SRI KRISHNA INSTITUTE OF TECHNOLOGY

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Department of Computer Science & Engineering

Academic Year	:	2025-26	Course Name	:	**CLOUD COMPUTING**
Semester	:	6th	Course Code	:	BCS601
Scheme	:	2022	L: T: P: C	:	4:0:2:4
Total Contact hours	:	40	CIE Marks	:	50
Course Plan Author	:	LATHA A	SEE Marks	:	50
Date	:	19-02-2026	Total Marks	:	100

Course Prerequisites:

- Web Application,Computer Networks

Learning Objectives:

CLO 1. Introduce the rationale behind the cloud computing revolution and the business drivers
CLO 2. Understand various models, types and challenges of cloud computing
CLO 3. Understand the design of cloud native applications, the necessary tools and the design tradeoffs.
CLO 4. Realize the importance of Cloud Virtualization, Abstraction`s, Enabling Technologies and cloud security

Course Outcomes:

CO		*At the end of the course, students should be able to*	**Blooms' Level**
CO1	:	Describe various cloud computing platforms and service providers.	L2
CO2	:	Illustrate the significance of various types of virtualization.	L2
CO3	:	Identify the architecture, delivery models and industrial platforms for Cloud computing based applications	L3
CO4		Analyze the role of security aspects in cloud computing	L3
CO5		Demonstrate cloud applications in various fields using suitable cloud platforms	L3

Blooms' Taxonomy:

L1	L2	L3	L4	L5	L6
Remembering	**Understanding**	**Applying**	**Analyzing**	**Evaluating**	**Creating**

Program Outcomes:

PO1	:	Engineering knowledge	**PO7**	:	Environment and sustainability
PO2	:	Problem analysis	**PO8**	:	Ethics
PO3	:	Design/development of solutions	**PO9**	:	Individual and team work
PO4	:	Conduct investigations of complex problems	**PO10**	:	Communication
PO5	:	Modern tool usage	**PO11**	:	Project management and finance
PO6	:	The engineer and society	**PO12**	:	Life-long learning

Program Specific Outcomes:

PSO1:	Model computational problems by applying mathematical concepts and design solutions using suitable data structures & algorithmic techniques.
PSO2:	Demonstrate basic knowledge of computer science in efficient design of problem solutions of varying complexity.
PSO3:	Create career path to become a successful computer science professional, entrepreneur and relish for higher studies

CO-PO-PSO Mapping:

CO	Program Outcomes														
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	2				2							1		1	2
CO2	2			2	3									2	1
CO3		3		3	3				3		2	1	1		2
CO4		3			3			2	3		2	1	2		2
CO5			3	3	3				3	2	3		2	2	2

CO PO Justification

CO1 – Describe various cloud computing platforms and service providers (L2)

CO1	PO / PSO	Program Outcomes	Justification
	PO1	2	Students understand moderately fundamental concepts of cloud computing platforms such as AWS, Azure, and Google Cloud using basic computing knowledge.
	PO5	2	Students gain moderate exposure to modern cloud tools and platforms like AWS used in industry for computing services.

	PO12	1	Awareness of evolving cloud technologies encourages continuous learning of evolving cloud technologies for creating and using VM, Services- storage,software development IDE's
	PSO2	1	Basic computer science understanding is supported. Knowledge of cloud service providers like AWS, GCP helps students understand real-world software and distributed computing environments.
	PSO3	2	Awareness of industry platforms helps students apply cloud infrastructure for application development and deployment and supports career readiness.

CO2 – Illustrate the significance of various types of virtualization (L2)

CO2	PO / PSO	Program Outcomes	Justification
	PO1	2	Students moderately apply basic computing and operating system concepts to understand virtualization technologies.
	PO4	2	Students understand how virtualization improves system performance and resource utilization.
	PO5	3	Students learn about virtualization tools such as XEN,VMware and VirtualBox.
	PSO2	2	Virtualization concepts support system design and resource management in computing environments.
	PSO3	1	Virtualization technologies are essential in distributed and cloud computing infrastructures.

CO3 – Identify architecture, delivery models, and industrial platforms for cloud computing applications (L3)

	PO / PSO	Program Outcomes	Justification
CO3	PO2	3	Students analyze different cloud architectures and select appropriate delivery models (IaaS, PaaS, SaaS).
	PO4	3	Students examine cloud service models and evaluate their applicability to different computing problems.
	PO5	3	Students identify industry platforms such as AWS used to implement cloud solutions.
	PO9	3	Understanding cloud platforms supports collaborative development and deployment of applications.
	PO11	2	Knowledge of service models helps in planning and managing cloud-based projects effectively.
	PO12	1	Awareness of emerging cloud technologies motivates continuous professional development.
	PSO1	1	Supports software system architecture design using cloud infrastructure.
	PSO3	2	Helps students develop and deploy cloud-based applications.

