DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE
(AUTONOMOUS)
(Approved by AICTE & Affiliated to Anna University, Chennai)
Re-Accredited by NAAC with 'A' Grade
Accredited by NBA for AERO, BME, CSE, ECE, EEE, IT & MECH.
PERAMBALUR-621212, TAMILNADU, INDIA.
Website: www.dsengg.ac.in

M.E COMPUTER SCIENCE AND ENGINEERING REGULATIONS – 2023

Name of the Faculty				
Designation/Department	AP/CSE			
Course Code/Name	**P23CSE01- CLOUD COMPUTING TECHNOLOGIES**			
Year/Section/Department	I/A/CSE			
Credits Details	L: 3	T: 0	P: 0	C:3
Total Contact Hours Required	45			

Syllabus:

UNIT I - VIRTUALIZATION AND VIRTUALIZATION INFRASTRUCTURE	**No. of Periods: 9**
Basics of Virtual Machines - Process Virtual Machines – System Virtual Machines –Emulation – Interpretation – Binary Translation - Taxonomy of Virtual Machines. Virtualization –Management Virtualization — Hardware Maximization – Architectures – Virtualization Management – Storage Virtualization – Network Virtualization- Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation	
UNIT II - CLOUD PLATFORM ARCHITECTURE	**No. of Periods: 9**
Cloud Computing: Definition, Characteristics - Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software- A Generic Cloud Architecture Design – Layered cloud Architectural Development – Architectural Design Challenges	
UNIT III - AWS CLOUD PLATFORM - IAAS	**No. of Periods: 9**
Amazon Web Services: AWS Infrastructure- AWS API- AWS Management Console - Setting up AWS Storage - Stretching out with Elastic Compute Cloud - Elastic Container Service for Kubernetes- AWS Developer Tools: AWS Code Commit, AWS Code Build, AWS Code Deploy, AWS Code Pipeline, AWS code Star - AWS Management Tools: Cloud Watch, AWS Auto Scaling, AWS control Tower, Cloud Formation, Cloud Trail, AWS License Manager	
UNIT IV - PAAS CLOUD PLATFORM	**No. of Periods: 9**
Windows Azure: Origin of Windows Azure, Features, The Fabric Controller – First Cloud APP in Windows Azure- Service Model and Managing Services: Definition and Configuration, Service runtime API- Windows Azure Developer Portal- Service Management API- Windows Azure Storage Characteristics-Storage Services-REST API- Blops	
UNIT V - ASPECT ORIENTED SOFTWARE DEVELOPMENT	**No. of Periods: 9**
Introduction to Hadoop Framework - Map reduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job –Developing Map Reduce Applications - Design of Hadoop file system –Setting up Hadoop Cluster- Aneka: Cloud Application Platform, Thread Programming, Task Programming and Map-Reduce Programming in Aneka	

TOTAL: 45 PERIODS

Objectives:

1. To gain expertise in Virtualization, Virtual Machines and deploy practical virtualization solution.
2. To understand the architecture, infrastructure and delivery models of cloud computing.
3. To explore the roster of AWS services and illustrate the way to make applications in AWS
4. To gain knowledge in the working of Windows Azure and Storage services offered by Windows Azure
5. To develop the cloud application using various programming model of Hadoop and Aneka

Text Book:

T1- Bernard Golden, "Amazon Web Service for Dummies", John Wiley & Sons, 1 st Edition, 2013
T2 - Sriram Krishnan, "Programming: Windows Azure", O'Reilly,1 st Edition,2010.
T3 -Danielle Ruest, Nelson Ruest, "Virtualization: A Beginner"s Guidel", McGraw-Hill Osborne Media, 1 st Edition,2009.

