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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (2025 - 2026)

Subject: Cloud and Edge Computing

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

- | | | |
|-------|---|---|
| (1.1) | Identify the correct option for technologies significantly contributed to the evolution of cloud computing? (CO1, K1) | 1 |
| | <ul style="list-style-type: none"> (a) Artificial Intelligence (AI) and Machine Learning (ML) (b) Virtualization and distributed computing (c) Local storage and floppy disks (d) Analog computing and wired networks | |
| (1.2) | Identify the correct feature(s) of cloud computing? (CO1, K1) | 1 |
| | <ul style="list-style-type: none"> (a) Security (b) Availability (c) Large Network Access (d) All of the mentioned | |
| (1.3) | Identify level of virtualization involves abstracting the underlying hardware resources to create a uniform environment for applications? (CO2, K2) | 1 |
| | <ul style="list-style-type: none"> (a) Operating system level (b) Library level (c) Application level (d) Hardware abstraction level (HAL) | |
| (1.4) | The technology used to distribute service requests to resources is referred to as _____ (CO2, K2) | 1 |
| | <ul style="list-style-type: none"> (a) load performing (b) load scheduling (c) load balancing | |

- (d) all of the mentioned
- (1.5) In the Layered Cloud Architecture Design, which layer serves as the foundation for building the platform layer? (CO3, K2) 1
- (a) Service layer
 - (b) Virtualization layer
 - (c) Infrastructure layer
 - (d) Application layer
- (1.6) Identify the correct option for is a system for creating block-level storage devices that can be used for Amazon Machine Instances in EC2? (CO3, K2) 1
- (a) CloudWatch
 - (b) Amazon Elastic Block Store
 - (c) AWS Import/Export
 - (d) None of the above
- (1.7) Identify statement best describes the proposed Complex Event Processing (CEP) mechanism? (CO4, K2) 1
- (a) The CEP mechanism is specific to certain types of sensing devices and CEP engines.
 - (b) The CEP mechanism is universally applicable and compatible with all sensing devices but not CEP engines.
 - (c) The CEP mechanism is universal and suitable for any heterogeneous sensing devices and CEP engines.
 - (d) The CEP mechanism is limited in its applicability to certain types of sensing devices only.
- (1.8) Point out the lightweight protocol. (CO4, K1) 1
- (a) SPI
 - (b) CoAP
 - (c) HTTP
 - (d) MQTT
- (1.9) Point out the significance of the OTA Setup Step 0. (CO5, K1) 1
- (a) Writing application code for OTA function
 - (b) Uploading program to AWS service
 - (c) Sending instructions to cloud
 - (d) Receiving firmware update
- (1.10) List the advantage of Auto Scaling? (CO5, K1) 1
- (a) Fault Tolerance
 - (b) Better Availability
 - (c) Better Cost Management
 - (d) All of above

2. Attempt all parts:-

- (2.1) List any two architectural design challenges in cloud computing. (CO1, K1) 2

- | | | |
|-------|--|---|
| (2.2) | List two advantages of publish subscribe model? (CO2, K1) | 2 |
| (2.3) | In AWS, S3 stands for_____. (CO3, K1) | 2 |
| (2.4) | List the two major components of an edge computing infrastructure? (CO4, K1) | 2 |
| (2.5) | Describe AWS IoT MQTT broker, (CO5, K2) | 2 |

SECTION-B

30

Answer any one of the following:-

- | | | |
|-------|--|---|
| (3.1) | Explain the essential characteristics of cloud computing as defined by NIST. (CO1, K1) | 6 |
| (3.2) | Why we need Hybrid clouds? (CO1, K1) | 6 |

Answer any one of the following:-

- | | | |
|-------|---|---|
| (3.3) | Differentiate between bare-metal virtualization hypervisors (Type I hypervisors) and hosted virtualization hypervisors (Type II hypervisors), highlighting their respective advantages and use cases. (CO2, K2) | 6 |
| (3.4) | Discuss the role of REST (Representational State Transfer) in web service architecture, including its principles and benefits in facilitating communication between client and server applications. (CO2, K2) | 6 |

Answer any one of the following:-

- | | | |
|-------|---|---|
| (3.5) | Explain the concept of Storage as a Service (STaaS), outlining its advantages and use cases for different types of organizations. (CO3, K2) | 6 |
| (3.6) | List 3 types of cloud deployment models with suitable example? (CO3, K2) | 6 |

Answer any one of the following:-

- | | | |
|-------|---|---|
| (3.7) | List the key components of an edge-computing testbed, and how do they automate server placement decisions based on round-trip times (RTT) between servers and wireless base stations? (CO4, K3) | 6 |
| (3.8) | Explain Launching an Edge Testbed in detail. (CO4, K3) | 6 |

Answer any one of the following:-

- | | | |
|--------|---|---|
| (3.9) | Outline the four-step process involved in setting up OTA updates for IoT devices using the AWS cloud service. (CO5, K4) | 6 |
| (3.10) | Explain AWS Iot core with a schematic diagram. (CO5, K2) | 6 |

SECTION-C

50

4. Answer any one of the following:-

- | | | |
|-------|---|----|
| (4.1) | Explore the challenges and opportunities presented by emerging technologies in cloud computing, such as serverless computing and containerization. Discuss the potential benefits of these technologies for businesses, including cost savings, improved scalability, and enhanced development agility. Evaluate the key considerations organizations should take into account when adopting these technologies, including security, interoperability, and performance. (CO1, K1) | 10 |
| (4.2) | Explain how cloud computing evolved over the years? Explain in detail. (CO1, K2) | 10 |

5. Answer any one of the following:-

- | | | |
|-------|---|----|
| (5.1) | State different Disaster Recovery methods. (CO2, K2) | 10 |
| (5.2) | Compare SOA with traditional system architecture. (CO2, K2) | 10 |

6. Answer any one of the following:-

- | | | |
|-------|--|----|
| (6.1) | Discuss the challenges and solutions in porting the OTA library to resource-constrained IoT devices. (CO3, K2) | 10 |
| (6.2) | Explain RDS role in cloud and edge. (CO3, K2) | 10 |

7. Answer any one of the following:-

- | | | |
|-------|---|----|
| (7.1) | Evaluate the scalability and flexibility of edge computing infrastructure in meeting the evolving needs of financial organizations, considering factors such as distributed computing topology and edge environment requirements. Discuss how edge computing enables financial institutions to deploy applications across local branch offices and remote locations, while also ensuring high availability and reliability. (CO4, K5) | 10 |
| (7.2) | Discuss, how Edge AI can be used to improve ATMs' security. (CO4, K5) | 10 |

8. Answer any one of the following:-

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|-------|--|----|
| (8.1) | Explain the concept of complex event processing (CEP) and its relevance to IoT applications. Discuss how CEP technology can be used to analyze real-time data streams from IoT devices and trigger actionable insights (CO5, K3) | 10 |
| (8.2) | Illustrate Edge-to-gateway-to-cloud OTA updates. (CO5, K2) | 10 |