|  |  |
| --- | --- |
| MONO | **DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING****NATIONAL INSTITUTE OF TECHNOLOGY PATNA** Ashok Raj Path, PATNA 800 005 (Bihar), India |
|  Phone No.: 0612 – 2372715, 2370419, 2370843, 2371929, 2371930, 2371715 Fax – 0612- 2670631 Website: [www.nitp.ac.in](http://www.nitp.ac.in/) |

***CSX457*** ***CLOUD COMPUTING***

**L-T-P-Cr 3-0-0-3**

**Pre-requisites:** Basic knowledge of networks and algorithms

**Objectives/Overview:**

* This course introduces about the cloud environment.
* Building software systems and components that scale to millions of users in modern internet.
* Cloud concepts capabilities across the various cloud service models including IaaS, PaaS, SaaS, and developing cloud based software applications on top of cloud platforms.
* This course also introduces about the data intensive computing and studies about different cloud applications.

**Course Outcomes:**

At the end of the course, a student should:

|  |  |  |
| --- | --- | --- |
| **S.NO** | **Course outcomes ( Cloud Computing)**  |  |
|  | Understands the basic concepts and terminologies in cloud computing, parallel and distributed computing | PO4, PO7, PO12 |
|  | Demonstrate the knowledge in virtualization and different technology examples of virtualization | PO2, PO4, PO7, PO12 |
|  | Understands the cloud computing architecture and how to build Aneka clouds. | PO2, PO4, PO7, PO12 |
|  | Able to design data intensive applications using Map-Reduce programming. | PO1, PO6, PO7, PO12 |
|  | Able to demonstrate the different cloud applications.  | PO3, PO4, PO7, PO12 |

**UNIT I: Introduction Lectures: 6**

Cloud Computing at a Glance, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies.

**Principles of Parallel and Distributed Computing**

Eras of Computing, Parallel vs. Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing, Technologies for Distributed Computing

**UNIT II: Virtualization Lectures: 8**

Introduction, Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples.

**UNIT III: Cloud Computing Architecture**  **Lectures: 12**

Introduction, Cloud Reference Model, Types of Clouds, Economics of the Cloud, Open Challenges

**Cloud Application Platform:** Anatomy of the Aneka Container, Building Aneka Clouds, Cloud Programming and Management High-Throughput Computing: Task Programming: Task Computing, Task-based Application Models, Aneka Task-Based Programming.

**UNIT IV: Data Intensive Computing**: **Lectures: 6**

Map-Reduce Programming: What is Data-Intensive Computing? Technologies for Data-Intensive Computing.

**UNIT V: Cloud Applications**: **Lectures: 6**

Scientific Applications, Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Biology: Gene Expression Data Analysis for Cancer Diagnosis, Business and Consumer Applications, Multiplayer Online Gaming.

**UNIT VI: Advanced Topics in Cloud Computing**: **Lectures: 4**

Energy Efficiency in Clouds, Market Based Management of Clouds

**Text/Reference Books**

1. *Mastering Cloud Computing*: by Rajkumar Buyya, Christian Vecchiola and S. Thamarai
Selvi, McGraw Hill Education.
2. *Cloud Computing*: by Rajkumar Buyya, TMH