CLOUD COMPUTING

VII Semester: IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AITB15	**Core**	3	-	-	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

I. COURSE OVERVIEW:

Cloud Computing is a large-scale distributed computing paradigm which has become a driving force for information technology over the past several years. The exponential growth data size in scientific instrumentation/simulation and social media has triggered the wider use of cloud computing services. We will explore solutions and learn design principles for building large network-based systems to support both compute and data intensive computing across geographically distributed infrastructure

II. OBJECTIVES:

The course should enable the students to:
- I. Provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real-life scenarios.
- II. Enable students exploring some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.
- III. Expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.
- IV. Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.

COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Outline** the concept of cloud computing, its evolution for on-demand network access to a shared pool of configurable computing resources over the internet	Understand
CO 2	**Explain** distributed and cloud computing system models using Multi-core CPUs and Multithreading Technologies to handle diversifiedtasks in Network based Systems	Understand
CO 3	**Illustrate** the benefits and drawbacks of cloud software environments for distributed systems that help multiple computers to host different software components to accomplish a common goal	Understand
CO 4	**List** the cloud security providers and their impact for obtaining power requirements of high-performance computing (HPC)/ high density applications	Remember
CO 5	**Outline** the architectural design for running applications, storingdata, files and performing backups of compute and storage clouds	Understand
CO 6	**Relate** the various layers in the cloud building blocks for differentiating cloud service models which satisfy a unique set ofindustry requirements	Analyze
CO 7	**Distinguish** various threats and techniques used in cloud security for accurate access control between cloud providers and their customers	Understand

CO 8	**Illustrate** the reasons for full virtualization and para virtualization techniques used in CPUs to enhance resource sharing and improve computer performance	Understand
CO 9	**Compare** classical OS virtual memory and system memory virtualization for CPU and I/O devices communication and management	Analyze
CO 10	**Identify** the need for policies, mechanisms and techniques for automation, orchestration of resources and key scheduling in a cloud.	Apply
CO 11	**Explain** the fundamental aspects of parallel and distributed programming models for implementing Inter-Process Communication in Cloud and Grid platforms	Understand
CO 12	**Compare** Amazon AWS, MS Azure and Google cloud used in programming large clusters of servers that store many terabytes and petabytes of information	Evaluate
CO 13	**Analyze** different cloud programming models to obtain solutions for cloud problems such as storage and design to meet exact needs.	Apply

IV. SYLLABUS:

MODULE-I	SYSTEM MODELING, CLUSTERING AND VIRTUALIZATION	Classes:09

Scalable computing over the Internet, Technologies for network-based systems, System models for distributed and cloud computing, Software environments for distributed systems and clouds, Performance, security and energy efficiency.

MODULE-II	VIRTUAL MACHINES AND VIRTUALIZATION OF CLUSTERS AND DATA CENTERS	Classes: 09

Implementation levels of virtualization, Virtualization tools, structures and mechanisms, Virtualization of CPU, Memory and I/O devices, Virtual clusters and resource management, Virtualization for data center automation.

MODULE-III	CLOUD PLATFORM ARCHITECTURE	Classes: 09

Cloud computing and service models, Architectural design of compute and storage clouds, Public cloud platforms, Inter-cloud resource management.

Cloud security and trust management, Service Oriented Architecture (SOA), Message-oriented middleware architecture.

MODULE-IV	CLOUD PROGRAMMING AND SOFTWARE ENVIRONMENTS	Classes: 09

Features of Cloud and grid platforms, Parallel and distributed programming paradigms, Programming support of Google App Engine, Programming on Amazon AWS and MS Azure, Emerging cloud software environments.

MODULE-V	CLOUD RESOURCE MANAGEMENT AND SCHEDULING	Classes: 09

Policies and mechanisms for resource management applications of control theory to task scheduling in a cloud, Stability of a two-level resource allocation architecture, Feedback controls based on dynamic thresholds, Coordination of specialized autonomic performance managers, Resource Bundling.

V. Textbooks:

1. Rajkumar Buyya, James Broberg and Andrzej, M.Goscinski, "Cloud computing: Principles and Paradigms" Wiley, 2011.
2. Kai Hwang, Geofferyu C.Fox, Jack J.dongarra, "Distributed and Cloud Computing", Elsevier, 2012.

3. Dan Marinescu, "Cloud Computing Theory and Practice", Elsevier, 3rd Edition, 2012.
4. Arshadeep Bagra and Vijay Madisetti, "Cloud Computing, A Hands-On Approach", University Press, 3rd Edition, 2012.

VI. Reference Books:

1. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGraw Hill, 2011.
2. Gautam Shroff, "Enterprise Cloud Computing", Cambridge University Press, 2010.
3. John W .Ritting house ,James F. Ransom, "Cloud Computing: Implementation, Management and Security" CRC press, 2012.
4. George Reese, "Cloud Applications Architectures: Building Applications and Infrastructure in the Cloud", O Reilly, SPD, 2011.
5. im Mather, Subra Kumaraswamy, Shahed Latif, Oreilly, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", SPD, 2011.

VII. Web References:

1. http://searchcloudcomputing.techtarget.com/definition/cloud-computing.
2. http://in.pcmag.com/networking-communications-software/38970/feature/what-is-cloud-computing.

VIII. E-Text Books:

1. http://www.pds.ewi.tudelft.nl/ , http://csrc.nist.gov/publications/nistpubs.
2. http://cloudipedia.com/wp-content/uploads/2009/11/cloud_computing_made_easy.pdf.

IX. MOOC Course:

1. http://www.edx.org/course/introduction-cloud-computing-ieeex-cloudintro-x-1
2. http://www.coursera.org/specialization/cloud-computing