

Year: M. Tech. I (Semester – II)

Subject Name: Cloud Computing

Subject Code: MTCO24202

Type of course: Professional Elective - III

Prerequisite (if any): Fundamentals of Distributed Computing

List of Courses where this course will be a prerequisite: --

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

Teaching and Examination Scheme:

| Teaching Scheme | | | | Theory Marks | | | Practical Marks | | Total |
|-----------------|---|---|---|--------------|-----|-----|-----------------|-----|-------|
| L | T | P | C | TEE | CA1 | CA2 | TEP | CA3 | |
| 3 | 0 | 2 | 4 | 60 | 25 | 15 | 30 | 20 | 150 |

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests. CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

| Sr. No. | Content | Total Hrs |
|---------|--|-----------|
| 1 | Overview of Computing Paradigm: Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Cloud Computing (NIST Model) Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers | 3 |
| 2 | Cloud computing stack: Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models (XaaS): Infrastructure as a Service(IaaS): , Platform as a Service(PaaS):, Software as a Service(SaaS) Deployment Models: Public cloud, Private cloud, Hybrid cloud, Community cloud | 8 |
| 3 | Introduction to Virtualization: Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost – limitations Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization – Network virtualization, Migrating into a Cloud Introduction, Challenges while migrating to | 10 |

| | | |
|---|--|----|
| | Cloud, Broad approaches to migrating into the cloud-why migrate -deciding on cloud migration, the Seven-step model of migration into a cloud. | |
| 4 | AWS Web Services: Amazon EC2, AWS Storage, AWS Identity and access management, Serverless Services on AWS (AWS Lambda), Application integration, AWS Security, Identity, and Compliance, AWS Machine Learning Services | 12 |
| 5 | Google Cloud Services: Google Compute, BigQuery ML, Data Analytics on Google Cloud, Database Management, Business Intelligence and Analytics with Looker | 7 |
| 6 | Cloud Security: Infrastructure Security-Network level security, Host level security, Application level security, Data security and Storage,Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control | 5 |

Reference Books:

| Sr.No | Title of book /article | Author(s) | Publisher and details like ISBN | Year of publication | Publication Edition |
|-------|---|---|--|---------------------|---------------------|
| 1 | Cloud Computing Bible | Sosinsky B | Wiley India ISBN: 978-0-470-90356-8 | 2011 | |
| 2 | Cloud Computing: Principles and Paradigms | Rajkumar Buyya | Wiley India Edition | 2011 | |
| 3 | Cloud Security and Privacy | Tim Mather, Subra Kumaraswamy, and Shahed Latif | O'Reilly Media | 2009 | 1 |
| 4 | Cloud Computing – A Practical Approach | Velte T., Velte A., Elsenpeter R., | Tata McGraw-Hill | 2010 | |
| 5 | Cloud Security -A Comprehensive Guide to Secure Cloud Computing | Ronald L. Krutz Russell Dean Vines | Wiley ISBN: 978-0-470-58987-8 | 2010 | |

Course Outcomes:

| Sr.No. | CO statement | Marks % weightage |
|--------|--------------|-------------------|
| | | |



| | | |
|------|---|----|
| CO-1 | To understand the principles and paradigm of Cloud Computing | 20 |
| CO-2 | Formulate the Service Model with reference to Cloud Computing | 25 |
| CO-3 | Demonstrate the role of Virtualization Technologies | 20 |
| CO-4 | Understand cloud security issues and solutions | 10 |
| CO-5 | Ability to design and deploy Cloud Infrastructure | 25 |

List of Open learning website:

- www.nptel.ac.in

List of Open Source Software:

- Open Stack
- Open Shift
- Cloud Sim
- Xen

FOR LAB SESSIONS:

Recommended List of Practicals:

| Sr. No | Practical |
|--------|--|
| 1 | Deploy website on Google Cloud |
| 2 | Create a scenario in CloudSim to create a data center and host. Also create virtual machines with static configuration to run cloudlets on them. |
| 3 | Organize a case in Aneka / Eucalyptus for simulation entities in run-time using its toolkit support and manage virtual clouds. |
| 4 | Sketch out and analyze the architecture of Microsoft Azure. |
| 5 | Sketch out and analyze the architecture of Amazon Web Service (AWS). |
| 6 | Categorize Microsoft Azure Services and discuss each. |
| 7 | Categorize Amazon Web Service (AWS) and implement its various cloud entities using its Cloud Toolbox support. |
| 8 | Implement and use sample cloud services with the help of Microsoft Azure. |
| 9 | Create a sample mobile application using Microsoft Azure account as a cloud service. Also provide database connectivity with implemented mobile applications. |
| 10 | Create a sample mobile application using Amazon Web Service (AWS) account as a cloud service. Also provide database connectivity with implemented mobile applications. |