

Year: B. Tech IV (Semester VII)

Subject Name: Cloud Computing
Type of course: Professional Elective - IV
Prerequisite (if any) : -

Subject Code: BTCO14704

List of Courses where this course will be prerequisite:

Rationale: The course presents a top-down view of cloud computing, from applications and administration to programming, infrastructure, billing and security. The topics include: overview of cloud computing, cloud systems, Load balancing in AWS, distributed storage systems, virtualization, security in AWS, Students will study state-of-the-art solutions for cloud computing developed by Amazon and Open Source Cloud Management Solutions.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
2	0	2	3	60	25	15	30	20	150

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Content	Total Hrs
1	Overview of Computing Paradigm : Recent trends in Computing ,Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Cloud Computing (NIST Model)Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers	03
2	Cloud computing stack: Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models (XaaS):Infrastructure as a Service(IaaS): , Platform as a Service(PaaS):, Software as a Service(SaaS) Deployment Models : Public cloud, Private cloud, Hybrid cloud, Community cloud	06

3	Introduction to Virtualization: Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost – limitations Types of hardware virtualization: Full virtualization - partial virtualization - paravirtualization Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization – Network virtualization, Migrating into a Cloud Introduction, Challenges while migrating to Cloud, Broad approaches to migrating into the cloud-why migrate -deciding on cloud migration, the Seven-step model of migration into a cloud, Migration.Kubernetes, Open Stack, Openshift, KVM	08
4	Web Services: AWS Compute, AWS Storage, AWS Identity and access management, Serverless Services on AWS (AWS Lambda), Application integration,AWS Security, Identity, and Compliance,AWS Machine Learning Services	04
5	Cloud Security: Infrastructure Security-Network level security, Host level security, Application level security,Data security and Storage ,Data privacy and security Issues, Jurisdictional issues raised by Data location,Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations. Privacy Issues: Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Protecting Privacy, Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing, Legal and Regulatory Implications, U.S. Laws and Regulations,International Laws and Regulations	06
6	Cloud Based Case-Studies: Overview of Cloud services, Designing Solutions for the Cloud, Implement & Integrate Solutions, Emerging Markets and the Cloud, Tools for Building Private Cloud: IaaS using Eucalyptus, PaaS on IaaS – AppScale ,Open Nebula	03

Suggested Specification table with Marks (Theory): (For B.Tech only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
8	12	13	6	6	15

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom’s Taxonomy)

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.

Reference Books:

Sr No	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication / Publication Edition
1	Cloud Computing Bible	Sosinsky B	Wiley India ISBN: 978-0-470-90356-8	Latest Edition
2	Cloud Computing: Principles and Paradigms	Rajkumar Buyya	Wiley India Edition	
3	Cloud Computing – A practical Approach	Velte T., Velte A., Elsenpeter R.,	Tata McGrawHill	
4	Cloud Security -A Comprehensive Guide to Secure Cloud Computing	Ronald L. Krutz Russell Dean Vines	Wiley ISBN: 978-0-470-58987-8	
5	Cloud Security & Privacy: An Enterprise Perspective on Risks and Compliance	Tim Mather, Subra Kumaraswamy, Shahed Latif	O'Reilly ISBN: 978-0596802769	

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	To understand the principles and paradigm of Cloud Computing	20
CO-2	Formulate the Service Model with reference to Cloud Computing	25
CO-3	Demonstrate the role Virtualization Technologies	20
CO-4	Understand cloud security issues and solutions	10
CO-5	Ability to design and deploy Cloud Infrastructure	25

List of Open learning website:

- www.nptel.ac.in

List of Open Source Software:

- Open Stack
- Open Shift
- Cloud Sim
- Xen

FOR LAB SESSIONS:

List of Experiments:

Sr. No	Practical
1	Sketch out and analyze architecture of Aneka / Eucalyptus / KVM identify different entities to understand the structure of it.
2	Create a scenario in Aneka / Eucalyptus to create a datacenter and host. Also create virtual machines with static configuration to run cloudlets on them.
3	Make and perform scenarios to pause and resume the simulation in Aneka / Eucalyptus entity, and create simulation entities dynamically.
4	Organize a case in Aneka / Eucalyptus for simulation entities in run-time using its toolkit support and manage virtual clouds.
5	Sketch out and analyze the architecture of Microsoft Azure.
6	Sketch out and analyze the architecture of Amazon Web Service (AWS).
7	Categorize Microsoft Azure Services and Google Cloud and discuss each.
8	Categorize Amazon Web Service (AWS) and implement its various cloud entities using its Cloud Toolbox support.
9	Implement and use sample cloud services with the help of Microsoft Azure/Google Cloud.
10	Create a sample mobile application using Microsoft Azure account as a cloud service. Also provide database connectivity with implemented mobile applications.
11	Create a sample mobile application using Amazon Web Service (AWS) account as a cloud service. Also provide database connectivity with implemented mobile applications.