



## GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3170717

**CLOUD COMPUTING**

Semester - 7<sup>th</sup> Semester

**Type of course:** Professional Elective

**Prerequisite:** Fundamentals of Distributed Computing

**Rationale:** This course aims students to understand the hardware, software concepts and architecture of cloud computing. Students realize the importance of Cloud Virtualization, Abstractions and Enabling Technologies.

### Teaching and Examination Scheme:

| Teaching Scheme |   |   | Credits<br>C | Examination Marks |    |                 |        | Total<br>Marks |
|-----------------|---|---|--------------|-------------------|----|-----------------|--------|----------------|
| L               | T | P |              | Theory Marks      |    | Practical Marks |        |                |
|                 |   |   |              | ESE (E)           | PA | ESE (V)         | PA (I) |                |
| 3               | 0 | 0 | 3            | 70                | 30 | 0               | 0      | 100            |

### Contents:

| Sr. No. | Content   | Total Hrs |
|---------|---|-----------|
| 1       | <b>Introduction:</b> Cloud Computing, Layers and Types of Clouds, Cloud Infrastructure Management, Challenges and Applications. Virtualization: Virtualization of Computing, Storage and Resources. Cloud Services: Introduction to Cloud Services IaaS, PaaS and SaaS  | 04        |
| 2       | <b>Software as a Service (SaaS):</b> Evolution of SaaS, Challenges of SaaS Paradigm, SaaS Integration Services, SaaS Integration of Products and Platforms. Infrastructure As a Services (IaaS): Introduction, Background & Related Work, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action. Platform As a service (PaaS): Integration of Private and Public Cloud, Technologies and Tools for Cloud Computing, Resource Provisioning services | 08        |
| 3       | <b>Abstraction and Virtualization:</b> Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Context, Virtualization of CPU, Memory, I/O Devices, Virtual Clusters and Resource management, Virtualization for Data Center Automation      | 08        |
| 4       | <b>Cloud Infrastructure and Cloud Resource Management:</b> Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources. Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards   | 08        |
| 5       | <b>Security:</b> Security Overview, Cloud Security Challenges and Risks, Software-as-a Service Security, Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security, Identity and Presence, Identity Management and Access Control, Autonomic Security Establishing Trusted Cloud   | 07        |



## GUJARAT TECHNOLOGICAL UNIVERSITY

### Bachelor of Engineering

Subject Code: 3170717

|   |   |    |
|---|---|----|
|   | computing, Secure Execution Environments and Communications, , Identity Management and Access control Identity management, Access control, Autonomic Security Storage Area Networks, Disaster Recovery in Clouds.                                 |    |
| 6 | <b>Cloud Middleware:</b> OpenStack, Eucalyptus, Windows Azure, CloudSim, EyeOs, Aneka, Google App Engine  | 05 |
| 7 | <b>Cloud Based Case-Studies:</b> Overview of Cloud services, Designing Solutions for the Cloud, Implement & Integrate Solutions, Emerging Markets and the Cloud, Tools for Building Private Cloud: IaaS using Eucalyptus, PaaS on IaaS - AppScale | 05 |

### Suggested Specification table with Marks (Theory):

| Distribution of Theory Marks |         |         |         |         |         |
|------------------------------|---------|---------|---------|---------|---------|
| R Level                      | U Level | A Level | N Level | E Level | C Level |
| 25                           | 30      | 10      | 05      | -       | -       |

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

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

### 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.

**Course Outcomes:** Students will be able to

| Sr. No. | CO Statement  | Marks % Weightage |
|---------|---|-------------------|
| 1       | Compare the strengths and limitations of cloud computing                                  | 15                |
| 2       | Identify the architecture, infrastructure and delivery models of cloud computing          | 25                |
| 3       | Apply suitable virtualization concept.  | 20                |
| 4       | Choose the appropriate cloud player, Programming models and approach                      | 20                |
| 5       | Address the core issues of cloud computing such as security, privacy and interoperability | 20                |

### List of Open Source Software/learning website:

- [technolamp.blogspot.com](http://technolamp.blogspot.com)
- [www.intelligentedu.com/](http://www.intelligentedu.com/)
- NITTR Instructional Resources Videos