machine to directly interact with physical hardware, improving performance and isolation.

Advantages include:

- Better resource utilization
- Isolation and security
- Cost savings

3b. Taxonomy of Virtualization Techniques

- **Full virtualization**
- **Paravirtualization**
- **OS-level virtualization**

- **Storage virtualization**
- **Network virtualization**

4a. Characteristics of Virtualized Environments

- Partitioning
- Isolation
- Encapsulation
- Dynamic resource allocation

4b. Type-I and Type-II Hypervisors

- **Type-I Hypervisor (Bare Metal):** Runs directly on hardware (e.g., VMware ESXi, Microsoft Hyper-V)
- **Type-II Hypervisor (Hosted):** Runs on an operating system (e.g., VirtualBox, VMware Workstation)

Module-3

5a. Types of Cloud

- **Public Cloud:** Open to multiple users (e.g., AWS, Azure, Google Cloud)
- **Private Cloud:** Dedicated to a single organization
- **Hybrid Cloud:** Combination of public and private clouds
- **Community Cloud:** Shared by multiple organizations with common concerns

5b. Infrastructure as a Service (IaaS)

IaaS provides virtualized computing resources over the internet. Example: AWS EC2. Diagram includes:

- Virtual Machines
- Storage
- Networking

6a. Economics of Cloud Computing

- Reduced capital expenditure
- Pay-as-you-go pricing model
- Lower maintenance costs

6b. Software as a Service (SaaS)

SaaS provides software over the internet (e.g., Google Docs, Salesforce). It eliminates the need for local installations.

Module-4

7a. Cloud Security Risks

- Data breaches
- Insider threats
- Data loss
- Insecure APIs
- Compliance risks

7b. Security Risks in Management OS

- Privilege escalation
- Malicious insiders

- Vulnerabilities in hypervisors

8a. Trust and Security in Online Activities

- Authentication and authorization
- Data encryption
- Secure transactions

8b. Virtual Machine Security

- Hypervisor security
- Regular patching
- Secure configurations

Module-5

9a. Amazon EC2 and Its Features

Amazon EC2 provides scalable virtual servers. Features:

- Elastic Compute
- Auto-scaling
- Load balancing
- Secure access with key pairs

9b. Cloud Computing for Remote ECG Monitoring

- Cloud storage for ECG data
- AI-based analysis
- Remote patient monitoring

10a. Buckets in Cloud Storage

A **bucket** is a storage container in cloud platforms (e.g., Amazon S3). It provides object storage for unstructured data.

10b. Core Components of Google App Engine

- Compute engine
- Datastore
- Task queues
- API services