Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-7 (B.Tech.)

Subject: Cloud Computing-BETCE17336

Type of course: Professional Core

Prerequisite: Basic knowledge of Computer Networks, Operating Systems, Virtualization, and Distributed Systems.

Rationale:

Cloud Computing is a transformative technology that enables on-demand access to computing resources over the internet. It provides scalable, flexible, and cost-effective solutions for storage, processing, and application deployment. This subject introduces students to cloud architecture, service models, virtualization, and modern cloud platforms. Understanding cloud computing is essential for designing, deploying, and managing applications in real-world IT environments.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
3	0	0	3	60	30	10	00	50	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

GYANMANJARI INNOVATIVE UNIVERSITY BHAVNAGAR

Course Content:

Sr. No	Course content	Hrs.	% Weightage
1	**Introduction to Cloud Computing:** Definition, Evolution of Cloud Computing, Characteristics of Cloud, Benefits and Challenges, Cloud Service Models (IaaS, PaaS, SaaS), Deployment Models (Public, Private, Hybrid, Community), Cloud Architecture, Comparison with Traditional Computing.	09	20%
2	**Virtualization and Cloud Infrastructure:** Concept of Virtualization, Types of Virtualizations (Server, Storage, Network), Hypervisors, Virtual Machines vs Containers, Resource Management, Virtualization Tools and Techniques, Data Center Architecture, Storage Systems in Cloud.	09	20%
3	**Cloud Platforms and Services:** Overview of Major Cloud Providers, Compute Services, Storage Services, Networking Services, Cloud APIs and SDKs, Cloud Deployment Models, Introduction to Serverless Computing, Orchestration: Kubernetes Introduction, DevOps in Cloud: CI/CD pipelines, Case Studies of Cloud Platforms.	09	20%
4	**Cloud Security and Management:** Security Challenges in Cloud, Identity and Access Management (IAM), Data Security, Encryption Techniques in Cloud, Secure Data Storage, Privacy Issues, Service Level Agreements (SLA), Risk Management, Compliance and Governance.	09	20%
5	**Advanced Cloud Concepts and Applications:** Big Data in Cloud, Cloud for IoT, Edge and Fog Computing, Load Balancing and Auto Scaling, Cloud Monitoring and Performance Optimization, Cloud Migration Strategies, Green Cloud Computing, Case Studies and Industry Applications.	09	20%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Cloud Service Deployment:** In this activity, each student will create and deploy a basic web application using a cloud platform to understand real-world cloud computing concepts. They will configure compute services (such as virtual machines or app services) and storage services (such as cloud storage or databases), and demonstrate successful application hosting. The implementation should showcase deployment, accessibility over the internet, and basic resource management. Students will submit the source code, deployment details, and a screenshot of the running application, and upload them on the GMIU portal.	10
2	**Virtualization Implementation:** In this activity, each student will install and configure a virtual machine or container-based environment to understand the fundamentals of virtualization. They will demonstrate resource allocation (CPU, memory, storage) and isolation between multiple virtual instances. The implementation should showcase the creation, configuration, and execution of virtual environments. Students will submit the configuration details, source/setup files, and screenshots demonstrating successful virtualization, and upload them on the GMIU portal.	10
3	**Cloud Security Analysis (Review Activity):** In this activity each student will prepare a review paper on the security features of a cloud platform to understand critical aspects of cloud security. They will analyze components such as Identity and Access Management (IAM), encryption techniques, and data protection mechanisms implemented by the platform. The study should include comparative analysis, real-world scenarios, and best practices for securing cloud environments. Students will submit a detailed report or research paper along with proper references, and upload it on the GMIU portal.	10

4	**Cloud Risk & SLA Evaluation (Industry Case Study):** In this activity, each student will perform a detailed case study on a real-world cloud service provider to analyze Service Level Agreements (SLA), risk management strategies, and compliance frameworks. They will evaluate security challenges, identify potential risks, and propose mitigation strategies based on industry standards. The study should include comparison of SLAs across providers, identification of gaps, and recommendations for improvement. Students will submit a structured analytical report with real-world references and upload it on the GMIU portal.	10
5	**Cloud Performance Optimization & Auto-Scaling Analysis:** In this activity, each student will conduct a research-oriented study on cloud performance optimization techniques, focusing on load balancing, auto-scaling mechanisms and monitoring tools. They will analyze how cloud systems handle varying workloads and propose optimized architectures for performance and cost efficiency. The activity should include evaluation of real or simulated scenarios, use of cloud monitoring metrics, and discussion of modern trends such as edge/fog computing integration. Students will submit a detailed technical report with diagrams, analysis, and findings, and upload it on the GMIU portal.	10
	Total	50

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	**Remembrance (R)**	**Understanding (U)**	**Application (A)**	**Analyze (N)**	**Evaluate (E)**	**Create (C)**
Weightage %	20%	30%	15%	15%	10%	10%

Note: This specification table shall he treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Understand cloud computing concepts, models, and architecture.
CO2	Apply virtualization and cloud infrastructure techniques.
CO3	Use cloud platforms and deploy applications.
CO4	Analyze cloud security mechanisms and risks.
CO5	Evaluate advanced cloud technologies and real-world applications.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory.

The internal evaluation will be done on the basis of Active Learning Assignment.

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] Rajkumar Buyya, James Broberg, Andrzej Goscinski – Cloud Computing: Principles and Paradigms – Wiley, 2011.
[2] Dan C. Marinescu – Cloud Computing: Theory and Practice – Morgan Kaufmann, 2013.
[3] Douglas Comer – The Cloud Computing Book – Pearson, 2021.
[4] Barrie Sosinsky – Cloud Computing Bible – Wiley, 2011.
[5] Naresh Kumar Sehgal, Pramod Chandra P. Bhatt – Cloud Computing: Concepts and Practices – Springer, 1st Edition, 2018.
[6] Ashish Bhatnagar, Shailza Sharma – Cloud Computing – S.K. Kataria & Sons, 1st Edition, 2018.