Topics to Study for CSE 4267 – Cloud Computing Exam

Total 4 Questions (Q1(15) + Q2(16) + Q3(15) + Q4(24)) = 70

- Remembering/Understanding: (5 questions X 3 = 15 marks)
    - Recalling facts and basic concepts.
    - Explaining ideas or concepts.
      example: Explain in short, Differentiate, Describe
- Applying/Evaluating: (4 questions X 4 = 16 marks)
    - Using information in new situations.
    - Justifying a stand or decision.
      Example: Optimize, Mitigating, Planning
- Analyzing: (3 questions X 5 = 15 marks)
    - Mathematical calculation storage, cost and other calculations.
      Example: Calculate Storage, Compute Cost, Analyze
- Creating: (3 questions X 8 = 24 marks)
    - Producing new or original work
      Example: Design, Recommend, Develop

1. Cloud Computing Basics

- Definition & Characteristics of Cloud Computing (On-Demand, Elasticity, Measured Service, etc.).
- Cloud Deployment Models: Public, Private, Hybrid, Community – Benefits & Use Cases.
- Cloud Service Models: IaaS, PaaS, SaaS – Differences & Examples.
- Shared Responsibility Model – Security Roles of Cloud Providers vs. Customers.
- Advantages & Challenges of Cloud Computing (Cost Efficiency, Scalability, Security Risks, Vendor Lock-in).
- Edge Computing vs. Cloud Computing – How They Work Together.
- Cloud Sustainability & Green Computing – How Cloud Reduces Carbon Footprint.

2. Cloud Scaling & Optimization

- Auto-Scaling vs. Load Balancing – Differences, Benefits & Implementation.
- Vertical Scaling vs. Horizontal Scaling – When to Use Each.
- Cloud Cost Optimization Strategies:
    - Reserved Instances, Spot Instances, Savings Plans.
    - AWS Cost Explorer & Budgets – How to Manage Costs.
- Performance Optimization in Cloud Environments.

3. Virtualization & Containerization

- Virtualization Basics: What is a Virtual Machine?
- Hypervisors:
    - Type 1 (Bare-Metal) vs. Type 2 (Hosted).
- Containers vs. Virtual Machines: Key Differences.
- Docker – Why It's Important for Cloud Computing.
- Kubernetes (Container Orchestration) – Basics & Use Cases.
- Infrastructure as Code (IaC): AWS CloudFormation

4. Cloud Security

- Identity & Access Management (IAM) – Roles, Policies, Permissions.
- Common Cloud Security Risks:
    - DDoS Attacks, Data Breaches, Misconfigurations.
- Security Best Practices:
    - Principle of Least Privilege (PoLP).

    - Data Encryption (At-Rest & In-Transit).
    - Multi-Factor Authentication (MFA).
- Compliance & Governance in Cloud (GDPR, HIPAA, ~~ISO 27001~~).
- Hybrid Cloud Security Challenges – Managing Security Across Multiple Cloud Providers.

5. Cloud Networking & Content Delivery

- Amazon Route 53:
    - DNS Management, Multi-Region Failover.
- CDN (Amazon CloudFront):
    - Edge Locations, Caching Strategies.
- API Gateway & Microservices Architecture – Role in Modern Applications.
- Virtual Private Cloud (VPC):
    - Subnets, Security Groups, NAT Gateway, Peering.

6. Cloud Storage & Databases

- Amazon S3:
    - Storage Classes (Standard, IA, Glacier, One-Zone IA).
    - Lifecycle Policies for Cost Management.
- Relational Database Service (RDS):
    - High Availability (Multi-AZ), Read Replicas, Scalability.
- NoSQL Databases:
    - DynamoDB vs. MongoDB – Differences & Use Cases.
- Backup & Disaster Recovery Strategies:
    - Point-in-Time Recovery, Snapshots, Cross-Region Backup.

7. Serverless & Event-Driven Computing

- AWS Lambda:
    - How it Works, Use Cases.
- Event-Driven Architecture:
    - SNS, SQS, SES – When to Use Each.
- Serverless vs. Traditional Deployment: Pros & Cons.

8. Cloud Cost & Performance Calculations

- AWS Pricing Models (On-Demand, Reserved, Spot Instances)
- Cost Calculation for EC2, Lambda, S3, and Data Transfer
- SLA Uptime Calculation & Downtime Analysis

9. Cloud-Based Application Design

- High-Availability & Fault-Tolerant Architectures
- Hybrid Cloud Strategies (On-Premises + AWS)
- Multi-Region Deployment & Disaster Recovery Plans
- Continuous Integration/Continuous Deployment (CI/CD) Challenges

10. Exam Preparation Tip

- *Understand Key Concepts – Don't just memorize; focus on why and how things work.*
- *Practice Problem-Solving – Work on cost, storage, and performance calculations.*
- *Learn Cloud Provider Services – AWS examples are commonly used; familiarize yourself with key AWS services.*
- *Use Real-World Scenarios – Think about practical applications of cloud computing concepts.*
- *Review Security Best Practices – Cloud security is a major exam topic.*