DOMAIN SPECIFIC ELECTIVES

22DS3E1: CLOUD COMPUTING

Course Name	Cloud Computing		L	T	P	C	CIA	SEE	TM
Course Code	22DS3E1		4	0	0	4	30	70	100
Year of Introduction: 2021	Year of Offering: 2022	Year of Revision: No Revision			Percentage of Revision: Nil				
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks									

Course Descriptive and Purpose: This course is designed to provide students with a comprehensive understanding of a range of topics in the field of cloud computing. These topics include fundamental cloud computing concepts, data visualization, cloud computing service models, open-source cloud platforms and their management, designing application architectures for cloud environments, programming for the cloud, evaluating risks, consequences, and costs associated with cloud computing, implementing AAA (Authentication, Authorization, and Accounting) for cloud administration, and developing applications for both cloud and mobile platforms.

Course Objectives: This course will help the students to learn about basic concepts of Cloud Computing, Visualizations, Cloud Computing Services, Open Source Cloud Implementations and Administration, Application Architecture for Cloud, Cloud Programming, Risks, Consequences and Costs for Cloud Computing, AAA Administration for Clouds, Application Development for Cloud and Mobile Cloud Computing.

Specific objectives include:

- To understand the *Benefits of Cloud Computing* and *Virtualization*.
- To understand the *Services* and *Deployment Models* of *Cloud Computing*.
- To develop *Cloud Applications* using *Open Source Cloud Software*.
- To understand the *Risks*, *Consequences* and *Costs for Cloud Computing*, *AAA Model*.
- To understand *Application Development for Cloud* and *Architecture*, *Challenges and Benefits of*
- *Mobile Cloud Computing.*

Course Outcomes:

On successful completion

CO1: This course provides a comprehensive understanding of the cloud computing era, including its foundational concepts, comparisons with other architectures (peer-to-peer, client-server, grid computing), the evolution of cloud computing, virtualization principles and benefits, various levels of virtualization, mechanisms, open source technologies, and hardware support, enabling students to grasp the core components and delivery models of cloud computing.

CO2: This course equips students with in-depth knowledge of various cloud computing services, including IaaS, PaaS, SaaS, and DbaaS, while also providing hands-on experience in deploying and administering open-source cloud implementations such as Eucalyptus and Open Stack, enabling them to effectively manage cloud environments for private and multi-node deployments.

CO3: This course provides a deep understanding of cloud application architecture, covering requirements, recommendations, fundamental principles, and the relevance of client-server and service-oriented architectures for cloud applications, as well as practical skills in cloud programming and deployment using platforms like Google App Engine, Bigtable, Chubby, AWS, enabling students to design and deploy cloud-based applications effectively..

CO4: This course delves into the comprehensive understanding of risks, consequences, and costs associated with cloud computing, encompassing risk assessment, vendor lock-in, compliance, resource scarcity, security threats, and cost calculations, while also addressing AAA administration for clouds, covering authentication, authorization, and industry implementations, equipping students with the knowledge and skills to manage cloud-related challenges effectively.

CO5: This course empowers students with the ability to develop and manage cloud applications, encompassing the differences between on-premises and cloud applications, modification of traditional applications for cloud

deployment, development stages, agile methodologies, best practices, and static code analysis, while also addressing the unique aspects of mobile cloud computing, including its architecture, benefits, and challenges.

UNIT-I (12 Hours)

Era of Cloud Computing: Getting to Know the Cloud – Peer to Peer – Client Server and Grid Computing – Cloud Computing versus Client Server Architecture – Cloud computing versus Peer To Peer Architecture – Cloud computing versus Grid Computing – How we got to the Cloud – Server Virtualization versus Cloud Computing – Components of Cloud Computing – Cloud Types – Cloud Computing Service Delivery Models.
Introducing Virtualization: Introducing Virtualization and its Benefits – Implementation Levels of Virtualization – Virtualization at the OS Level – Virtualization Structure – Virtualization Mechanisms – Open Source Virtualization Technology – Binary Translation with Full Virtualization – Virtualization of CPU – Memory and I/O Devices – Hardware support for Virtualization in Intex x86 Processor.

UNIT-II (12 Hours)

Cloud Computing Services: Infrastructure as a Service – Platform as a Service – Language and Pass – Software as a Service – Database as a Service.
Open Source Cloud Implementations and Administration: Open Source Eucalyptus Cloud Architecture – Open Source Open Stack Cloud Architecture – Private Cloud Deployment using Eucalyptus – Cloud Implementation using OpenStack and Meghdooth (Single Node & Multi Node).

