Course Code	PCS21E02J	Course Name	CLOUD COMPUTING	Course Category	D	Discipline Elective Course	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	*Understand and Analyze the cost metrics, handle the security threats and construct different cloud delivery design models*
CLR-2 :	*understand the architecture of cloud*
CLR-3 :	*understand the need for virtualization*
CLR-4 :	*the concepts behind scheduling and load balancing that is happening across heterogeneous resources in the environment*
CLR-5 :	*justify the need for improved hardware and software infrastructures (servers, protocols, security algorithms)*
CLR-6 :	*know the commercial functioning of cloud computing*

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO 1	PSO 2	PSO 3
CLO-1 :	*defend the need for cloud computing to run an online business*	3	80	70	L	H	-	H	L	-	-	-						-	-
CLO-2 :	*understand and figure out the necessities of middleware technologies*	3	85	75	M	H	L	M	L	-	-	-						-	-
CLO-3 :	*practically create a virtual environment (lab purpose using VMware)*	3	75	70	M	H	M	H	L	-	-	-						-	-
CLO-4 :	*implement cryto algorithms that may be used in the computing environment*	3	85	80	M	H	M	H	L	-	-	-						-	-
CLO-5 :	*Learn cloud enabling technologies and its applications*	3	85	75	H	H	M	H	L	-	-	-						-	-
CLO-6 :	*Commercial functioning*	3	80	70	L	H	-	H	L	-	-	-						-	-

Duration (Hour)		15	15	15	15	15
S-1	SLO-1	*Introduction to Networking*	*Roles and Boundaries*	*Cloud Computing Applications: Cloud for Health care, Energy systems, Transportation systems*	*Cloud Usage Monitor , Resource Replication ,Ready-Made environment*	*Fundamental Cloud Security: Threat Agents*
	SLO-2	*Data Communication*	*Cloud Characteristics*	*Manufacturing Industry, Government, Education and Mobile Communication*	*Specialized Cloud Mechanisms*	*Cloud Security Threats*
S-2	SLO-1	*Cloud computing*	*Cloud Delivery models*	*Cloud Computing Mechanisms: Logical Network Perimeter, Virtual server: Cloud Storage device*	*Load Balancer, SLA Monitor, Hypervisor, Resource Cluster*	*Single –sign on :Kerberos Identification*
	SLO-2	*Origin of Cloud Computing*	*Cloud Deployment models*	*Fundamental Cloud Architectures*	*Cloud Management Mechanisms: Remote Administration systems*	*One-time Password, Basic Cloud data Security mechanisms*
S-3	SLO-1	*Basic Concepts of Cloud Computing*	*Cloud Enabling Technology and Applications*	*Design Approaches with case Study*	*SLA Management System*	*Advanced Cloud*
	SLO-2	*Basic Concepts and Terminology*	*Broadband Network and Internet Architecture*	*Design Methodology for IaaS Service*	*Resource Management System, Billing Management system*	*Mobile Cloud*
S 4-5	SLO-1	*Laboratory 1: Create a virtual machine*	*Laboratory 4: Create GAE Launcher*	*Laboratory 7:Encryption and Decryption of Text*	*Laboratory 10: Security mechanisms: Encryption :Hashing: Digital Signature*	*Laboratory 13: Create a Warehouse Application in Sales force.Com*
	SLO-2					
S-6	SLO-1	*Goals and Benefits*	*Data Center Technology, Virtualization Technology*	*Design Methodology for PaaS Service*	*Cost Metrics and Pricing Models: Business Cost Metrics, Cloud Usage cost metrics*	*Green Cloud*

Duration (Hour)		15	15	15	15	15
	SLO-2	Risks and Challenges	Web Technology ,Multitenant Technology	Study of Saas Service Model	Service Quality Metrics ,SLA Guidelines	Media Cloud
S-7	SLO-1 SLO-2	Introduction to virtualization	Include –v Flag	Basis of SaaS	Security Cloud : CIA Concept	Specific Cloud Services Models
S-8	SLO-1 SLO-2	Types of Virtual Machines	Viewing your application	Advantages of SaaS	Types of Security Attacks	Basic Terms and Conditions- Cloud
S9-10	SLO-1 SLO-2	Laboratory 2: Install a C compiler in the virtual machine created using virtual box and execute SimplePrograms	Laboratory :5 Client Server communication between two virtual machine instances, execution of chat application	Laboratory 8: Simple Experiments in Cloud Sim	Laboratory 11: Simple Experiments in Cloud Sim	Laboratory 14: Create a Warehouse Application in Sales force.Com using Apex prog Lang
S-11	SLO-1 SLO-2	Install virtual box	Implement two host operating systems onto a single virtual box	Brief Introductory part of software as a service	Security Policy Implementation	Resource allocation in cloud computing
S-12	SLO-1 SLO-2	Download Linux	Run the virtual machines	Saas : Unification Technologies	Security Policy Implementation : Policy Types	Introduction
S-13	SLO-1	How to install Virtual box	Open terminal in one VM, give ifconfig command	Saas :Integrated Products	Techniques to Secure Data	Importance of Cloud Computing
	SLO-2	How to install Linux os	Then ping the Ip of one machine in the other terminal,ping 10.0.2.10	Saas product selection criteria	Cloud Encryption	Strategies for Resource Allocation
S14-15	SLO-1	Laboratory 3: Installing C environment	Laboratory 6: Then run the communication between the terminals	Laboratory 9: Saas Integration services	Laboratory 12: Symmetric Encryption	Laboratory 15: Resource Allocation Policies and Algorithms
	SLO-2	Install Linux using Virtual box	Create a cloudlet	Infrastructure as a Service	Cloud Security Alliance	Performance-based RAS

Learning Resources	
1. Thomas Erl, ZaighamMahmood,RichardoPuttini, "Cloud Computing: Concepts,Technology& Architecture", Fourth Printing, Prentice Hall/PearsonPTR, 2014,ISBN: 780133387520. 2. ArshdeepBahga, Vijay Madisetti, "Cloud Computing: A Hands-On Approach", University Press, 2016, ISBN: 9780996025508.	3. K.Chandrasekaran, "Essentials of Cloud Computing", Chapman and Hall/CRC Press, 2014, ISBN 9781482205435. 4. Thomas Erl, Robert Cope, Amin Naserpour, "Cloud Computing Design Patterns",Prentice Hall/Service Tech Press, Pearson, 2015, ISBN: 978-0133858563.

Learning Assessment

Bloom's Level of Thinking		Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
Level 2	Apply Analyze	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Level 3	Evaluate Create	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. S. Karthik, Assistant Consultant, Tata Consultancy Services	Dr.S.Sasikala, Associate Professor and Head, Dept. of Computer Science, University of Madras	Dr. P.Muthulakshmi Mrs. E. Aarthi