CSE11121	Distributed Systems and Cloud	L	T	P	C
Version 1.0	Contact Hours 45	3	0	0	3
Pre-requisite/Exposure	Knowledge of programming, computer systems architectures, networks and operation systems				
Co-requisite	NIL				

Course Objectives:

- To explain the evolving computer model called cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.
- Apply distributed computational model and understand the need for cloud computing.

Course Outcomes:

On the completion of this course the student will be able to

CO1: Explain distributed system models and cloud service & deployment models.

CO2: Analyse the need for virtualization in a cloud environment and apply it in compute, memory andstorage levels.

CO3: Explain distributed computation model on large datasets using parallel and distributed programmingapproaches over cloud platforms.

CO4: Analyse the security issues on SPI infrastructure and explain the need for Homomorphic encryption.CO5: Explain the role of trust and energy efficiency in cloud.

Course Description:

It serves as one of the important courses in terms of having an understanding about the basic concepts about distributed systems, their types or categories with some concepts about basic networking and various differen t directions in whichit is useful and applicable. The outcome of the course implicitly and explicitly affects the abilities of students to have agood understanding of the upcoming other related courses. This course also gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

Course Content:

Units	Lecture Hours
Unit-I: Distributed System Models & Enabling technology: Scalable computing over the internet, Technologies for network based system, System models for distributed & cloud, Software environments for distributed & Cloud. Time and Global States: Introduction, Clocks events and process states, synchronizing	09

Units	Lecture Hours
physical clocks, Logical clocks, Global states Introduction to Cloud Computing: Cloud Computing in a Nutshell System Model for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud,Basic Principles, of Cloud Computing, Challenges and Risks, Service Models.	
Unit-II: Virtual Machines and Virtualization of Cluster and Data Centres: Levels of Virtualization, Virtualizationstructures/Tools and Mechanism, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resources Management, Virtualization Data-Centre Automation.	**09**
Unit-III: Service Oriented Architecture for Distributed Computing: Services & SOA, Message Oriented Middleware,Workflow in SOA. Cloud Programming & Software Environments: Features of Cloud & Grid, Parallel & Distributed programmingparadigms, Programming support of Google Cloud, Amazon AWS & Azure. Case Studies: OpenStack & Aneka.	**09**
Unit-IV: Cloud Security, Data Security in the Cloud: An Introduction to the Idea of Data Security, The Current State ofData Security in the Cloud CryptDb: Onion Encryption layers- DET, RND, OPE, JOIN, SEARCH, HOM, and Homomorphism Encryption, FPE.	**09**
Unit-V: Trust Management & Green Cloud: Trust, Reputation and Security Management in P2P Systems, Load Balancing-HAProxy, Container based Virtualization-Docker, Green Cloud - Energy Consumption Models and Energy-aware Data Centres and Clouds.	**09**

Examination Scheme:

Components	Mid Term	Class Assessment	End Term
Weightage (%)	20	30	50

Relationship between Course Outcomes (COs) and Program Outcomes (POs):

1 = Weakly Mapped

2 = Moderately Mapped3 = Strongly Mapped

Course Code	Course Name	COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CSE11	Distribu	CO1112	2	3	3	3	2	1	1	-	1	-	-	3	2	3	3
121	ted	1.1															
	Systems	CO1112	3	2	2	3	2	1	1	-	1	-	-	2	3	2	2
	and	1.2															

Course Code	Course Name	COs	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
	Cloud	CO1112	3	1	3	1	2	1	2	-	3	-	3	1	2	3	1
		1.3															
		CO1112	1	2	1	3	3	3	1	-	3	-	-	2	2	1	2
		1.4															
		CO1112	3	2	2	3	3	3	2	-	2	-	2	3	2	1	1
		1.5															
		CO1112	2.	2.	2.	2.	2.	1.	1.	-	2.	-	2.5	2.2	2.2	2.0	1.8
		1	4	0	2	6	4	8	4		0						