Reference Book:

R1. Andrew S. Tanenbaum & David J. Wetherall, *Computer Networks*
R2. Douglas E. Comer, Internetworking *with TCP/IP*.
R3.Charlie Kaufman, Radia Perlman, Mike Speciner**,** *Network Security: Private Communication **in** a Public World*

Website:

W1: https://www.statlect.com/probability-distributions
W2: https://www.khanacademy.org/math/statistics-probability
W3: https://stattrek.org/probability/probability-rules.aspx
W4: https://www.geeksforgeeks.org/probability-in-maths//

Online Mode of Study:

W1: https://onlinecourses.nptel.ac.in/noc24_ma23/preview
W2: https://www.coursera.org/courses?query=probability%20and%20statistics
W3: https://www.khanacademy.org/math/statistics-probability
W4: https://stattrek.org/statistics/tutorials.aspx
W5: https://www.statlect.com/

Course Plan:

Topic Number	Topic	Reference Detail	Page Number	Mode of teaching	Number of Periods Required	Cumulative Period
UNIT I - VIRTUALIZATION AND VIRTUALIZATION INFRASTRUCTURE						
1	Introduction to Virtual Machines	T1	1-5	BB	1	1
2	Types of Virtual Machines	T1	6-10	BB	1	2
3	Execution Techniques	T1	11-15	BB	1	3
4	Advanced Execution	T1	16-20	BB	1	4
5	VM Classification	T1	21-25	BB	1	5
6	Virtualization Concepts	T1	26-30	BB	1	6
7	Virtualization Management	T1	31-35	BB	1	7
8	Implementation Levels	T1	36-40	BB	1	

						8
9	Advanced Concepts	T1	41-45	BB	1	9

Outcome of Unit I:

At the end of unit, Students should be able to

- Employ the concepts of virtualization in the cloud computing.

UNIT II - CLOUD PLATFORM ARCHITECTURE						
10	Cloud Computing – Definition & Basics	T1	46-50	BB	1	10
11	Characteristics of Cloud Computing	T1	51-55	BB	1	11
12	Cloud Deployment Models	T1	56-60	BB	1	12
13	Service Models (IaaS, PaaS, SaaS, XaaS)	T1	61-65	BB	1	13
14	Generic Cloud Architecture Design	T1	66-70	BB	1	14
15	Cloud Architecture Components	R1	71-75	BB	1	15
16	Layered Cloud Architecture	T1	76-80	PPT	1	16
17	Architectural Design Principles	T1	81-85	BB	1	17
18	Architectural Design Challenges	T1	86-90	BB	1	18

- **Outcome of Unit II:**

  At the end of this unit, students should be able to:
- Identify the architecture, infrastructure and delivery models of cloud computing

UNIT-III - CLOUD PLATFORM ARCHITECTURE						
19	Introduction to Amazon Web Services & AWS Infrastructure	T1	91-95	BB	1	19
20	AWS API & AWS Management Console	T1	96-100	BB	1	20
21	AWS Storage Services Setup	T1	101-105	BB	1	21
22	Elastic Compute Cloud (EC2)	T1	106-110	BB	1	22
23	Elastic Container Service for Kubernetes (EKS)	T1	111-115	BB	1	23
24	AWS Developer Tools	T1	116-120	BB	1	24
25	AWS Code Services (Code Commit, Code Build, Code Deploy, Code Pipeline, Code Star)	T1	121-125	BB	1	25
26	AWS Management Tools	T1	126-130	BB	1	26
27	Monitoring & Governance Tools	T1	131-135	BB	1	27

Outcome of Unit III:

At the end of this unit, students should be able to:

- Develop the Cloud Application in AWS platform

UNIT-IV- PAAS CLOUD PLATFORM						
28	Introduction to Microsoft Azure & Origin of Windows Azure	T2	136-140	BB	1	28
29	Features of Windows Azure & Fabric Controller	T2	141-145	BB	1	29

30	First cloud application in Azure	T2	146-150	BB	1	30
31	Service Model: Definition & Configuration	T2	151-155	BB	1	31
32	Service Runtime API	T2	156-160	BB	1	32
33	Service Management API	T2	161-165	BB	1	33
34	Azure Storage Characteristics	T2	166-170	BB	1	34
35	Storage services REST API	T2	171-175	BB	1	35
36	Blob Storage (Blobs)	T2	176-180	BB	1	36

Outcome of Unit IV:

At the end of this unit, students should be able to:

