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|  | | | | | **INDUS INSTITUTE OF TECHNOLOGY& ENGINEERING**  **Constituent Institute of Indus University** | | | | | | | |
| **Subject: Cloud Computing** | | | | | | | | | | | |
| **Program: B. Tech CE/CS/IT** | | | | | | **Subject Code: :CE0723** | | | | **Semester: VII** | |
| **Teaching Scheme (Hours per week)** | | | | | **Examination Evaluation Scheme (Marks)** | | | | | |  |
| **Lecture** | **Tutorial** | **Practical** | **Credits** | | **University Theory Examination** | | **University Practical Examination** | **Continuous Internal Evaluation (CIE)- Theory** | **Continuous Internal Evaluation (CIE)- Practical** | | **Total** |
| **3** | **0** | **2** | **4** | | **40** | | **40** | **60** | **60** | | **200** |

**Course Objectives:**

1. Identify the technical foundations of Cloud systems architecture.

2. Analyze the problems and solutions to cloud application problemssoftware that helps in skill development.

3. Identify the research scope in cloud computingthat enhances entrepreneurship skills in students.

4. Describe various service delivery models of cloud computing architecture, and the ways in which clouds can be deployed as public, private, hybrid, and community clouds.

5. Comprehend the technical capabilities and business benefits of virtualization and cloud computingthat enhance the employability skills of students.

6. Describe the landscape of different types of virtualization and understand the different types of clouds.

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**CONTENTS**

**UNIT-I**

**[12 hours]**

**Introduction to Cloud Computing Cloud Computing:** Overview, History of Cloud Computing, Layers and Types of Cloud, Offerings of a cloud, Software-as-a-Service, Platform- as-a-Service, Infrastructure-as-a-Service, Challenges and Risks.

**Cloud Computing Architecture and Vitalization:** Cloud Computing Architecture, Deployment Models, Virtualization, XML Basics, web Services, Service Oriented Architecture**.**

**UNIT-II**

**[12 hours]**

**Managing Cloud and SLA**: Managing cloud data, Introduction to MapReduce, OpenStack, Cloud Economics, Service Level Agreement (SLA), Resource Management, Case Studies Commercial Cloud and Google Cloud Platform.

**Virtualization of the resource provisioning**: Virtual machine technology, virtualization applications in enterprises, Drawbacks of virtualization.

**Multitenancy on offering**: Multi-entity support, Multi-schema approach, Multitenancy using cloud data stores, Data access control for enterprise applications.

**UNIT-III**

**[12 hours]**

**Cloud Security Aspects:**

**Cloud security fundamentals** Vulnerability assessment tool for cloud, Privacy and Security in cloud

**Cloud computing security Structure** Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro- architectures; Identity Management and Access control Identity management, Access control, Autonomic Security, Virtualization security management virtual threats, VM Security Recommendations, VM-Specific Security techniques.

**Cloud computing security Issues**: Cloud Computing: Security Issues in Collaborative SaaS, Cloud Computing: Broker for Cloud Marketplace

**UNIT-IV**

**[12 hours]**

**Recent trends and Research scope in cloudcomputing**: Mobile cloud Computing, Fog Computing, Geo-Spatial cloud, Green Cloud Computing, IoT Cloud, Big Data and Cloud Computing, Introduction to Docket Container, Research Scope of the Cloud Computing, Open Source and Commercial Clouds, Cloud Simulator

**Course Outcomes**

At the end of this subject, students should be able to:

1. Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
2. Implement the virtual cloud.
3. Security perusal of data in cloud environment.
4. Compare various cloud service provider architecture.
5. Illustrate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.
6. Explore the research scope of cloud computing

**Text Books:**

1. Rajkumar Buyya, Cloud Computing: Principles and Paradigms, John Wiley & Sons, First Edition
2. Gautam Shroff, Enterprise Cloud Computing: Technology, Architecture, Applications, Cambridge University Press, First Edition Judith Hurwitz, R Bloor, M.Kanfman, F.Halper, Cloud Computing for Dummies, Wiley India Edition, First Edition

**Reference Books:**

1. Anthony T Velte, Cloud Computing : A Practical Approach, McGraw- Hill Osborne, First Edition
2. Barrie Sosinsky, Cloud Computing Bible, Wiley India, First Edition
3. Ronald Krutz and Russell Dean Vines, Cloud Security, Wiley-India, First Edition
4. Tim Malhar, S. Kumaraswammy, S.Latif, Cloud Security & Privacy, O’Really Publications, First Edition
5. Scott Granneman, Google Apps, Pearson, First Edition

**Web Resources**

1. <http://cloudbus.orgH>

2. <Http://www.salesforce.com/in/cloudcomputing/>

3. http://www.ibm.com/cloud-computing/in/en/what-is-cloud- computing.html

4. <http://www.rackspace.com/cloud/what_is_cloud_computing>

5. <http://aws.amazon.com/>

6. <http://www.microsoft.com/en-in/server-cloud/cloud-os/>

7. <http://azure.microsoft.com/en-in/>

8. <https://cloud.google.com/>

9. https://cloud.google.com/products/

**LIST OF EXPERIMENTS**

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| **Experiment. No.** | **Title** | **Learning Outcomes** |
| 1 | Sketch out and analyze architecture of Cloudsim and identify different entities to understand the structure of cloudsim | Usage of CLoudSim and Architecture of the same. |
| 2 | Create a scenario in cloudsim to create a datacenter along with one host. Also create one virtual machine with static configuration to run one cloudlet on it. | Working of the data centers in cloud environment. |
| 3 | Illustrate a scenario in cloudsim to create one datacenter and one host. Also implement required virtual machines to run two cloudlets on it. Assume that cloudlets run in VMs with the same MIPS requirements. The cloudlets will take the same time to complete the execution. | Understanding the cloudlets request in a cloud scenario |
| 4 | Implement a datacenter with two hosts and run two cloudlets on it in cloudsim. Consider the cloudlets run in VMs with different MIPS requirements. The cloudlets will take different time to complete the execution depending on the requested VM performance. | Analyzing the cloud performance in the distinct scenario. |
| 5 | Design a program in cloudsim to create two data centers with one host and run two cloudlets on it. | Multiple cloudlet execution in the cloud. |
| 6 | Construct a case in cloudsim to create two datacenters with one host each and run cloudlets of two users on them. | Multiple data center approach and its performance on the cloud. |
| 7 | Make and perform scenario to pause and resume the simulation in cloudsim, and create simulation entities (a Datacenter Broker) dynamically | Understanding the Broker concept with example |
| 8 | Organize a case in cloudsim for simulation entities (a Datacenter Broker) in run-time using a global manager entity (Global Broker). | Understanding the global manager in cloud. |
| 9 | Sketch out and analyze architecture of Microsoft Azure. | Working of AZURE cloud. |
| 10 | Implement a web application using Microsoft Azure account as a cloud service by creating a web page and database. Also provide database connectivity with implemented webpage. | Utilizing the cloud services. |