



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma in Engineering

Level: Diploma

Branch: Diploma Computer Engineering / Computer Science and Engineering

Subject Code : DI04000041

Subject Name : Cloud Computing

W.E. F. Academic Year:	2025-26
Semester:	4 th
Category of the Course:	Professional Elective - I

Prerequisite:	Basic Knowledge of IT and Networking Knowledge, Security Fundamentals, Programming, Database
Rationale:	The cloud computing syllabus equips students with essential knowledge and practical skills to thrive in today's technology-driven world. It bridges theory and practice through hands-on use of cloud platforms, enhances employability by aligning with industry certifications and job roles, and fosters innovation through problem-solving with scalable cloud solutions. The syllabus also builds awareness of security and compliance, prepares students for emerging trends like containers and server less computing, and encourages adaptability and lifelong learning to stay future-ready.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Describe the principles and paradigm of Cloud Computing	Understand
02	Compare the Deployment models with reference to Cloud Computing	Understand
03	Simulate the Service Model with reference to Cloud Computing	Apply
04	Evaluate various virtualization technologies and methods	Apply
05	Implement comprehensive security measures, ensuring the security and privacy of data	Apply

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

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



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to Cloud Computing <ul style="list-style-type: none">● Cloud Computing: Cloud, Computing, Definition of cloud computing, Central Ideas Behind Cloud Computing● Characteristics of Cloud Computing● Challenges of Cloud Computing● Novel Applications of cloud computing● Security risk of cloud computing● Advantages and Disadvantages of Cloud Computing	6	17
2.	Cloud Computing Architecture & Deployment Model Introduction Cloud Computing Architecture <ul style="list-style-type: none">● Front End● Back End● Components: Client Infrastructure, Cloud access device, Application, Services, Runtime cloud, Storage, Infrastructure, Security Cloud Deployment Model <ul style="list-style-type: none">● Types of Cloud Deployment Model● Public cloud: Brief Introduction, Advantages and Disadvantages● Private cloud: Brief Introduction, Advantages and Disadvantages● Hybrid cloud: Brief Introduction, Advantages and Disadvantages● Community cloud: Brief Introduction, Advantages and Disadvantages● A Comparative Analysis of Cloud Deployment Models Key drivers to adopting the cloud● The impact of Cloud computing on Users	10	23



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3.	<p>Cloud Service Model & Service Providers</p> <p>Cloud Service Model</p> <ul style="list-style-type: none"> ● SaaS: Brief Introduction, Advantages and Disadvantages ● PaaS: Brief Introduction, Advantages and Disadvantages ● IaaS: Brief Introduction, Advantages and Disadvantages ● Difference between SaaS, PaaS, IaaS <p>Service Provider</p> <ul style="list-style-type: none"> ● Amazon web service ● Microsoft Azure ● Google cloud platform ● IBM cloud service ● Oracle cloud ● Red hat ● VMWare cloud <p>Service Level Agreement (SLA)</p> <ul style="list-style-type: none"> ● Brief Introduction ● Life Cycle of SLA 	09	19
4.	<p>Virtualization</p> <ul style="list-style-type: none"> ● Introduction of Virtualization ● Working of Virtualization ● Types of Virtualizations: Desktop virtualization, Network Virtualization, Storage Virtualization, Data virtualization, Hardware Virtualization, Software Virtualization ● Advantages and Disadvantage of Virtualization ● Characteristic and Applications of Virtualization ● Hypervisors: Type 1 Hypervisor, Type 2 Hypervisor, Choosing the right hypervisor 	10	24
5.	<p>Security and Privacy in Cloud Computing</p> <ul style="list-style-type: none"> ● Infrastructure Security: The Network level, The Host level, The Application Level 	10	17



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	<ul style="list-style-type: none"> ● Data Security and storage ● Privacy issue ● Data Life Cycle: Generation, Use, Transfer, Transformation, Destruction, Archival, Storage ● Key Privacy concern in the cloud ● Protecting Privacy <p>Cloud Computing and Big Data for Green Hydrogen Analytics</p> <ul style="list-style-type: none"> ● Role of Cloud Computing in Green Hydrogen Analytics ● Role of Big Data Analytics in Green Hydrogen ● Data Analytics for Predictive Maintenance and Efficiency Optimization ● Cloud-based dashboards for remote monitoring 		
	Total	45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
42	58	00	0	0	0

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Cloud Computing: Concepts, Technology & Architecture, Thomas Erl, Ricardo Puttini, Zaigham Mahmood, Pearson Service Technology ISBN (9780133387520)
2. Cloud Computing For Dummies-- Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, Wiley India Pvt Ltd
3. Cloud Computing Black Book, Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde, Dr. Deven Shah, Dreamtech Press, ISBN (978-9351193944)
4. Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More (Student Edition) - Kris Jamsa- Published by - Jones & Bartlett Learning