UNIT-III (12 Hours)

Application Architecture for Cloud: Cloud Application Requirements – Recommendations for Cloud Application Architecture – Fundamental Requirements for Cloud Application Architecture – Relevance and use of Client Server architecture for Cloud Application – Service Oriented Architecture for Cloud Applications.
Cloud Programming: Programming Support for Google Apps Engine – Big Table as Google's NOSQL System – Chubby as Google Distributed Lock Service – Administrating AWS – Deploying in AWS.

UNIT-IV (12 Hours)

Risks, Consequences and Costs for Cloud Computing: Introducing Risks in Cloud Computing – Risk Assessment and Management – Risk of Vendor Lock In – Risk of Loss Control – Risk of Not Meeting Regulatory Compliances – Risk of Resource Scarcity – Risk in Multi Tenant Environment – Risk of Failure – Risk of Failure of Supply Chain – Risk of Malware and Internet Attacks – Risk of Inadequate SLA – Risk of Management of Cloud Resources – Risk of Network Outages – Risks in the Physical Infrastructure – Direct and Indirect Cloud Costs – Calculating Total Cost of Ownership for Cloud Computing – Cost Allocations in a Cloud.
AAA Administration for Clouds: The AAA Model – Single Sign On for Clouds – Industry Implementations for AAA – Authentication Management in the Cloud – Authorization Management in the Cloud.

UNIT-V (12 Hours)

Application Development for Cloud: Developing on Premise Versus Cloud Applications – Modifying Traditional Applications for Deployment in Cloud – Stages during the development process of Cloud Application – Managing a Cloud Application – Using Agile Software Development for Cloud Application – Cloud Applications: What Not to do – Static Code Analysis for Cloud Applications – Developing Synchronous and Asynchronous Cloud Applications.

Mobile Cloud Computing: Definition of Mobile Cloud Computing – Architecture of Mobile Cloud Computing – Benefits of Mobile Cloud Computing – Mobile Cloud Computing Challenges.

Prescribed Text Books			
S.No	Author	Title	Publisher
1	Kailash Jayaswal,Jagannath Kallakurchi, Donald J. Houde& Dr. Deven Shah	Cloud Computing, Black Book	Dreamtech Press

Reference Text Books			
S.No	Author	Title	Publisher
1	Thomas Erl, ZaighamMahmood, Ricardo Puttini	Cloud Computing- Concepts Technology and Architecture	Pearson
2	Raj Kumar Buyya, Christen Vecctiola, S Tammaraiselvi	Mastering Cloud Computing, Foundations and Application Programming	TMH

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc.(Computational Data Science), Third Semester

Course Name: Cloud Computing

Course Code: 22DS3E1

(w.e.f admitted batch 2022-23)

Time: 3 Hours **Max Marks: 70**

SECTION-A

Answer ALL Questions **(5×4=20Marks)**

1. (a) Explain SaaS (CO1,L2)

(or)

(b) Explain Virtualization (CO1,L2)

2. (a) What is an Open Source? (CO2,L1)

(or)

(b) What is Eucalyptus? (CO2,L1)

3. (a) What are the advantages of SOA?(CO3,L1)

(or)

(b) What are the drawbacks of GFS? (CO3,L1)

4. (a) Explain the risk of Malware (CO4,L2)

(or)

(b) Explain Authentication (CO4,L2)

5. (a) What not to do in Cloud Application Development? (CO5,L1)

(or)

(b) What are the advantages of MCC? (CO5,L1)

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.

All Questions Carry Equal Marks. **(5×10=50Marks)**

6. (a) Explain the various Types of Cloud with neat diagrams.(CO1,L2)

(b) Compare and contrast Cloud Computing Architecture with Peer to Peer Architecture. (CO1,L2)

(or)

© Explain Virtualization and its benefits and levels.(CO1,L2)

7. (a) Apply Cloud Computing Services on private cloud. (CO2,L3)

(or)

(b) Build Open Source Cloud Architecture with example. (CO2,L3)

8. (a) What requirements of Cloud Application? (CO3,L1)

(or)

(b) What is Big Table as Google's NoSQL System? Explain EBS. (CO3,L1)

9. (a) Explain Risks in Cloud Computing.(CO4,L2)

(or)

(b) Explain AAA Model for Clouds. (CO4,L2)

10 (a) Explain Stages during the Development Process of Cloud Applications. (CO5, L5)

(or)

(b) Explain Mobile Cloud Computing its Advantages and Disadvantages. (CO5,L5)