[This question paper contains **4** printed pages.]

Your Roll No.: ……

Sr. No. of Question Paper	:	**15085**
Unique Paper Code	:	2932813502
Name of the Paper	:	Cloud Computing
Name of the Course	:	B. Tech. (CSE)
Semester	:	VI

Duration: 3 Hours Maximum Marks: 90

Instructions for Candidates

1. Write your Roll No. on the top immediately upon receipt of this question paper.
2. Attempt **five** questions in all, including **question no. 1**, which **is compulsory**.
3. Non-programmable scientific calculator is allowed.
4. **All** questions carry equal marks.

Questions

1.(a)	Explain the concept of on-demand self-service in cloud computing. How does the pay-per-use model make cloud computing economically attractive for organizations?
1.(b)	Differentiate between IaaS, PaaS, and SaaS with one suitable example of each.
1.(c)	Explain the concept of resource abstraction in cloud computing. How does it help in the efficient utilization of physical resources?
1.(d)	What is a Service Level Agreement (SLA) in cloud computing? Mention any one parameter commonly included in an SLA.
1.(e)	What is Identity and Access Management (IAM)? Why is the principle of least privilege important in cloud security?
1.(f)	What is Function as a Service (FaaS)? Explain how it differs from traditional server-based deployment.
	(3 × 6 = 18)

2.(a)	Explain the fundamental characteristics of cloud computing. Discuss how scalability, elasticity, resource pooling, broad network access, and measured service make cloud computing different from traditional computing.
2.(b)	A medium-sized software company is currently running all its applications on in-house servers. The company faces high hardware maintenance costs, difficulty in scaling during peak demand, and delayed provisioning of new servers. As a cloud consultant, recommend a suitable cloud adoption strategy. In your answer, discuss the appropriate service model, deployment model, major benefits, and possible risks such as vendor lock-in, downtime, and data privacy.
	$(9 \times 2 = 18)$
3.(a)	Explain virtualization in cloud computing. Compare Type-1 and Type-2 hypervisors with respect to architecture, performance, security, and use cases. Also, explain how virtualization enables better resource utilization in cloud infrastructure.
3.(b)	An organization wants to store three types of data on the cloud: i. Large volumes of images, videos, and backup files ii. A high-performance database requiring low latency iii. Shared documents accessed by multiple departments. As a cloud architect, identify the most suitable storage model for each requirement from object storage, block storage, and file storage. Justify your answer by comparing their access method, scalability, performance, and typical use cases.
	$(9 \times 2 = 18)$

4.(a)	A cloud-based web application must be securely hosted for users across different geographical locations. The application should provide isolated networking, secure remote administrative access, faster content delivery, and balanced traffic distribution. Explain how VPC, VPN, CDN, and Load Balancer can be used together to design such a cloud networking solution. Also describe the role of each component in improving security, performance, availability, and scalability**.**
4.(b)	A software company frequently deploys cloud applications but faces delayed releases, configuration errors, security vulnerabilities, and poor coordination between development and operations teams. Explain how DevOps and DevSecOps practices can solve these problems. Discuss the role of CI/CD, infrastructure automation, continuous monitoring, security integration, vulnerability scanning, and compliance checks in cloud deployment.
	(9 × 2 = 18)
5.(a)	Explain Docker containerization in detail. Compare Docker containers with virtual machines in terms of operating system dependency, isolation, size, startup time, portability, and resource utilization. Also, explain the role of Docker image, Docker container, Dockerfile, Docker Engine, and Docker registry.
5.(b)	A student develops a web application that works on his laptop but fails when deployed on another system due to missing dependencies and configuration differences. He decides to use Docker for deployment. Answer the following: i. How does Docker solve the “it works on my machine” problem? ii. What should be included in the Dockerfile to package the application correctly? iii. Why is port mapping required when running a web application inside a Docker container? iv. What problems may arise if multiple unused containers and images are kept running or stored? v. Suggest suitable Docker commands for building, running, listing, stopping, and removing containers.
	(9 × 2 = 18)

6.(a)	Explain the architecture of a cloud-based data lake. Discuss data ingestion, storage, processing, cataloging, security, governance, discovery, and visualization components. Also, differentiate between a data lake and a data warehouse.
6.(b)	A retail company wants to analyze customer purchase history, website clickstream data, product images, and social media reviews. The company wants to perform batch analytics, real-time analytics, and machine learning on this data. As a cloud data architect, propose a suitable data lake architecture. In your answer, discuss: i. Type of data that can be stored ii. Suitable storage layer iii. Batch, real-time, and stream processing methods iv. Role of Apache Spark, Hadoop, and EMR platform v. Security and governance measures required to avoid a data swamp
	(9 × 2 = 18)

(300)