R.V. R. & J.C. COLLEGE OF ENGINEERING *(Autonomous)*,
Chowdavaram, Guntur-19
Department of Computer Science and Business System

Minor Degree
(Cloud Computing)

Subject Code	Subject Name	No.of Hours		
		Lecture	Tutorial	Practical
CCMR1	Principles of Cloud Computing	3	1	-
CCMR2	Cloud Networking	2	-	2
CCMR3	Cloud Programming	2	-	2
CCMR4	Grid and Cluster Computing	3	1	-
CCMR5	Enterprise Storage System	2	-	2
CCMR6	Cloud Security	3	1	-
CCMR7	High Performance Computing	3	1	-
CCMR8	Cloud Computing and Distribution Systems (MOOCs)	-	-	-
CCMR9	Block chain and its Applications (MOOCs)	-	-	-

Note: Students who completes C, Python are eligible.

CCMR1- PRINCIPLES OF CLOUD COMPUTING

Minor Degree

Course outcomes:

CO-1: Differentiate the parallel and distributed computing
CO-2: Demonstrate the virtualization
CO-3: select the type of cloud for different requirements of an organization.
CO-4: apply the cloud services to different applications

UNIT-I   **CO1**   **[15 periods]**

Basics: The vision of cloud computing, the cloud computing reference model, Characteristics and benefits and challenges
Historical developments: Distributed systems, Virtualization, web 2.0, Service-oriented computing, utility oriented computing
Building cloud computing environments: Application development, Infrastructure and system development, Computing platforms and technologies
Principles of Parallel and Distributed Computing: Eras of computing, Parallel vs. distributed computing, Elements of parallel computing, Elements of distributed computing, Technologies for distributed computing

UNIT-II   **CO2**   **[12 periods]**

Virtualization: Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization,
Technology examples.

UNIT-III   **CO3**   **[12 periods]**

Cloud Computing Architecture: Introduction, The cloud reference model, Types of clouds, Economics of the cloud, Open challenges

UNIT-IV   **CO4**   **[12 periods]**

Cloud Platforms in Industry: Amazon web services, Google AppEngine, Microsoft Azure
Cloud Applications: Scientific applications, Business and consumer applications.

Text Books:
1. Mastering Cloud Computing Foundations and Applications Programming by RajkumarBuyya, Christian Vecchiola, S. ThamaraiSelvi, Morgan Kaufmann, 2013
2. Cloud Computing Principles and Paradigm by RajKumarBuyya, James Broberg and AndrzejGoscinski, John Wiley & Sons, 2011.

Reference Books:
1. https://cloud.google.com/ (Links to an external site.)
2. https://aws.amazon.com/training/awsacademy/

CCMR2(R20)　　　　　　　　　**CLOUD NETWORKING**　　　**L**　**P**　**C**
　　　　　　　　　　　　　　　　　(Minor Degree)　　　　　　　2　　0　　3

Course Objectives:
At the end of the course, the student will
1. Understand the basic concepts of Networking.
2. Understand the basic concepts of Inter cloud Resource Management
3. Understand the concepts of VPN Architecture and Tunneling.
4. Understand the concepts of P2P Networks, Social Networks

Course Outcomes:

CO1-Expalin the basics of Networks, Virtualization Structures/Tools
CO2-Explain the concepts of Data Center networks and virtual machines
CO3-Demonstrate the creation of Virtual private networks
CO4-Understand the basic concepts of P2P Overlay Networks and Social Networks

Unit-I　　　　　　　　　　　　　　　　　　　　　　　CO1,12 Periods
Introduction to Cloud Networking: Introduction, Networking Basics, Networks, Network Operating Systems, Network Architecture
Virtualization Structures/Tools and Mechanisms: Hypervisor and Xen Architecture, Binary Translation with Full Virtualization, Para Virtualization with compiler support

Unit-II　　　　　　　　　　　　　　　　　　　　　　CO2,13 Periods
Data Center Design and Interconnection Networks: Data Center Interconnection Networks, Modular Data Center in shipping Containers, Inter connection of Modular Data Centers, Data-Center Management Issues.
Inter-cloud Resource Management: Extended Cloud Computing Services, Resource provisioning and platform Deployment, Virtual Machine Creation and Management, Global Exchange of Cloud Resources

