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

M.Tech Integrated

SEM: IV - THEORY EXAMINATION (2025 - 2026)

Subject: Introduction to Cloud 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) A key challenge in distributed systems is: (CO1, K1)

1

- (a) Concurrency & synchronization
- (b) High speed
- (c) Cost saving
- (d) Pay-as-you-go

(1.2) Multi-tenancy means: (CO1, K1)

1

- (a) Multiple virtual machines on one physical machine
- (b) One VM per server
- (c) No resource sharing
- (d) Only storage scaling

(1.3) Point out the correct statement. (CO2, K1)

1

- (a) A client can request access to a cloud service from any location
- (b) A cloud has multiple application instances and directs requests to an instance based on conditions
- (c) Computers can be partitioned into a set of virtual machines with each machine being assigned a workload
- (d) All of the mentioned

(1.4) Select one of the following provide system that resource access to virtual machines. (CO2, K1)

1

- (a) VMM
- (b) VMC
- (c) VNM

- (d) All of the mentioned
- (1.5) A cloud built within an organization's intranet is _____ cloud. (CO3, K2) 1
- (a) Public Cloud
- (b) Private Cloud
- (c) Hybrid Cloud
- (d) Community Cloud
- (1.6) The most suitable model for developers focusing only on coding is _____. (CO3, K2) 1
- (a) IaaS
- (b) SaaS
- (c) PaaS
- (d) CaaS
- (1.7) Operational support system in cloud environment includes _____. (CO4, K2) 1
- (a) Provisioning
- (b) configuration management
- (c) service request management
- (d) All of the mentioned
- (1.8) Total number of actors in NIST CCRA is: (CO4, K1) 1
- (a) 3
- (b) 4
- (c) 5
- (d) 6
- (1.9) Global cloud resource exchange supports: (CO5, K2) 1
- (a) Isolation
- (b) Scalability
- (c) Local storage
- (d) Hardware dependency
- (1.10) Integrity attack refers to: (CO5, K2) 1
- (a) Data theft
- (b) Data modification
- (c) Data delay
- (d) Data storage

2. Attempt all parts:-

- (2.1) Compare On-demand and Reserved pricing models in cloud economics. (CO1, K2) 2
- (2.2) Brief the way Web Services enable cross-platform interoperability. (CO2, K2) 2
- (2.3) Enumerate the responsibilities of a Cloud Provider in NIST CCRA. (CO3, K2) 2
- (2.4) Relate load balancing and service availability for continuous service delivery in cloud. (CO4, K2) 2
- (2.5) Enlist benefits of using VPC endpoints. (CO5, K2) 2

SECTION-B

30

Answer any one of the following:-

- (3.1) Discuss the security and cost challenges in cloud economics with an example. (CO1, K2) 6
- (3.2) Describe three service models of cloud computing (IaaS, PaaS, SaaS) with detailed examples and use cases. (CO1, K2) 6

Answer any one of the following:-

- (3.3) Infer virtualization and differentiate server and storage virtualization with illustration of an example. (CO2, K2) 6
- (3.4) Detail the way Stateless constraint in REST simplifies server design and improves scalability. Provide an example that must be included in a client request to maintain this principle. (CO2, K2) 6

Answer any one of the following:-

- (3.5) A government organization plans to adopt cloud services but must comply with strict regulatory and security standards. Using the **NIST Cloud Computing Reference Architecture**, explain the roles of cloud consumer, provider, broker, auditor, and carrier that would interact in this deployment. (CO3, K2) 6
- (3.6) An online travel booking platform needs to integrate with airline, hotel, and payment provider systems developed using different programming languages. infer the way Web Services can enable interoperability and data exchange among these heterogeneous systems. (CO3, K2) 6

Answer any one of the following:-

- (3.7) A company uses CRM software hosted on one cloud provider and analytics tools hosted on another. However, differences in APIs and data formats are causing integration issues. Discuss **Interoperability** challenges to ensure seamless communication between the two cloud environments. (CO4, K2) 6
- (3.8) A smart city project integrates services from transportation, healthcare, utilities, and emergency response systems hosted on different clouds. Relate it with the **Four Levels of Federation** (infrastructure, platform, application, and business federation) that can be applied to ensure seamless coordination and service delivery. (CO4, K2) 6

Answer any one of the following:-

- (3.9) An enterprise deploys applications in a public cloud environment and wants to protect them from unauthorized access and malicious traffic. Compare the role of a traditional **Firewall** and cloud-based **Security Groups** in controlling inbound and outbound network traffic. (CO5, K2) 6
- (3.10) An online banking platform must ensure that only authorized customers and employees can access sensitive financial information. Explain the **Identity and Access Management (IAM)**, that can be implemented to manage users, roles, permissions, and access policies securely. (CO5, K2) 6

SECTION-C 50

4. Answer any one of the following:-

- (4.1) A gaming company plans to provide an online multiplayer game with fluctuating user traffic. Discuss how elasticity, on-demand provisioning, and EC2 instance scaling can ensure optimal performance during peak traffic. (CO1, K2) 10
- (4.2) An international consultancy firm wants to provide cloud-based analytics 10

dashboards to clients in different countries, with variable workloads. Discuss the use of EC2 instances, cloud elasticity, and on-demand provisioning to handle such dynamic workloads. Include economic benefits. (CO1, K2)

5. Answer any one of the following:-

- (5.1) Design an SOA-based e-commerce workflow using at least three services (catalog, payment, shipping). Explain the interaction of each service utilized for the workflow. (CO2, K3) 10
- (5.2) Analyze virtual machines and containers in detail using diagram. And prepare a small case study of deploying a web application using both approaches. (CO2, K4) 10

6. Answer any one of the following:-

- (6.1) An enterprise decides to adopt an **Open Architecture** approach to avoid vendor lock-in and support integration with third-party systems. However, teams face issues with interoperability, inconsistent standards, and security vulnerabilities. Enumerate the major **Open Architecture Challenges** in this scenario and the steps to address them. (CO3, K2) 10
- (6.2) Compare the **Publish-Subscribe Model**, **SOAP architecture**, and **REST architecture**. Recommend the best suited approach for Interoperability performance. (CO3, K2) 10

7. Answer any one of the following:-

- (7.1) A technology consulting firm predicts that future enterprises will increasingly rely on collaborative multi-cloud ecosystems powered by AI and edge computing. Discuss the **Future of Federation** in cloud computing, including emerging trends, opportunities, and challenges related to security, governance, and interoperability for this scenario. (CO4, K2) 10
- (7.2) Extends CCRA roles in multi-tier application deployment. Also discuss the possibility of federation in NIST reference architecture. (CO4, K2) 10

8. Answer any one of the following:-

- (8.1) A fintech company wants to differentiate access privileges for viewers, content creators, and administrators. Explain **Authentication and Authorization** mechanisms that can be designed to verify identities and enforce role-based access control in cloud based eco-system. (CO5, K2) 10
- (8.2) A company adopts a cloud-based HR management system delivered through **Software-as-a-Service (SaaS)**. Employees access payroll and personal information remotely from different devices. Enumerate security risks that are associated with SaaS applications and discuss secure user data and application access for it. (CO5, K2) 10