CO4 – Analyze the role of security aspects in cloud computing (L3)

CO4	PO / PSO	Program Outcomes	Justification
	PO2	3	Students analyze threats, vulnerabilities, and risks in cloud environments.
	PO5	3	Students use security tools and techniques such as encryption, authentication, and access control mechanisms.
	PO8	2	Ethical responsibility in cloud security is moderately addressed.
	PO9	3	Security analysis often involves collaborative work.
	PO11	2	Security planning relates moderately to project responsibility.
	PO12	1	Continuous learning is required due to evolving threats.
	PSO1	2	Secure system design concepts are applied.
	PSO3	2	Security knowledge enhances professional competence.

CO5 – Demonstrate cloud applications in various fields using suitable cloud platforms (L3)

CO5	PO / PSO	Program Outcomes	Justification
	PO3	3	Strong design and development of cloud-based solutions.
	PO4	3	Investigation and evaluation during application deployment.
	PO5	3	Extensive use of modern cloud tools and services.
	PO9	3	Applications are developed individually and in teams.
	PO10	2	Demonstration of applications improves communication skills.
	PO11	3	Planning, deploying, and managing applications resembles project work.
	PSO1	2	Applies computational thinking in application development.
	PSO2	2	Efficient solution implementation is demonstrated.
	PSO3	2	Enhances industry readiness and career skills.

Course Content (Syllabus)

Module-1: Distributed System Models and Enabling Technologies	CH
Scalable Computing Over the Internet, Technologies for Network Based Systems, System Models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds, Performance, Security and Energy Efficiency. Textbook 1: Chapter 1: 1.1 to 1.5 **RBT:**	08

L2	
Module-2: Virtual Machines and Virtualization of Clusters and Data Centers	
Implementation Levels of Virtualization, Virtualization Structure/Tools and Mechanisms, Virtualization of CPU/Memory and I/O devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation. Textbook 1: Chapter 3: 3.1 to 3.5 **RBT: L2**	**08**
Module-3: Cloud Platform Architecture over Virtualized Datacenters	
Cloud Computing and Service Models, Data Center Design and Interconnection Networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms: GAE, AWS and Azure, Inter-Cloud Resource Management. Textbook 1: Chapter 4: 4.1 to 4.5 **RBT: L2**	**08**
Module-4: Cloud Security and Cloud Security and Trust Management	
Top concern for cloud users, Risks, Privacy Impact Assessment, Cloud Data Encryption, Security of Database Services, OS security, VM Security, Security Risks Posed by Shared Images and Management OS, XOAR, A Trusted Hypervisor, Mobile Devices and Cloud Security Cloud Security Defense Strategies, Distributed Intrusion/Anomaly Detection, Data and Software Protection Techniques, Reputation-Guided Protection of Data Centers. Textbook 2: Chapter 11: 11.1 to 11.3, 11.5 to 11.8, 11.10 to 11.14 Textbook 1: Chapter 4: 4.6 **RBT: L2**	**08**
Module-5: Cloud Programming and Software Environments	
Features of Cloud and Grid Platforms, Parallel and Distributed Computing Paradigms, Programming Support for Google App Engine, Programming on Amazon AWS and Microsoft, Emerging Cloud Software Environments. **RBT: L2**	**08**
Practical Components	

1.	Creating a Virtual Machine: Configure and deploy a virtual machine with specific CPU and memory requirements in Google Cloud. OR Exploring AWS CloudShell and the AWS Cloud9 IDE
2.	Getting Started with Cloud Shell and gcloud: Discover the use of gcloud commands to manage Google Cloud resources from Cloud Shell. OR Working with Amazon S3 Orchestrating Serverless Functions with AWS Step Functions
3.	Cloud Functions: Create and deploy a Cloud Function to automate a specific task based on a Cloud Storage event. OR Working with Amazon DynamoDB
4.	App Engine: Deploy a web application on App Engine with automatic scaling enabled. OR Developing REST APIs with Amazon API Gateway

