GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering Syllabus

Subject Code : 3164502

Subject Name : Cloud Computing

WEF Academic Year :	2021 - 22
Semester :	6
Category of the Course :	Professional Elective

Prerequisite :	Basic understanding of computer networks and operating systems, along with fundamental programming skills in languages like Python or Java. Additionally, familiarity with web technologies, databases, and general IT concepts is essential for grasping the course content effectively.
Rationale :	This course offers an easy-to-understand overview of cloud computing, covering everything from using cloud applications to handling security. Key topics are cloud basics, how Amazon Web Services (AWS) balances workloads, storing data across different locations, creating separate virtual spaces, keeping AWS secure, and handling operations and costs. The course focuses on Amazon's latest cloud innovations. Students will get hands-on experience through a programming task and a project, both done using Amazon Web Services. This course is designed to help students grasp the fundamental concepts and architecture of cloud computing, including hardware and software aspects. It emphasizes the significance of Cloud Virtualization, Abstractions, and Enabling Technologies.

Course Scheme :

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

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1	**Introduction to Cloud Computing :** Definition and Characteristics, Historical Perspective, Service Models (IaaS, PaaS, SaaS), Deployment Models, Benefits and Challenges.	3	10
2	**Cloud Computing Architectures** : Design Principles, Public vs. Private vs. Hybrid Clouds, Core Cloud Components, Architectural Layers, Real-world Architectural Examples.	4	10

3	**Virtualization and Cloud Platforms :** Exploring virtualization, Load balancing, Hypervisors, Machine imaging, Cloud marketplace overview, Comparison of Cloud providers, Virtual Machine Provisioning and Migration in Action.	5	10
4	**Cloud Storage and Databases :** Storage Options (Block, Object, File), Cloud-based Database Systems, Data Replication and Synchronization, Data Migration, Storage Security.	4	5
5	**Cloud Networking :** Network Design in the Cloud, Content Delivery Networks, Virtual Private Cloud, Network Security, Network Performance Optimization.	4	5
6	**Cloud Security :** Security Challenges, Identity and Access Management, Data Encryption, Compliance and Legal Issues, Incident Response and Recovery.	3	10
7	**Cloud Management and Monitoring :** Resource Management, Performance Monitoring, Log Management, Automation and Orchestration, Cost Management and Billing.	4	10
8	**Application Development in the Cloud :** Cloud-Native Application Design, Serverless Architecture, Microservices, Development and Testing in the Cloud, CI/CD Pipelines.	4	10
9	**Cloud Services and APIs :** Overview of Major Cloud Providers, Using Cloud APIs, Developing Scalable Cloud Applications, Integration Patterns, API Management.	4	10
10	**AWS networking and databases :** AWS history, AWS Infrastructure, AWS services, AWS ecosystem, Virtual private clouds, Cloud models, Private DNS servers (Route 53), Relational database service – DynamoDB, ElastiCache, Redshift.	4	10
11	**Other AWS services and management services :** Analytics services, Application services, Cloud security, CloudWatch, CloudFormation, CloudTrail, OpsWorks.	3	10
	Total	**42**	**100**

Reference Book :

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. Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl, Ricardo Puttini, and Zaigham Mahmood.

5. Amazon Web Services in Action" by Andreas Wittig and Michael Wittig.
6. Cloud Computing Bible. Barrie Sosinsky. John Wiley & Sons. ISBN-13: 978-0470903568.
7. Amazon Web Services in Action by Michael Wittig and Andreas Wittig, Dreamtech Press, ISBN:9789351198758.

Course Outcome :

After Completion of the Course, Student will able to :

No.	Course Outcomes	RBT Level*
01	Recall key cloud computing concepts, service models (IaaS, PaaS, SaaS), and basic cloud architectures.	RM
02	Understand Fundamental Concepts of Cloud Computing.	UN
03	Apply suitable virtualization concept.	AP
04	Analyze cloud security challenges and apply best practices for data privacy and regulatory compliance.	AN
05	Develop skills to evaluate and optimize cloud solutions for performance, scalability, and cost-effectiveness.	EV

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Course Practical List :

At Least 10-12 practicals based on topics of the syllabus have to be performed either in tools or in hardware kits.

List of Laboratory/Learning Resources Required :

1. CloudSim 3.0.3
2. http://www.cloudbus.org/
3. https://aws.amazon.com/
4. http://aws.amazon.com/documentation/
5. http://docs.aws.amazon.com/IAM/latest/UserGuide/getting-started.html

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