Unit-III　　　　　　　　　　　　　　　　　　　　　CO3,13 Periods
Architectural Design of Compute and Storage clouds: Cloud Architecture Design, Layered Cloud Architectural Development, Virtualization support, Disaster Recovery, Architectural Design Challenges.
Virtual Private Network: Introduction, VPN Architecture, VPN Tunnelling, VPN Security,
Remote Accessing on Cloud, Case Studies
Peer-to-peer computing systems: Basic concepts of P2P computing systems, challenges in P2P computing systems, Taxonomy of p2p Network Systems

Unit-IV   CO4,12 Periods

P2P overlay networks and properties: Unstructured, Structured P2P Overlay Networks, Distributed Hash Tables, Hierarchically Structured Overlay Networks.

Routing, proximity, and fault tolerance: Routing in P2P Overlay Networks, Network Proximity in P2P Overlays, Fault Tolerance and Failure Recovery, Churn Resilience against Failures.

Online social and professional networking: Online Social Networking Characteristics, Graph Theoretic Analysis of Social Networks, Communities and Applications of Social Networks, Facebook, Twitter for Microblogging, News and Alert Services

| Text Book(s): | 1. | Lee Chao – "Cloud Computing Networking: Theory, Practice and Development" |
| | 2. | Kai Hwang Geoffrey C. Fox Jack J. Dongarra – "Distributed and Cloud Computing: From Parallel Processing to the Internet of Things". |

CCMR3(R20)   **CCMR3: Cloud Programming**   **L   P   C**

                      Minor Degree   4   0   3

Course Objectives:
At the end of the course, the student will
  1. Understand the basic concepts of cloud architecture
  2. Understand the basic concepts of SOA, Open Source Tools
  3. Understand the concepts of Cloud Service Providers.
  4. Understand the concepts of Programming support for AWS, Google Cloud and MS Azure

Course Outcomes:
CO1-Expalin the basics of Cloud architecture
CO2-Explain the concepts of SOA, Cloud computing Tools and Applications
CO3-Explain the concepts of Cloud Service Providers
CO4-Explain the concepts of programming environments for AWS, Google Cloud, Microsoft Azure

UNIT-I	[CO1]12 periods
Introduction to Cloud Computing: Introduction to Cloud Computing, 5-4-3 principles, Cloud Eco System, features of Cloud service. Model for federal Cloud Computing, Cloud Federation, Two-layer Connectivity for Cloud Federation. Cloud architecture, Anatomy of Cloud, Managing the Cloud, Cloud Migration. Cloud Deployment and Service Models.	
UNIT-II	[CO2]12 Periods
SOA and Cloud Computing Tools and Applications: Introduction, SOA and SOC, Benefits of SOA, Technologies used by SOA, Similarities and Differences between SOA and cloud computing. Cloud computing Tools, Cloud Applications, Open-Source Support for Cloud: Introduction, Open-Source Tools for Iaas, Paas, SaaS.	
UNIT-III	[CO3]14 Periods
Cloud Service Providers: Amazon web services - Compute services, Storage services, Communication Services and Additional Services. Google App Engine - Architecture and core concepts, Application life cycle, Cost model, Observations. Microsoft Azure –Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance	

UNIT-IV	[CO4]14 Periods

Cloud Programming and Software Environments:

Features of Cloud and Grid Platforms - Cloud Capabilities and Platform Features, Traditional Features Common to Grids and Clouds, Data Features and Databases, Programming and Runtime Support Programming Support of Google App Engine - Programming the Google App Engine, Google File System (GFS), Big Table, Google's NOSQL System, Chubby, Google's Distributed Lock Service. Programming on Amazon AWS and Microsoft Azure - Programming on Amazon EC2, Amazon Simple Storage Service (S3), Amazon Elastic Block Store (EBS) and SimpleDB, Microsoft AzureProgramming Support.

TextBook(s):	1. K. Chandra Sekaran – Essentials of CLOUD COMPUTING. 2. Kai Hwang, Geoffrey C Fox, Jack J Dongarra, "Distributed and Cloud Computing - From Parallel Processing to the Internet of Things", MorganKaufman Publishing, 2012