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5. Cloud Computing: A practical approach by Anthony T. Vetle – Tata McGraw Hill Education Private Limited (2009)
6. Rajkumar Buyya, Christian Vechhiola, S.Thamarai Selvi, “Mastering Cloud Computing “, McGraw Hill Education (India) Private Limited
7. Cloud Computing: Master the Concepts, Architecture and Applications with Real-world examples and Case studies, Kamal Kant Hiran, Ruchi Doshi, Temitayo Fagbola, Mehul Mahrishi, Dr Maria-Alexandra Paun, Deepak Modi, BPB Publications, ISBN (978-9388511407)

(b) Open source software and website:

1. https://www.tutorialspoint.com/cloud_computing/index.htm
2. <https://www.geeksforgeeks.org/cloud-computing/>
3. https://www.w3schools.com/aws/aws_cloudelements_cloudcomputing.php
4. <https://www.w3schools.in/cloud-computing>
5. <https://www.javatpoint.com/cloud-computing>
6. https://onlinecourses.nptel.ac.in/noc21_cs14/preview
7. <https://www.edx.org/learn/cloud-computing/ibm-introduction-to-cloud-computing>
8. <https://www.coursera.org/specializations/cloud-computing>
9. <https://aws.amazon.com/education/awseducate/>

Suggested Course Practical List:

1. To study cloud architecture and cloud computing model.
2. Study and implementation of Infrastructure as a Service
 - OpenStack Computing Components
 - Install OpenStack on Ubuntu 18.04 with DevStack
3. Study and real life application of Storage as a Service
4. Case Study: "Choosing the Right Cloud Deployment Model"
 - Examine case studies of organizations adopting different cloud deployment models (public, private, hybrid, community).
 - Analyze the advantages and disadvantages of each model.
 - Discuss key drivers influencing the choice of a specific cloud deployment model.
5. Case Study: "Comparative Analysis of Cloud Service Providers"
 - Evaluate case studies of major cloud service providers (e.g., AWS, Azure, Google Cloud).
 - Analyze their service models (SaaS, PaaS, IaaS) and advantages/disadvantages.



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- Discuss the impact of cloud computing on users using real-world examples.
6. Mini-project: Design a flowchart for deploying a simple Hello World application on Google App Engine (steps only, no coding).
 7. Prepare a comparative chart of major cloud providers (AWS, Azure, Google Cloud, Oracle) with their unique features.
 8. Study Firebase Authentication & Cloud Datastore (prepare a flow diagram of how user login & data storage works).
 9. Prepare a comparative table of types of virtualization (desktop, network, storage, data, hardware, software).
 10. Case Study: "Implementing Virtualization in Enterprise IT"
 - Explore a case where an organization successfully implemented virtualization.
 - Discuss the types of virtualization used (desktop, network, storage, data).
 - Analyze the advantages and disadvantages experienced by the organization.
 11. Case Study: "Data Security and Privacy in a Cloud-Based Healthcare System"
 - Investigate a case where a healthcare organization adopted cloud computing.
 - Discuss infrastructure security at the network, host, and application levels.
 - Analyze data security, storage, and privacy issues in the context of sensitive healthcare data.
 12. "Migration to the Cloud: A Banking Sector Perspective"
 - Explore how a traditional bank migrated its infrastructure to a public cloud.
 - Analyze the security considerations and challenges faced during the migration.
 13. "Global Company's Hybrid Cloud Strategy"
 - Examine a multinational corporation's use of a hybrid cloud model.
 - Analyze how the organization balances data storage, compliance, and efficiency.
 14. Case Study: "Netflix – Personalized Recommendations Using Cloud Computing"
 - Discuss Cloud Platform:



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- Analyze Big Data Analytics Approach
- Results and Impact

15. Case study: "National Renewable Energy Laboratory (NREL) – Hydrogen Data Hub"

- Discuss Data Hub
- Explain Outcomes & Impact
- Analyze Challenges & Limitations

List of Laboratory/Learning Resources Required:

1. Computer system with operating system: Windows 7 or higher VerIntel Core i7 processor
16GB RAM 512GB SSD with High speed internet access

Suggested Activities for Students:

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

1. Debate: "Cloud Computing – A Boon or a Security Risk?"
2. Service Model Simulation – Demonstrate SaaS, PaaS, IaaS with real examples (Google Docs, AWS EC2, Heroku).
3. Hands-on: Install and run a VM using VirtualBox/VMware.
4. Privacy Policy Analysis – Compare policies of AWS, Google, Microsoft.
5. Industry Talk / Webinar Report (invite cloud expert).
6. Arrange Poster Making Competition
