GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Integrated MSc, 9th Semester
Branch: Computer Science
Subject Name: Advanced Cloud Computing
Subject Code: 1390301

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA (M)	PA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Content:

Sr. No.	Content	Teaching Hours	Module Weightage (%)
1	**Fundamentals of Cloud Computing:** Characteristics, service models (IaaS, PaaS, SaaS), deployment models (public, private, hybrid), and cloud ecosystem.	5	15%
2	**Cloud Virtualization:** Types of virtualizations, hypervisors (VMware, KVM), resource management, and containers (Docker).	5	15%
3	**Cloud Architecture:** SOA for cloud, multi-tenancy, scalability, and cloud-native applications. SOA for cloud, multi-tenancy, scalability, and cloud-native applications.	8	15%
4	**Cloud Storage & Networking:** Distributed file systems (HDFS, GFS), content delivery networks (CDN), cloud storage (AWS S3), and VPC setup.	8	20%
5	**Cloud Security:** Security challenges, IAM, data protection, encryption, compliance, and disaster recovery.	5	15%
6	**Advanced Cloud Concepts:** Edge computing, serverless computing, DevOps integration, and cloud case studies (AWS, Azure, GCP).	6	20%

Reference Books:

1. Rajkumar Buyya, James Broberg, Andrzej M Goscinski, Cloud Computing: Principles and Paradigms, Wiley publication.
2. Toby Velte, Anthony Velte, Cloud Computing: A Practical Approach, McGraw-Hill Osborne Media.
3. George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly Publication.
4. John Rhoton, Cloud Computing Explained: Implementation Handbook for Enterprises, Recursive Press.

Suggested Practical:

1. **Setting Up Cloud Environment**

Install and configure OpenStack or similar private cloud platforms.
Create and manage virtual machines.

2. **Cloud Storage Operations**

Upload and retrieve data using AWS S3 or Azure Blob Storage.
Configure shared storage and demonstrate access control.

3. **Application Deployment**

Deploy a sample application using AWS Elastic Beanstalk or Azure App Service.
Set up containerized applications using Docker.

4. **Virtualization Techniques**

Experiment with virtual machines using VMware or VirtualBox.
Demonstrate container management using Kubernetes.

5. **Security Practices**

Configure IAM roles and policies for user access.
Create and secure a Virtual Private Cloud (VPC).

6. **Load Balancing & Scalability**

Demonstrate load balancing using AWS Elastic Load Balancer.
Implement auto-scaling for a cloud-based application.

7. **Serverless Computing**

Write and deploy a serverless function using AWS Lambda or Google Cloud Functions.
Integrate serverless APIs with cloud databases.

8. **Monitoring and Optimization**

Monitor application performance using AWS CloudWatch or Azure Monitor.
Analyze logs for troubleshooting and performance optimization.

Course Outcomes (CO)

CO1: Understand the fundamentals of cloud computing, service models, and deployment strategies.

CO2: Utilize virtualization and resource management techniques for cloud solutions.

CO3: Design and deploy scalable, cloud-based applications.

CO4: Address cloud-specific security challenges and implement solutions.

CO5: Apply advanced cloud concepts such as serverless computing and DevOps.