5.	Cloud Storage: Qwikstart: Google Cloud Storage provides scalable and secure object storage for managing data, accessible via the Cloud Console or gsutil CLI. OR Creating Lambda Functions Using the AWS SDK for Python
6.	Cloud SQL for MySQL: Discover how Google Cloud SQL for MySQL provide automated management and high availability for MySQL databases? OR Migrating a Web Application to Docker Containers
7.	Cloud Pub/Sub: Experiment how Google Cloud Pub/Sub facilitate real-time messaging and communication between distributed applications. OR Caching Application Data with ElastiCache, Caching with Amazon CloudFronT, Caching Strategies
8.	Multiple VPC Networks: Explore benefits of using multiple VPC networks in Google Cloud for organizing and isolating resources. OR Implementing CloudFront for Caching and Application Security
9.	Cloud Monitoring: Discover how Cloud Monitoring help in tracking and analyzing the performance and health of cloud resources? OR Orchestrating Serverless Functions with AWS Step Functions
10.	Kubernetes Engine: Qwik Start: Deploy a containerized application to a Kubernetes Engine cluster. OR Automating Application Deployment Using a CI/CD Pipeline

Schedule of Instruction:

Class No	Topic	DATE	RBT	CO	Mode
Module-1					
Chapter Name: Distributed System Models and Enabling Technologies					
1.	Introduction to course, course outcome	27-1-26	L2	CO1	presentation based
2.	Prerequisite knowledge discussion, Scalable Computing Over the Internet- evolution	28-1-26	L2	CO1	Discussion
3.	Scalable Computing Over the Internet- trend	29-1-26	L2	CO1	presentation based
4.	Technologies for Network Based Systems, System Models for Distributed -virtualization	30-1-26	L2	CO1	presentation based
5.	Technologies for Network Based Systems, System Models for Distributed and	9-2-26	L2	CO1	presentation based
6.	Technologies for Cloud Computing	11-2-26	L2	CO1	presentation based
7.	System Models for Distributed and Cloud Computing	12-2-26	L2	CO1	presentation based
8.	System Models for Distributed and Cloud Computing	13-2-26	L2	CO1	presentation based
9.	Software Environments for Distributed Systems and Clouds	16-2-26	L2	CO1	presentation based
10.	Software Environments for Distributed Systems and Clouds	18-2-26	L2	CO1	presentation based
11.	Software Environments for Distributed Systems and Clouds	19-2-26	L2	CO1	presentation based
12.	Performance	20-2-26	L2	CO1	presentation based
13.	Security and Energy Efficiency.	23-2-26	L2	CO1	presentation based
Module-2					
Chapter Name : Virtual Machines and Virtualization of Clusters and Data Centers					

14.	Implementation Levels of Virtualization	25-2-26	L2	CO1	presentation based
15.	Virtualization Structure/Tools and Mechanisms	26-2-26	L2	CO2	presentation based
16.	Virtualization Structure/Tools and Mechanisms	27-2-26	L2	CO2	presentation based
17.	Virtualization of CPU/Memory and I/O devices	2-3-26	L2	CO2	presentation based
18.	Virtualization of CPU/Memory and I/O devices	4-3-26	L2	CO2	Active Learning
19.	Virtual Clusters and Resource Management	5-3-26	L2	CO2	presentation based
20.	Virtualization for Data Center Automation	6-3-26	L2	CO2	Video
21.	Virtualization for Data Center Automation	9-3-26	L2	CO2	Video
Module-3					
Chapter Name : Cloud Platform Architecture over Virtualized Datacenters					
22.	Cloud Computing and Service Models	11-3-26	L3	CO3	presentation based
23.	Data Center Design and Interconnection Networks	12-3-26	L3	CO3	Video, PRESENTATIO N-BASED,
24.	Data Center Design and Interconnection Networks	23-3-26	L3	CO3	Problem based learning
30.	Architectural Design of Compute and Storage Clouds	25-3-26	L3	CO3	Problem based learning
26.	Architectural Design of Compute and Storage Clouds	27-3-26	L3	CO3	presentation based
27.	Public Cloud Platforms: GAE, AWS and Azure	30-3-26	L3	CO3	presentation based
28.	Public Cloud Platforms: GAE, AWS and Azure	1-4-26	L3	CO3	presentation based
29.	Inter-Cloud Resource Management	2-4-26	L3	CO3	presentation based
Module-4					

