JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

B.Tech-V Semester (CSE/IT)

COURSE CODE (CREDITS): 20B1WCI532 (02) MAX. MARKS: 35

COURSE NAME: CLOUD COMPUTING: CONCEPTS, TECHNOLOGY & ARCHITECTURE

COURSE INSTRUCTORS: PKG, NKR, VNS MAX. TIME: 2 hours

Note: *(a) All questions are compulsory.* ***Attempt all parts of a question consecutively in one place.***

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems.

Q.No	Question	CO	Marks
Q1	***Assessment-Based Questions:*** a) Why is IAM considered the backbone of AWS security? b) What is the difference between AMI and EC2 instance types? c) Explain the difference between S3 Standard and S3 Intelligent Tiering. d) Define cloud elasticity and explain how it differs from scalability. e) Explain how the Noisy Neighbor Problem arises in resource pooling.	CO4	**1x5=5**
Q2	***Theory Questions:*** a) Explain the resource allocation strategies used in a pooled environment. b) Explain the problems caused by poorly configured auto-scaling policies. c) Explain the architecture behind dynamic scalability. Discuss the various types of dynamic scaling that are commonly implemented.	CO4	**2x3=6**
Q3	***Numerical Questions:*** a) In a MapReduce framework, consider the HFFS block size 64MB. We have three files of size 64K, 65Mb, and 127 Mb. How many blocks will be created by the Hadoop framework? b) Write the pseudo codes (for map and reduce functions) for calculating the average of a set of integers in MapReduce. Suppose A = (10, 20, 30, 40, 50) is a set of integers. Show the Map and Reduce outputs. Show the map and reduce outputs.	CO4	**3x2=6**

Q4	***Derivation-Based Questions:*** a) Using Little's Law ($L = \lambda T$), derive the relationship between average response time (T) and incoming request rate (λ) in a cloud service. b) Discuss how the system behaves as λ approaches the service capacity limit.	CO4	**3x2=6**
Q5	***Critical-Thinking Questions:*** A cloud provider hosts 1,200 tenants on a shared pool of compute and storage. Two tenants begin running analytics workloads involving massive disk I/O. Other tenants report severe application slowness even though CPU and RAM usage remain moderate. Analyze how resource pooling architecture resulted in a 'Noisy Neighbor Problem'. Propose a multi-layer solution for the following critical scenarios that addresses both detection and prevention without hurting pooling efficiency. a) Why I/O becomes the bottleneck in pooled resources b) Whether virtualization, containers, or serverless architectures mitigate the issue. c) How auto-throttling, priority queues, or resource reservation could help. d) Trade-offs between fairness and performance	CO4	**1.5x4=6**
Q6	***Project-based Questions:*** a) List the steps that demonstrate the launch and configuration of an EC2 instance. Explain the security group rules used. b) List the deployment steps of a static website on Amazon S3. What permissions are needed for public access?	CO4	**3x2=6**

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