CSE11136	Virtualization and Applied Cloud Computing	L	T	P	C
Version 1.0	Contact Hours 45	3	0	0	3
Pre-requisite/Exposure	Familiarity with Java, Python				
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.

Course Outcomes:

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

CO1: Understand the fundamentals of Cloud Computing and VirtualizationCO2: Analyze different cloud infrastructure

CO3: Explain Various aspects of Virtualization

CO4: Comparing different advance virtualization techniques

CO5: Developing software models on different virtualization platforms

Course Description:

The course presents a top-down view of cloud computing, from applications and administration to programming and infrastructure. Its main focus is on parallel programming techniques for cloud computing and large scale distributed systems which form the cloud infrastructure. The topics include: overview of cloud computing, cloud systems, parallelprocessing in the cloud, distributed storage systems, virtualization, security in the cloud, and multicore operating systems. Students will study state-of-the-art solutions for cloud computing developed by Google, Amazon, Microsoft, Yahoo, VMWare, etc. Students will also apply what they learn in one programming assignment and one project executedover Amazon Web Services.

Course Content:

Units	Lecture Hours
Unit-I: Introduction Introduction Definition and evolution of Cloud Computing; Enabling Technologies, Service and Deployment Models Popular Cloud Stacks and Use Cases; Benefits, Risks, and Challenges of Cloud Computing Economic Models and SLAs. Topics in Cloud Security; Common cloud providers and their associated cloud stacks and popular cloud use case scenarios.	9
Unit-II: Cloud Infrastructure Historical Perspective of Data Centers; Datacenter Components: IT Equipment and Facilities; Design Considerations: Requirements,	9

Units	Lecture Hours
Power, Efficiency, & Redundancy, Power calculations, PUE (Power usage effectiveness) and Challenges in Cloud Data Centres; Cloud Management and Cloud Software Deployment Considerations.	
Unit-III: Virtualization Introduction to Virtualization, Popek Goldberg criteria for virtualization, Traditional IT infrastructure and its shortcomings, Virtualization benefits. Comparison of traditional and virtualized environment, Implementing virtualization(Hands on in lab), Logical equivalence, Types of virtualization: Hardware emulation and technologyclassification, X86, IBM power VM virtualization.	**5**
Unit-IV: Server Virtualization Server virtualization and its classification, Para virtualization, Emulation vs Simulation, Hardware assisted virtualization, Hypervisors, Desktop virtualization and its classification, Xen Server architecture, Storage virtualization and its classification, Host based mirroring, Network based storage virtualization, Network virtualization and its classification, VPN and VLAN	**10**
Unit-V: Case Study Unit Heading: Amazon EC2; Software Defined Networks (SDN); Software Defined Storage (SDS), Optimization Model, Benefits of Virtualization, Challenges while migrating to Cloud, Broad approaches to migrating into the cloud why migrate -deciding on cloud migration, the Seven-step model of migration into acloud, Migration Risks and Mitigation.	**12**

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
CSE11136	Virtualization and	CO11136.1	3	3	3	2	2	3	3	-	1	-	-	3	2	1	1

	Applied Cloud Computing	**CO11136.2**	**2**	**3**	**2**	**2**	**2**	**1**	**3**	**-**	**1**	**-**	**-**	**3**	**1**	**2**	**1**
	Applied Cloud Computing	CO11136.3	3	2	2	3	3	3	2	-	3	-	-	3	2	1	2
	Applied Cloud Computing	CO11136.4	3	2	1	1	2	2	3	-	1	-	-	3	1	1	3
	Applied Cloud Computing	CO11136.5	2	2	2	3	2	3	2	-	2	-	-	2	3	1	2
	Applied Cloud Computing	CO11136	2. 6	2. 4	2. 0	2. 2	2. 2	2. 4	2. 6	-	1. 6	-	-	2.8	1.8	1.2	1.8