

ITE3007	Cloud Computing and Virtualization	L	T	P	J	C
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Pre-requisite	ITE2001	Syllabus version				
		1.0				
Course Objectives:						
<ul style="list-style-type: none"> To provide comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications 						
<ul style="list-style-type: none"> To learn basic concepts of MapReduce programming models for big data analysis on cloud. 						
<ul style="list-style-type: none"> To expose the students to frontier areas of Cloud Computing and virtualization concepts. 						
Expected Course Outcome:						
1) Analyse and solve industry-related problems using cloud computing solutions.						
2) Design different workflows according to requirements and apply Map Reduce programming model.						
3) Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud.						
4) Use cloud computing tools offered by industry leaders such as Amazon and Google.						
5) Assess cloud Storage systems and Cloud security, the risks involved, its impact.						
6) Compare, contrast, and evaluate the key trade-offs between multiple approaches to cloud system design.						
7) Design and evaluate a cloud-based system, process, component, or program to meet the desired needs.						
Student Learning Outcomes (SLO): 6, 17						
[6]	Having an ability to design a component or a product applying all the relevant standards and with realistic constraints.					
[17]	Having an ability to use techniques, skills and modern engineering tools necessary for engineering practice					
Module:1	Overview of Computing Paradigm	5 hours				
Recent trends in Computing- Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Web services.						
Module:2	Introduction to Cloud Computing	6 hours				
Introduction to Cloud Computing- System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud – Community Cloud – Hybrid Cloud.						
Module:3	Basics of Virtualization	6 hours				
Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures -						

Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.			
Module:4	Virtualization Techniques	6 hours	
Storage Virtualization – System-level or Operating Virtualization – Control-Plane Virtualization– Virtual Machine Basics – Taxonomy of Virtual machines - Server Virtualization – Physical and Logical Partitioning - Types of Server Virtualization.			
Module:5	Parallel and Distributed Programming Paradigms	6 hours	
MapReduce, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Cloud Software Environments -Google App Engine, Amazon AWS, Azure - Open Source tools.			
Module:6	Cloud infrastructure	6 hours	
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.			
Module:7	Security Overview	7 hours	
Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.			
Module:8	Contemporary issues	3 hours	
	Total Lecture hours:	45 hours	
Text Book(s)			
1.	Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, 2012.		
Reference Books			
1.	Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy, Oreilly, 2009		
2.	Barrie Sosinsky, Cloud Computing Bible, Wiley-India, 2011.		
3.	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011.		
4.	Ronald L. Krutz, Russell Dean Vines, Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley-India, 2010.		
5.	John W.Rittinghouse and James F.Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2010.		
6.	Rajkumar Buyya, Chirstian Vecchiola, S.Thamarai Selvi, Mastering Cloud Computing, Tata McGraw Hill ,2013		
Recommended by Board of Studies		05-03-2016	
Approved by Academic Council		No. 40	Date 18-03-2016