

CLOUD APPLICATION DEVELOPMENT

VII Semester: CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACS011	Core	L	T	P	C	CIA	SEE	Total
		3	1	3	4	30	70	100
Contact Classes: 60	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 60			
<p>OBJECTIVES: Students will try to learn:</p> <ol style="list-style-type: none"> I. The fundamental concepts of various services deployed with cloud models for solving current and future challenges. II. The principles in data centre design and services provided with virtualization techniques. III. The scaling and load balancing solutions for developing business models with appropriate cloud programming models. <p>COURSE OUTCOMES: After successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the core concepts, various models and services in the cloud computing environment. 2. Make use of different cloud computing techniques for efficient utilization of a pool of cloud resources. 3. Choose appropriate CSP based on user demanded services among AWS, GCP, MS Azure, and Apache Cloud Stack. 4. Apply cloud computing concepts for developing data center and deploy cloud applications that are resilient, elastic, and cost-efficient. 5. Identify the cloud architecture style and infrastructure in providing services with high elastic scalability as per user requirement. 6. Outline various virtualization techniques and their role in enabling the cloud computing system model. 7. Summarize Virtual Machine concepts for running different applications on different operating systems concurrently. 8. Compare Hypervisors (VMM) for providing virtualization services. 9. Categorize policies and mechanisms used for efficient resource management in cloud computing. 10. Determine resource scheduling and management methods for finding the best match of combined resources as per user requirement. 11. Explain system security issues and vulnerabilities for reducing system-specific attacks under a virtualization environment. 12. Analyze various cloud programming models and apply them to develop a business model according to applications. 								
Unit-I	INTRODUCTION AND CLOUD APPLICATION DEVELOPMENT							
Introduction: Definition, Characteristics, Benefits, challenges of cloud computing, cloud models: serviceIaaS(infrastructure as service),PaaS(platform as a service),SaaS(software as a service), deployment models- public, private, hybrid, community; Types of cloud computing: Grid computing utility computing, cluster; computing Cloud services: Amazon, Google, Azure, online services, open source private clouds, SLA; Applications of cloud computing: Healthcare, energy systems, transportation, manufacturing, education, government, mobile communication, application development.								
Unit-II	CLOUD ARCHITECTURE, PROGRAMMING MODEL							
Cloud Architecture, programming model: NIST reference architecture, architectural styles of cloud applications, single, multi, hybrid cloud site, redundant, non redundant, 3 tier, multi tier architectures;								

Programming model: Compute and data intensive; Compute intensive model: Parallel computation, BSP, workflows, coordination of multiple activities - zoo keeper; Data intensive model.	
Unit-III	CLOUD RESOURCE VIRTUALIZATION
Cloud resource virtualization: Basics of virtualization, types of virtualization techniques, merits and demerits of virtualization, Full vs Para - virtualization, virtual machine monitor/hypervisor - virtual machine basics, taxonomy of virtual machines, process vs system virtual machines. Emulation: Interpretation and binary translation, HLL, virtual machines, storage, desktop and application virtualization, applying virtualization.	
Unit -IV	CLOUD RESOURCE MANAGEMENT AND SCHEDULING
Cloud Resource Management and Scheduling: Policies and mechanisms for resource management, resource bundling, combinatorial , fair queuing, start time fair queuing, borrowed virtual time, cloud scheduling subject to deadlines, scheduling map reduce applications subject to deadlines, resource management and application scaling.	
Unit -V	CLOUD SECURITY
Cloud Security: Risks, privacy and privacy impacts assessments; Multi-tenancy issues, security in VM, OS, virtualization system security issues and vulnerabilities; Virtualization system-specific attacks: Technologies for virtualization-based security enhancement, legal; Compliance issues: Responsibility, ownership of data, right to penetration test, local law where data is held, examination of modern security standards (eg: PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloud provider vs compliance for the customer.	
Text Books:	
<ol style="list-style-type: none"> 1. Dan Marinescu, — Cloud Computing: Theory and Practicel, M K Publishers, 1st Edition, 2013. 2. Kai Hwang, Jack Dongarra, Geoffrey Fox, — Distributed and Cloud Computing, From Parallel Processing to the Internet of Thingsl, M K Publishers, 1st Edition, 2011. 	
Reference Books:	
<ol style="list-style-type: none"> 1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, - Cloud Computing: A Practical Approachl, McGraw Hill, 1st Edition, 2009. 2. Arshdeep Bahga, —Cloud Computing: A Hands on Approachl, Vijay Madiseti Universities Publications, 1st Edition, 2013. 	