



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Master of Computer Applications**

**Level: Post Graduate**

**Course / Subject Code: MC03094131**

**Course / Subject Name: Cloud Computing**

w. e. f. Academic Year:	2025-26
Semester:	3
Category of the Course:	Elective Group-2

<b>Prerequisite:</b>	Operating System, Computer Networking, Distributed Computing, Computer Architecture
<b>Rationale:</b>	<ul style="list-style-type: none"> <li>This course aims students to understand the basic concepts of parallel and distributed computing and their role in cloud computing.</li> <li>Students will realize the importance of cloud virtualization and relevant technologies available in the market.</li> <li>Students will also learn about various cloud computing services, cloud platforms, cloud architecture, cloud service providers and cloud security.</li> <li>This subject focuses on the many strategic and contemporary uses of cloud computing.</li> </ul>

**Course Outcome:**

After Completion of the Course, Students will be able to:

No.	Course Outcomes	RBT Level*
1	Describe basic concepts and characteristics of distributed computing, Cloud Computing and Virtualization techniques	UN
2	Analyze the suitability of public, private, hybrid, and community cloud deployment models for different cloud service models (IaaS, PaaS, and SaaS).	AN
3	Describe the challenges of data security and privacy issues in the cloud environment.	UN
4	Explain the risk, consequences and estimate the cost for various Cloud Computing services.	UN
5	Gain exposure to Google App Engine and use the GAE launcher to launch the web applications.	AP

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

**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 / CA (M)	PA/CA (I)	ESE (V)	
2	0	2	3	70	30	20	30	150



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## Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	<p><b>Overview of Distributed Computing:</b> What is Computing? Traditional Utilities, Creation of the Internet, Computing Paradigm Trends, Computing Paradigm Evolution, Next Big Thing: The “Cloud”, Cloud Computing: A New Paradigm, Differences and Similarities Among Different Types of Computing.</p> <p><b>Introduction to Cloud Computing:</b> Cloud Computing: Definitions, Central Ideas Behind Cloud Computing, Properties and Characteristics of Cloud Computing, Benefits of Cloud Computing, Cloud Service and Deployment Models, Organizational Scenario of Cloud: Cloud Deployment Model, Cloud Architecture, Challenges with Cloud Computing, Cloud Supporting Services, Management and Administration of Cloud Services</p> <p><b>Virtualization Techniques:</b> Virtualization Technology, Overview of X86 Virtualization, Types of Virtualization, Virtualization Products, Concept of VLAN and Benefits, Concept of SAN and Benefits, VM Migration, VM Consolidation and Management, Cloud Interoperability Standards</p>	7	20
2	<p><b>Cloud Computing Services:</b> Infrastructure as Services (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Database as a Service (DBaaS)</p> <p><b>Cloud Types and Models:(2)</b> Private Cloud, Community Cloud, Public Cloud, Hybrid Cloud</p> <p><b>Application Architecture for Cloud:</b> Cloud Application Requirements, Recommendation for Cloud Application Architecture, Fundamental Requirements for Cloud Application Architecture, Relevance and use of Client-server Architecture for Cloud Applications, Addressing Cloud Application Performance and Scalability, Service Oriented Architecture (SOA) for Cloud Applications</p>	7	25



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3	<p><b>SLA with Cloud Service Providers:</b> The Concept of SLA, SLA Aspects and Requirements, Service Availability, Cloud Outages, Credit Calculation for SLA Breaches, Sample SLA for: Amazon S3, The Rackspace Cloud Server, Google Apps, HP Cloud Compute</p> <p><b>Data Security in the Cloud:</b> Challenges with Cloud Data, Challenges with Data Security, Data Confidentiality and Encryption, Data Availability, Data Integrity, Cloud Data Management Interface, Cloud Storage Gateways (CSGs), Cloud Firewall, Virtual Firewall</p>	6	25
4	<p><b>Risk, Consequences and Costs for Cloud Computing:</b> Introducing Risks in Cloud Computing, Risk Assessment and Management, Risk of Vendor lock-in, Risk of Loss of Control, Risk of Not Meeting Regulatory Compliance, Risk of Resource Scarcity or Poor Provisioning, Risk of Multi-Tenant Environment, Risk of Failure, Risk of Failure of Supply Chain, Risk of Inadequate SLA, Risk of Malware and Internet Attack, Risk of Management of Cloud Resources, Risk of Network Outage, Risk in the Physical Infrastructure, Legal Risk due to Legislation, Risk with Software and Application Licensing, Security and Compliance Requirements in a Public Cloud, Calculating Total Cost of Ownership (TCO) for Cloud Computing, Direct and Indirect Cloud Costs, Costs Allocation in a Cloud, Chargeback Model for Allocation of Direct and Indirect Cost, Chargeback Methodology, Cost, Billable Items, Atomic Units, Pricing Model, Chargeback Tools and Solution, Maintaining Strategic Flexibility in a Cloud</p>	6	15
5	<p><b>Using Google Web Services</b> Exploring Google Applications, Surveying the Google Application Portfolio, Exploring the Google Toolkit: The Google APIs, Working with the Google App Engine.</p>	4	15
<b>Total Hours:</b>		<b>30</b>	<b>100%</b>

