CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2020-21

Programme: **Bachelor of Engineering (Information Technology)**

Semester: **VII**

Course Code: **102046710**

Course Title: **Introduction to Cloud Computing**

Course Group: **Professional Core Course**

Course Objectives: This course provides the knowledge of Cloud Computing paradigm. Students will be able to understand various platforms, applications and issues related to cloud environment. Students will explore Cloud virtualization, abstractions, and enablement technologies.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	2	4	40 / 14	60 / 21	20 / 7	30 / 10	150 / 52

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Principles of Parallel and Distributed Computing:** Eras of Computing, Parallel v/s Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing, Technologies for Distributed Computing	03
2	**Virtualization:** Introduction, Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples. Implementation Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Types of Hypervisors, Virtualization of CPU, Memory, and I/O Devices, Virtual Clusters and Resource Management	05

3	**Basics of Cloud Computing:** Overview, Applications, Intranets and the cloud. Cloud computing- Benefits, Limitations, Security Concerns. Software as a Service (SaaS)- Understanding the Multitenant Nature of SaaS Solutions, Understanding SOA. Platform as a Service (PaaS)-IT Evolution Leading to the Cloud, Benefits of Paas Solutions, Disadvantages of PaaS Solutions. Infrastructure as a Service (IaaS)-Understanding IaaS, Improving Performance through Load Balancing, Advantages, Server types. Identity as a Service (IDaaS)	**08**
4	**Fundamental Cloud Computing Architecture:** Introduction, Fundamental Concepts and Models, Roles and Boundaries, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models, Economics of the Cloud, Open Challenges. Workload Distribution Architecture, Resource Pooling Architecture, Dynamic Scalability Architecture, Elastic Resource Capacity Architecture, Service Load Balancing Architecture	**08**
5	**Advanced Cloud Architectures:** Hypervisor Clustering Architecture, Load Balanced Virtual Server Instances Architecture, Non-Disruptive Service Relocation Architecture, Zero Downtime Architecture, Cloud Balancing Architecture, Storage Workload Management Architecture	**08**
6	**Cloud Computing Security Architecture:** Security Overview, Cloud Security Challenges and Risks, Software-as-a Service Security, Architectural Considerations, General Issues Securing the Cloud, Identity and Presence, Identity Management and Access Control	**05**
7	**Service Management:** Service Level Agreement, Billing and Accounting **Case Study:** OpenStack, Windows Azure, Google App Engine, Amazon AWS	**03**
	Total	**40**

List of Practicals / Tutorials:

1	Install OracleVirtual box
2	VMware Workstation with different flavors of Linux or windows OS on top of Windows
3	Installation and Configuration of virtualization using KVM
4	Study and implementation of Infrastructure as a Service in public cloud
5	Study and implementation of Storage as a Service in public cloud
6	Study and implementation of Identity Management in public cloud
7	Study and implement Load Balancingin public cloud
8	Study and implement Elastic Managementin public cloud
9	Study and implement User Management in Cloud in public cloud
10	Prepare a case study of security policy and SLA signed by cloud service provider
11	Find a procedure to transfer the files from one virtual machine to another virtual machine
12	Case study on Amazon AWS/Microsoft Azure/Google Cloud Platform

Reference Books:

1	Mastering Cloud Computing Foundations and Applications Programming, Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, publisher Elsevier, 2013
2	Rajkumar Buyya, James Broberg, Andrzej M Goscinski, Cloud Computing: Principles and Paradigms, Wiley publication.
3	Virtualization Essentials, Matthew Portnoy, Publisher Wiley, Year 2016
4	Thomas Erl, Zaigham Mahmood and Ricardo Puttini, "Cloud Computing: Concepts, Technology and Architecture", Pearson, 1st Edition
5	John Rhoton, Cloud Computing Explained: Implementation Handbook for Enterprises, Recursive Press.
6	Anthony T. Velte Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", 2010, The McGraw-Hill.
7	Dr. Kris Jamsa, " Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more" , Wiley Publications

Supplementary learning material:	
1	NPTEL - Swayam Course Cloud computing by Prof. Soumya Kanti Ghosh, IIT Kharagpur
2	Coursera - https://www.coursera.org/learn/introduction-to-cloud

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Seminar/Poster Presentation
- Industrial/ Field visits
- Course Projects

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
15%	25%	25%	15%	20%	---	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Apply and design suitable Virtualization concept and Cloud Resource Management.	**26**
CO-2	Identify the architecture, infrastructure and delivery models of cloud computing	**25**
CO-3	Address the core issues of cloud computing such as security, privacy and interoperability	**25**

CO-4	To appreciate the emergence of cloud as the next generation computing paradigm.	**14**
CO-5	Choose the appropriate cloud player, Programming models and approach	**10**

Curriculum Revision:	
Version:	1.0
Drafted on (Month-Year):	June-2020
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	June-2025