INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**BACHELOR OF TECHNOLOGY (COMPUTER ENGINEERING)**
SEMESTER	**5**
COURSE TITLE	**CLOUD COMPUTING ESSENTIALS**
COURSE CODE	**01CE0514**
COURSE CREDITS	**3**

Objective:

1 This course is designed to understand the concept of cloud computing and its techniques, issues, and its services that will lead to design and development of a simple cloud service.

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Course Outcomes: After completion of this course, student will be able to:

1 Analyze the core concepts of cloud computing, including its service and deployment models.

2 Explain systems, hardware, and application virtualization, and describe their roles in enabling cloud services.

3 Collaborate effectively using real-time cloud platforms and services

4 Apply foundational knowledge of cloud infrastructure to design, build, and deploy cloud-based applications

5 Demonstrate an understanding of key issues in cloud computing, including security and privacy

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
2	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Overview of Cloud Computing** Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud – Community Cloud – Hybrid Cloud, Benefits and challenges of cloud computing, Business models around Cloud –Major Players in Cloud Computing - Issues in Cloud	5

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Contents : Unit	Topics	Contact Hours
2	**Virtualization** Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization, System VM, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM, VM Ware, Virtual Box, Hyper-V.	6
3	**Types of Cloud Services** Introduction to cloud different services- Service providers - Google App Engine, Amazon EC2, Microsoft Azure, Sales force, Introduction to Hadoop Framework.	6
4	**Cloud infrastructure** Architectural Design of Compute and Storage Clouds , Layered Cloud Architecture Development , Design Challenges , Inter Cloud Resource Management , Resource Provisioning and Platform Deployment , Global Exchange of Cloud Resources.	6
5	**Security** Introduction, Cloud Storage: from LANs to WANs, Technologies for Data Security in Cloud Computing, Security Concerns, Legal issues and Aspects, Securing the Private and Public Cloud Architecture.	5
Total Hours		**28**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical - 1** Setting Up a Cloud Environment	2
2	**Practical - 2** Deploy Virtual Machine Instance	2
3	**Practical - 3** Virtual Machine Management	2
4	**Practical - 4** Deploy a Web Application on AWS	2
5	**Practical - 5** Amazon EC2 instances with Microsoft Windows	2
6	**Practical - 6** Amazon Elastic Block Store	2
7	**Practical - 7** Google App Engine	2
8	**Practical - 8** Creating and configuring database instance	2
9	**Practical - 9** Containerization with Docker	2
10	**Practical - 10** Deploy Docker Technology	2

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
11	**Practical - 11** Study on Hadoop Framework	2
12	**Practical - 12** Using Auto Scaling with AWS Lambda and Lifecycle Hooks	2
13	**Practical - 13** Implementing a Serverless Architecture with AWS Managed Services	2
14	**Practical - 14** Cloud monitoring and management tools	2
Total Hours		**28**

Textbook :

1 Cloud Computing for Dummies, Bloor R., Kaufman M., Helper F. Judith Hurwitz , Wiley India Edition, 2010

References:

1 Cloud Computing Black Book, Cloud Computing Black Book, Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde, Dr. Deven Shah , Wiley India, 2014

2 Virtual Machines, Virtual Machines, James E Smith, Ravi Nair, Morgan Kaufmann , 2005

3 Cloud Computing Implementation Management and Strategy, Cloud Computing Implementation Management and Strategy, John W. Rittinghouse, James F. Ransome, Taylor & Francis, 2010

4 Cloud Computing: Principles and Paradigms, Cloud Computing: Principles and Paradigms, Andrzej M. Goscinski, James Broberg, Rajkumar Buyya, Wiley, 2010

5 Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly Media, 2009

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	20.00	20.00	15.00	10.00	15.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

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Instructional Method:

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1 http://www.cloudbus.org/cloudsim/

2 http://www.eucalyptus.com/

3 https://hadoop.apache.org/

4 http://hadoop.apache.org/docs/stable/hdfs_design.html

5 Coursera: https://www.coursera.org/specializations/cloud-computing

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