**Suggested Specification Table with Marks (Theory):**

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	40	40	10	0	0

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



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## References/Suggested Learning Resources:

**Textbook:** (Unit-1 from Book-1, Unit-2 to 4 from Book-2 and Unit-5 from Book-3)

1. Cloud Computing: Fundamental Industry Approach and Trends, By: Rishabh Sharma, Wiley Publication, ISBN: 978-81-265-5306-8
2. Cloud Computing – Black Book, By: Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde and Dr. Deven Shah, Dreamtech Publication, ISBN: 978-93-5119-418-7
3. Cloud Computing - Bible, By: Barrie Sosinsky, Wiley Publishing Corporation, ISBN: 978-0-470-90356-8

## Reference Books:

1. Mastering Cloud Computing, By: Rajkumar Buyya, Christian Vecchiola and S. ThamaraiSelvi, Elsevier, ISBN: 978-0-12-411454-8
2. Cloud Computing: Master the Concepts, Architecture and Applications with Real-world examples and Case studies, By: Kamal Kant Hiran, Ruchi Doshi, Dr. Temitayo Fagbola and Mehul Mahrishi, BPB Publication, ISBN: 978-93-88511-407
3. Cloud Computing: Principles and Paradigms, By: Rajkumar Buyya, James Broberg and Andrzej Goscinski, Wiley Publication, ISBN 978-0-470-88799-8
4. Cloud Computing: A Practical Approach, By: Anthony T Velte, Toby J. Velte, Robert Elsenpeter, Mc Graw Hill Publication, ISBN: 978-0-07-162695-8
5. Cloud Computing, By: Sandeep Bhowmik, Cambridge University Press, ISBN 978-1-316-63810-1
6. Programming Google App Engine, By: Dan Sanderson, 2<sup>nd</sup> Edition, O'Reilly, ISBN: 978-1-449-39826-2

## List of Useful websites / MOOCs

1. [https://www.tutorialspoint.com/cloud\\_computing/index.htm](https://www.tutorialspoint.com/cloud_computing/index.htm)
2. <https://www.geeksforgeeks.org/cloud-computing/>
3. Learners are advised to opt for NPTEL and SWAYAM courses that are relevant to this course

## Suggested Course Practical List:

1	Create an Account to Cloud Service Provider (AWS, AZURE, Google Cloud, etc.)
2	Create an Instance on Cloud
3	Provide Access Control and Permission to Users
4	Execute the Web Page on Cloud
5	Provide Security Mechanism to your instance.



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6	Install Virtual-box / VMware Workstation with different flavors of Linux or windows OS on top of windows7 or 8.
7	Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.
8	Install Google App Engine. Create hello world app and other simple web applications using python/java.
9	Use GAE launcher to launch the web applications.
10	Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
11	Find a procedure to transfer the files from one virtual machine to another virtual machine.
12	Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
13	Install Hadoop single node cluster and run simple applications like word count.
14	Creating Amazon EC2 instances with Microsoft Windows & Linux Server.
15	Launch a Web Server (IIS & Apache)
16	Working with Amazon Elastic Block Store (EBS)
17	Introduction to AWS Identity and Access Management (IAM)
18	Deploy a Web Application on AWS
19	CloudWatch Monitoring, Creating Dashboard, Setting up Alarms and Notifications.
20	Develop a hello world program web application and deploy it on the Google app engine.
21	Develop a web application which is customized version of the practical no 2, which relates the clock with Google accounts. Each user will get different view based on the preferences and the user's time zone.
22	Develop a simple Java web application for Google App Engine--a guestbook that lets users post messages to a public message board.
23	<b>List of projects:</b> (1) Online Book Store using Cloud Computing (2) University Campus Online Automation Using Cloud Computing (3) Student Information using Cloud Computing

### CO- PO Mapping:

Semester : 3	Course Name : Cloud Computing							
	POs							
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	1	1	-	-	-	-



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CO2	2	2	-	1	-	-	-	-
CO3	2	2	-	-	-	-	-	-
CO4	3	1	2	1	-	2	-	-
CO5	3	2	2	3	-	2	1	-

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

Note: The CO-PO mapping is indicative; the institute/faculty member can change as required.

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