Course Code	PIT21E302J	Course Name	CLOUD COMPUTING	Course Category	D	Discipline Specific 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	Procedural Knowledge	Skills in Specialization	Ability to Utilize	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	defend the need for cloud computing to run an online business	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-
CLO-2 :	understand and figure out the necessities of middleware technologies	3	85	75	M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
CLO-3 :	practically create a virtual environment (lab purpose using VMware)	3	75	70	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-4 :	implement cryto algorithms that may be used in the computing environment	3	85	80	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-5 :	Learn cloud enabling technologies and its applications	3	85	75	H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-6 :	Commercial functioning	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	-	-

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 3: Create GAE Launcher	Laboratory 5:Encryption and Decryption of Text	Basic Terms and Conditions	Laboratory 8: Create a Warehouse Application in Sales force.Com
	SLO-2				Cloud Security mechanisms: Encryption :Hashing: Digital Signature	
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
	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	Introduction
S9-10	SLO-1 SLO-2	Laboratory 2: Install a C compiler in the virtual machine created using virtual box and execute Simple Programs	Laboratory :4 Client Server communication between two virtual machine instances, execution of chat application	Laboratory 6: Simple Experiments in Cloud Sim	Laboratory 7: Simple Experiments in Cloud Sim	Laboratory 9: 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	Installing C environment	Then run the communication between the terminals	Saas Integration services	Symmetric Encryption	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	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	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**
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