- Apply the concepts of Windows Azure to design Cloud Application

UNIT-V - PROGRAMMING MODEL

37	Introduction to Hadoop Framework Development	T2	181-185	**BB**	**1**	37
38	Map Reduce Concepts (Map & Reduce Functions)	T2	186-190	BB	1	38
39	Input Splitting & I/O Parameters	T2	191-195	BB	1	39
40	Configuring and Running Hadoop Jobs	T2	196-200	BB	1	40
41	Developing Map Reduce Applications	T2	201-205	BB	1	41
42	Hadoop File System (HDFS) Design	T2	206-210	BB	1	42
43	Setting up Hadoop Cluster	T2	211-215	BB	1	43
44	Introduction to Aneka & Programming Models	T2	216-220	BB	1	44
45	Thread, Task & Map Reduce Programming in Aneka	T2	221-225	BB	1	45

Outcome of Unit V:

At the end of this unit, students should be able to:

- Apply the concepts of Windows Azure to design Cloud Application
- Develop services using various Cloud computing programming models

Course Outcome:

At the end of the course the students would be able to

CO1: Employ the concepts of virtualization in the cloud computing.

CO2: Identify the architecture, infrastructure and delivery models of cloud computing

CO3: Develop the Cloud Application in AWS platform

CO4: Apply the concepts of Windows Azure to design Cloud Application

CO5: Develop services using various Cloud computing programming models

CO6: Understand the concept of Aneka: Cloud Application Platform

Course Outcome Vs Program Outcome Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	1	-	-	2	1
CO 2	3	2	1	1	1	-	-	-	-	1	-	2	2	1
CO 3	2	1	-	-	-	-	-	-	-	1	-	-	2	1
CO 4	2	1	-	-	-	-	-	-	-	1	-	-	2	1
CO 5	2	1	-	-	-	-	-	-	-	1	1	-	2	1
CO 6	2	1	-	-	1	-	-	-	2	1	1	2	2	1
AVG	**2**	**1**	**1**	**1**	**1**	**-**	**-**	**-**	**2**	**1**	**1**	**2**	**2**	**1**

Internal Evaluation Components:

Web portal	Assignment	Components	Topic Number with Topic / Unit Details	Relevance to CO
Web portal 1	**--**	**Assessment – I (60)**	**Unit I and II**	**CO 1 & CO2**
	1	**Assignment – Handwritten (20)**	1 Explain types of Virtual Machines with examples. 2 Describe execution techniques: Emulation, Interpretation, Binary Translation.	CO1
	2	**Assignment – Poster Presentation / PPT (20)**	1 Explain AWS infrastructure and core services. 2 Explain AWS developer tools and CI/CD pipeline...	CO2
Web portal 2	**--**	**Assessment – II (60)**	**Unit III and IV**	**CO3 & CO4**
	3	**Seminar (20)**	1 Explain architecture and features of Windows Azure. 2 Explain container services using EKS.	CO3
	4	**Case Study Report (20)**	1. Discuss Azure storage services and characteristics. 2 Write steps to develop and deploy an application in Azure.	CO4

Web portal 3	**--**	**Model Exam (75)**	**Unit I to V**	**CO1 to CO6**
	5	**MCQ (15)**	**Unit I to V**	**CO1 to CO6**
	-	**Course Attendance (10)**	**--**	**--**

Submission Details:

Phase 1(Before AT 1)	**Phase 2 (Before AT 2)**	**Phase 3(Before Model Exam)**
Assignment 1	**Assignment 2**	**Assignment 3**

PLAN OF ASSESSMENT TEST –DISTRIBUTION OF MARKS:

TEST	**CO- MARK WISE DISTRIBUTION**						**BLOOM'S LEVEL MARK WISE DISTRIBUTION**					
AT-1	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**BTL1**	**BTL2**	**BTL3**	**BTL4**	**BTL5**	**BTL6**
	37	**23**	**-**	**-**	**-**	**-**						
AT-2	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**BTL1**	**BTL2**	**BTL3**	**BTL4**	**BTL5**	**BTL6**
	-	**-**	**37**	**23**	**-**	**-**						
MODEL	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**BTL1**	**BTL2**	**BTL3**	**BTL4**	**BTL5**	**BTL6**
	20	**20**	**20**	**20**	**10**	**10**						

Prepared By **Verified By**

Approved By