

Winter Semester 2025-26

SCOPE

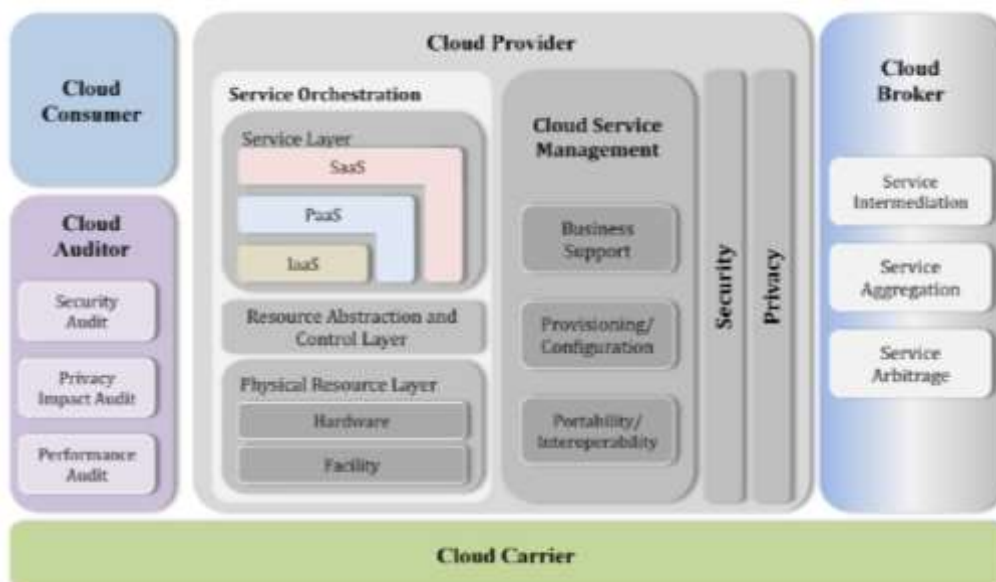
BCSE408L Cloud Computing – D1 Slot

CAT 1 Key

Question 1

Illustrate the NIST cloud computing reference architecture and explain the roles and responsibilities of each component in detail.

Key



Question 2

A mid-sized organization has a team of employees working on a critical software development project. The employees need secure access to corporate desktops and project-specific applications from home and branch offices. The IT team wants to reduce hardware costs, ensure a consistent desktop environment, and simplify management of project resources. Explain how the organization can provide secure, remote access to corporate desktops and project-specific applications. Discuss the different technological approaches to delivering virtual desktops, highlighting their advantages and challenges.

Key

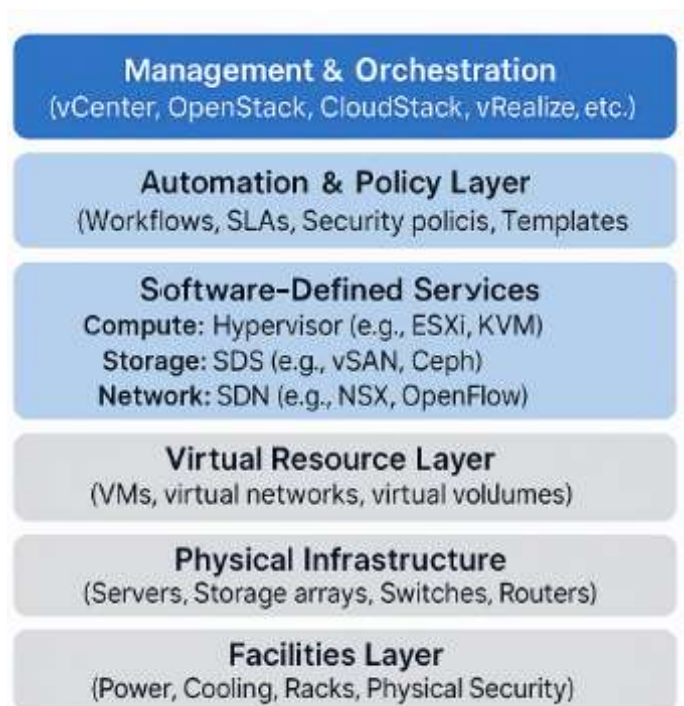
Desktop Virtualization

Approaches: Virtual Desktop Infrastructure, Remote Desktop Services and DaaS

Question 3

A large enterprise plans to modernize its IT infrastructure by adopting a Software-Defined Data Center to achieve greater flexibility, automation, and scalability. As a cloud architect, explain the concept of SDDC, illustrate its architecture, and discuss the key components involved in it.

Key



Question 4

Compare the features of serverless computing with traditional cloud service models, IaaS and PaaS with suitable use cases. Discuss the serverless service offered by AWS used to run user-defined functions with appropriate examples.

Feature	IaaS	PaaS	Serverless (FaaS)
Server management	User	Provider	Provider
Scaling	Manual / Auto	Auto	Fully automatic
Billing	VM uptime	Resource usage	Execution time
Execution	Continuous	Continuous	Event-driven
Example	EC2	Elastic Beanstalk	AWS Lambda

Cost Model and Use Cases

- **IaaS:** Pay for allocated VM resources.
Use case: Legacy applications requiring full control.
- **PaaS:** Pay for platform resources.
Use case: Web applications and APIs.
- **Serverless:** Pay only for execution time and number of invocations.
Use case: Event-driven and microservices-based applications.

AWS Lambda - is a serverless Function as a Service (FaaS) that allows execution of user-defined code without provisioning or managing servers.

It supports multiple programming languages and automatically handles scaling and availability.

Examples of AWS Lambda Usage

- Processing files uploaded to Amazon S3.
- Backend logic triggered by API Gateway requests.
- Real-time data processing from DynamoDB Streams.

Question 5

An organization plans to build its own private data center using AWS Cloud. It requires connectivity between multiple VPCs and also with its on-premises network.

- (a) Justify why Amazon VPC is suitable for this requirement.
- (b) Explain the role of VPC components such as subnets and routing table.
- (c) Discuss how VPC Peering and AWS Direct Connect help in achieving secure connectivity.

Key

- a) Justify why Amazon VPC is suitable for this requirement (2 Marks)

Amazon VPC allows organizations to create a logically isolated private network in the AWS Cloud.

It enables the organization to design a custom virtual data center with its own IP address range, subnets, and routing policies.

VPC supports secure communication using private IP addressing and controlled access through security mechanisms.

It provides hybrid connectivity options to connect multiple VPCs and on-premises networks using AWS networking services.

- b) Subnets (2 Marks)

A subnet is a logical subdivision of a VPC CIDR block used to organize resources.

Subnets can be public or private and are associated with Availability Zones to ensure high availability and fault tolerance.

Route Tables (2 Marks)

A route table contains a set of rules that determine traffic flow within the VPC.

It controls routing of traffic to destinations such as Internet Gateway, NAT Gateway, VPC Peering connections, VPN, or Direct Connect.

VPC Peering (2 Marks)

VPC Peering enables private communication between multiple VPCs using private IP addresses without traversing the public internet.

AWS Direct Connect (2 Marks)

AWS Direct Connect provides a dedicated private network connection between the on-premises data center and AWS, offering low latency, high bandwidth, and secure connectivity.