Title of the Course: Cloud Computing					
Course code: 4CS321		L	T	P	Cr
		3	-	-	3

Desirable Requirements: Operating system, Computer Networks

Textbooks:
1. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski ,"Cloud Computing: Principles and Paradigms", Wiley, 1 Edition 2013
2. Gautam Shroff, "Enterprise Cloud Computing - Technology, Architecture, Applications", Cambridge University Press, 2010
3. Ronald L. Krutz, Russell Dean Vines ,"Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley- India,2010

References:
1. Barrie Sosinsky,"Cloud Computing Bible", Wiley-India, 2010

Course Objectives :
1. An understanding of fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges.
2. Providing basic ideas and principles in cloud management techniques, virtualization techniques and cloud software deployment considerations.
3. Exploring cloud computing driven open source and commercial systems and applications.

Course Learning Outcomes:

CO	After the completion of the course the student should be	Bloom's Cognitive	
		level	Descriptor
CO1	Distinguish concepts of distributed paradigm from other computing paradigm and the mechanism of inter process communication in distributed systems.	2	Understanding
CO2	Describe main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.	2	Understanding
CO3	Illustrate different cloud infrastructure models, cloud computing architecture and various deployment models.	3	Applying
CO4	Classify different hypervisors and virtualization techniques based on their characteristics.	4	Analyzing
CO5	Identify core issues of cloud computing such as security, privacy, and interoperability.	4	Analyzing
CO6	Examine the components of Open and commercial cloud platform	4	Analyzing

CO-PO Mapping :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1													
CO2		2											2	
CO3		2											1	
CO4		2											1	
CO5		2											1	
CO6		2	2											

1: Low, 2: Medium, 3: High

Assessments :
Teacher Assessment:

TY B.Tech. (Computer Science and Engineering) Curriculum for 2020-21

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

	Hrs.
Module 1: Principles of distributed computing Eras of computing, Elements of distributed computing – General concepts and definitions, components of a distributed system, architectural styles for distributed computing, models for inter-process communication, Technologies for distributed computing – Remote procedure call, distributed object frameworks, service oriented computing.	**7**
Module 2:Introduction to Cloud Computing Cloud Computing (NIST Model)Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers Properties, Characteristics & Disadvantages,Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing, Role of Open Standards.	**5**
Module 3: Cloud Computing Architecture Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models (XaaS), Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), Deployment Models: Public cloud, Private cloud, Hybrid cloud, Community cloud.	**7**
Module 4: Virtualization Introduction, characteristics of virtualized environments, Taxonomy of virtualization Techniques, Virtualization and cloud computing, Pros and Cons of virtualization, technology Examples.	**6**
Module 5 : Cloud Security Type of attack, Security stack of IaaS, PaaS, SaaS, Gartner's seven cloud computing security Risks, Other cloud security issues: Virtualization, Access Control and identity Management, Application security, Data life cycle management	**6**
Module 6: Case Study on Open Source & Commercial Clouds Eucalyptus ,Microsoft Azure ,Amazon EC2,Google App Engine, Open Stack, Open Nebula	**8**

Module wise Measurable Students Learning Outcomes :

After the completion of the course the student should be able to:

Module 1:Describe elements of distributed computing along with concepts inter process communication paradigm

Module 2: Describe advantage of cloud computing over grid computing

Module 3: Demonstrate models of cloud deployment and services offered by cloud model

Module 4: Distinguish among available virtualization techniques

Module 5. Discuss and Identify security and privacy issues in cloud computing.

Module 6. Deploy and analyse applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and Google AppEngine. Also demonstrate open source cloud building software