

FOR EXAMINATIONS TO BE HELD IN THE MAY 2021, 2022, 2023

Class: M.Tech 2nd Semester

Branch: CSE

Course Title: Cloud Computing

Course No.: MCSE22A

Duration Exam: 3 HRS

L	T	P	C	Theory (External)	Internal
3	-	-	3	75	25

Course Overview: The course introduces the principles of distributed and parallel computing underlying cloud architectures and specifically focuses on virtualization, thread programming, task programming, and map-reduce programming. It explains how to make design choices and tradeoffs to consider when building applications to run in a virtual cloud environment.

Course Outcomes: By the end of the course students shall be able to:

CO22A.1	Install and configure various Cloud computing environments like Hadoop/AWS etc.
CO22A.2	Understand deployment of service and its usage over cloud by implementing Para-Virtualization using VM Ware's Workstation/ Oracle's Virtual Box and Guest O.S
CO22A.3	Implement Concurrent computing techniques to manage cloud resources efficiently.

Detailed Syllabus

UNIT 1: Distributed Systems: Virtualization, Web Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development. **(06 hrs)**

UNIT 2: Principles of Parallel and Distributed Computing: Eras of Computing, Parallel vs. Distributed Computing, Elements of Parallel Computing, Parallel Processing, Hardware Architectures for Parallel Processing, Approaches to Parallel Programming, Levels of Parallelism, Laws of Caution, Elements of Distributed Computing, General Concepts and Definitions, Components of a Distributed System, Architectural Styles for Distributed Computing, Models for Inter-Process Communication, Technologies for Distributed Computing, Remote Procedure Call, Distributed Object Frameworks, Service Oriented Computing. **(08 hrs)**

UNIT 3: Introduction to Virtualization: Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Case Studies: Xen(Paravirtualization), VMware(Full Virtualization), Microsoft(Hyper-V) . **(06 hrs)**

UNIT 4: Cloud Computing Architecture: Cloud Definition, Cloud Reference Model, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds(Public, Private, Hybrid and Community), Economics of the Cloud, Open Challenges, Cloud Interoperability and Standards, Scalability and Fault Tolerance, Security, Trust, and Privacy, Organizational Aspects. **(08 hrs)**

UNIT 5: Concurrent Computing and High-Throughput Computing: Thread Programming, Introducing Parallelism for Single Machine Computation, Programming Applications with Threads, Threads, Thread APIs, Techniques for Parallel Computation with Threads, Domain Decomposition: Matrix Multiplication, Functional Decomposition: Sine, Cosine, and Tangent, Task Programming, Task Computing, Characterizing a Task, Computing Categories, Frameworks for Task Computing, Task-based Application Models, Embarrassingly Parallel Applications, Parameter Sweep Applications, MPI Applications, Workflow Applications with Task Dependencies, Task Programming Model, Developing Applications with the Task Model, Developing Parameter Sweep Application, Managing Workflows. **(08 hrs)**

Note: The Question paper will comprise of 7 questions of 15 marks each uniformly distributed over the entire syllabus based on teaching hours. The candidates shall have to attempt any 5 questions.

Suggested Books:

- Rajkumar Buyya , Christian Vecchiola, S Thamarai Selvi, —Mastering Cloud Computing, McGraw Hill, Reprint 2006.
- T. Velte, A. Velte, R. Elsenpeter, Cloud Computing, A Practical Approach, McGraw-Hill, 2009
- Barrie Sosinsky, Cloud Computing Bible, Wiley, 2011
- Jurg Van Vliet and Flavia Paganelli, Programming Amazon EC2, O’Rielly, 2011