Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Fourth Year Bachelor of Engineering (CE/IT)

(To be Proposed For: Academic Year 2020-21)

Subject Code: CT703A-N	**Subject Title: High Performance Computing**
Pre-requisite	

Teaching scheme				**Total Credit**	**Evaluation Scheme**					**Total Marks**
L	**T**	**P**	**Total**		**Theory**		**IE Marks**	**CIA Marks**	**Pract. Marks**	
Hrs	**Hrs**	**Hrs**	**Hrs**		**Hrs**	**Marks**				
04	00	02	06	05	03	70	30	20	30	150

Learning Objective:

- To Study various computing technology architecture.
- To know Emerging trends in computing technology.
- To highlight the advantage of deploying computing technology.
- To explore the next generation of computing paradigm.

Outline of the course:

Sr. No	**Title of the Unit**	**Minimum Hours**
1	Cluster Computing and its Architecture	10
2	Cluster Setup and Administration	8
3	Introduction to Grid and its Evolution	8
4	Introduction to Cloud Computing	9
5	Nature of Cloud	7
6	Cloud Elements	6
7	Introduction to Hadoop	8
8	Introduction to FOG Computing and EDGE computing	8

Total hours (Theory): 64
Total hours (Lab): 32
Total hours: 96

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DETAILED SYLLABUS:

Sr. No	Topic	Lecture Hours	Weightage (%)
1	**Cluster Computing and its Architecture:** • Ease of Computing • Scalable Parallel Computer Architecture • Towards Low Cost Parallel Computing & Motivation • Windows opportunity • A Cluster Computer and Its Architecture • Cluster Classification • Commodity Components for Clusters • Network Services/Communication SW • Cluster Middleware and Single Systems Image • Resource management & Scheduling (RMS)	10	15
2	**Cluster Setup and Administration:** • Introduction • Setting up the cluster • Security • System Monitoring • System Tuning	8	13
3	**Introduction to Grid and its Evolution:** • Introduction to Grid and its Evolution: • Beginning of the Grid • Building blocks of Grid • Grid Application and Grid Middleware • Evolution of the Grid: First, Second & Third Generation	8	13
4	**Introduction to Cloud Computing:** • Defining Clouds • Cloud Providers • Consuming Cloud Services • Cloud Models – Iaas, Paas, SaaS • Inside the Cloud • Administering Cloud services • Technical interface • Cloud resources	9	14
5	**Nature of Cloud:** • Tradition Data Center • Cost of Cloud Data Center • Scaling computer systems • Cloud work load • Managing data on clouds • Public, private and hybrid clouds	7	10

6	**Cloud Elements:** • Infrastructure as a service • Platform as a service • Software as a service	6	9
7	**Introduction to Hadoop:** • What is Hadoop? • Core Hadoop Components • Hadoop Ecosystem • Physical Architecture • Hadoop limitations.	8	13
8	**Introduction to FOG computing and EDGE computing:** • What is FOG computing? • What is EDGE computing? • FOG/EDGE node • Middleware for Fog and Edge Computing • Data Management in Fog Computing.	8	13
	Total	**64**	**100**

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Reference Books:

1. High Performance Cluster Computing, Volume 1, Architecture and Systems, Rajkumar Buyya, Pearson Education.
2. Berman, Fox and Hey, Grid Computing – Making the Global Infrastructure a Reality, Wiley India.
3. Hurwitz, Bllor, Kaufman, Halper, Cloud Computing for Dummies, Wiley India.
4. Robert D. Schneider , Hadoop for Dummies, Wiley India.
5. Ronald Krutz, Cloud Security, Wiley India.
6. Cloud Computing, A Practical Approach, Anthony Velte, Toby Velte, Robert Elsenpeter, McGrawHill.
7. Fog and Edge Computing: Principles and Paradigms by Rajkumar Buyya, Satish Narayana Srirama.

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List of Experiments:

Sr. No	Name of Experiment
1	To study the basic commands of Linux.
2	To establish Beowulf Cluster using MPI (Message Passing Interface) Library.
3	To Implement efficient parallel debugging for MPI, Threads, and Beyond.
4	To Execute sample program using openMP.
5	Installation and Configuration of Alchemi Grid and Running a sample application on Alchemi Grid Environment.
6	To Run two sample programs using GridSim Toolkit.
7	To Implement Cloud Simulation Toolkit with example.
8	To Setup Hadoop platform.
9	Run sample program using Hadoop Framework.