Chapter Name : Cloud Security					
30.	Top concern for cloud users, Risks	6-4-26	L3	CO4	presentation based
31.	Privacy Impact Assessment, Cloud Data Encryption, Security of Database Services,	8-4-26	L3	CO4	presentation based
32.	OS security, VM Security	9-4-26	L3	CO4	presentation based
33.	Security Risks Posed by Shared Images and Management OS, XOAR	13-4-26	L3	CO4	presentation based
34.	A Trusted Hypervisor, Mobile Devices and Cloud Security. Cloud Security and Trust Management: Cloud Security Defense Strategies	15-4-26	L3	CO4	video
35.	Distributed Intrusion/Anomaly Detection	16-4-26	L3	CO4	Problem based learning
36.	Data and Software Protection Techniques	17-4-26	L3	CO4	Problem based learning
37.	Reputation-Guided Protection of Data Centers	22-4-26	L3	CO4	Problem based learning
Module-5					
Chapter Name : Cloud Programming and Software Environments					
38.	Features of Cloud and Grid Platforms	23-4-26	L3	CO5	PRESENTATIO N-BASED
39.	Parallel and Distributed Computing Paradigms	24-4-26	L3	CO5	PRESENTATIO N-BASED
40.	Programming Support for Google App Engine	27-4-26	L3	CO5	Video
41.	Programming Support for Google App Engine	29-4-26	L3	CO5	Video
42.	Programming on Amazon AWS and Microsoft	4-5-26	L3	CO5	Video
43.	Programming on Amazon AWS and Microsoft	6-5-26	L3	CO5	presentation based

44.	Emerging Cloud Software Environments.	11-5-26	L3	CO5	presentation based

Textbooks:

T1	Kai Hwang, Geoffrey C Fox, and Jack J Dongarra, Distributed and Cloud Computing, Morgan Kaufmann, Elsevier 2012.
T2	Dan C. Marinescu, Cloud Computing Theory and Practice, Morgan Kaufmann, 2nd Edition, Elsevier 2018
T3	Google Cloud Teaching Resources – LMS [for practical component]
T4	AWS Cloud Developing – AWS Academy Courses [for practical component]Rajkumar Buyya, Christian Vecchiola, and Thamrai Selvi Mastering Cloud Computing McGraw Hill Education.

Reference books:

R1	Rajkumar Buyya, Christian Vecchiola, and Thamrai Selvi, Mastering Cloud Computing McGrawHill Education, 1st Edition, 2017
R2	Toby Velte, Anthony Velte, Cloud Computing: A Practical Approach, McGraw-Hill Education, 2017.
R3	George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly Publication, 1st Edition, 2009
R4	John Rhoton, Cloud Computing Explained: Implementation Handbook for Enterprises, Recursive Press, 2nd Edition, 2009.

Web links and Video Lectures (e-Resources):

1	https://sites.google.com/skit.org.in/latha/home
2	https://freevideolectures.com/course/4639/nptel-cloud-computing/1.
3	https://www.youtube.com/playlist?list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J
4	https://www.youtube.com/watch?v=EN4fEbcFZ_E
5	https://www.youtube.com/watch?v=RWgW-CgdIk0
6	https://www.geeksforgeeks.org/virtualization-cloud-computing-types/
7	https://www.javatpoint.com/cloud-service-provider-companies

Assessment Schedule:

S.N.	Assessment Type	Content	CO	Duration	Marks	Date
1.	CIE 1 (Theory)	Module 1,2,3 (0.5)	1,2,3	1.5Hr	15	
2.	CIE 2 (Theory)	Module 3(0.5),4 & 5	3,4,5	1.5Hr	15	
3.	Case study-based Learning + quiz	All Module	1,2,3,4,5	2 Hrs	5+5	
4.	Practical Record + Conduction	All Programs	1,2,3,4,5	20 Hrs	15	
5.	Test	All Programs	1,2,3,4,5	2hr	10	
6.	Semester End Examination				50	

Case study Based Learning (Suggested Activities)/ Practical Based learning -5 marks

***RB** – Text Book/**R**eference **B**ook, ***L** – **L**ecture, **V**- Videos or any other mode, ***RBT** – **R**evised **B**looms' **T**axonomy, **L: T: P: C** – Theory/**L**ecture: **T**utorial: **P**ractical/Drawing: **C**redits, **SEE**: **S**emester **E**nd **E**xamination, **CIE**: **C**ontinuous **I**nternal **E**valuation, **Seminar**: Group of 6-8 students, **Module** 1,2,3,4 & 5,*

*The weightage of Continuous Internal Evaluation **(CIE) is 50%** and for Semester End Exam **(SEE) is 50%.** The **minimum passing mark for the CIE is 40%** of the maximum marks (20 marks out of 50) and for the **SEE minimum passing mark is 35%** of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a **minimum of 40% (40 marks out of 100)** in the **sum total** of the **CIE** (Continuous Internal Evaluation) and **SEE** (Semester End Examination) taken together.*

Faculty In charge **Course Coordinator** **HoD**