**DEPARTMENT OF COMPUTER ENGINEERING**

**B.E. IV YEAR (4YDC)**

**CO 44___: CLOUD COMPUTING**

| HOURS PER WEEK | | | CREDITS | | | MAXIMUM MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| T | P | Tu. | T | P | TOTAL | THEORY | | PRACTICAL | | TOTAL MARKS |
| | | | | | | CW | END SEM | SW | END SEM | 200 |
| 3 | 2 | 0 | 3 | 1 | 4 | 30 | 70 | 40 | 60 | |

**PRE-REQUISITE:** NIL

**COURSE OUTCOMES:**

**After Completing the course student should be able to:**

1. Understand web services, service oriented computing and their implementation.
2. Understand cloud file system and map reduce model & their implementation
3. Understand concept of virtualization, security issues and challenges in cloud.
4. Understand applications of cloud, inter cloud issues.

**COURSE CONTENTS:**

**THEORY:**

UNIT 1. Introduction to Service Oriented Architecture, Web Services, Basic Web Services Architecture, Introduction to SOAP, WSDL and UDDI; RESTful services: Definition, Characteristics, Components, Types; Software as a Service, Platform as a Service, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Study of a Hypervisor.

UNIT 2. Utility Computing, Elastic Computing, Ajax: asynchronous 'rich' interfaces, Mashups: User interface, Services Virtualization Technology: Virtualization applications in enterprises, Pitfalls of virtualization Multitenant software: Multi-entity support, Multi-schema approach, Multi-tenance using cloud data stores.

UNIT 3. Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, Features and comparisons among GFS, HDFS etc, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The Map-Reduce model: Parallel efficiency of Map-Reduce, Relational operations, Enterprise batch processing, Example/Application of Map-Reduce.

UNIT 4. Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud: Cloud computing security architecture, General Issues, Trusted Cloud computing, Security challenges: Virtualization security management-virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

UNIT 5. Issues in cloud computing; implementing real time application; QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load

balancing, Resource optimization, Resource dynamic reconfiguration, Monitoring in Cloud, Installing cloud platforms and performance evaluation, Features and functions of cloud computing platforms.

**TEXT BOOKS RECOMMENDED:**

1. Kai Hawang, Geoferrey C Fox, "Distributed and Cloud Computing", Elseveir publication, 2012
2. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, "Cloud Computing for Dummies", Wiley India Edition
3. Rajkumar Buyya, Christian Vecchiola, S. Thamaraselvi, Mastering Cloud Computing, McGraw Hill, 2013

**REFERENCE BOOKS:**

1. Scott Granneman, "Google Apps", Pearson, 2012
2. Tim Malhar, S.Kumaraswammy, S.Latif, "Cloud Security & Privacy", SPD, O'REILLY
3. Ronald Krutz and Russell Dean Vines, "Cloud Security", Wiley-India, 2011

**THEORY ASSESSMENT:**

1. Internal Assessment for continuous evaluation, mid-term tests, Tutorials, Quizzes, Class Performance, etc. (30%)
2. End semester Theory Exam (70%)

**PRACTICAL:**

1. Study of services of different cloud provider like Google App engine/Amazon/Sales Force/Aneka/Microsoft Azure.
2. Deployment of app in a cloud.
3. Assignment to understand concepts of virtualization.
4. Installation of Hadoop and programming assignments on map-reduce.
5. Creating a toy distributed file system.

**PRACTICAL ASSESSMENT:**

1. Internal Assessment for continuous evaluation (40%): Lab assignments, demonstration Viva, file etc.
2. End semester Practical Exam (60%): Quiz/Programming test, lab journal, demo, viva etc.