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Master of Engineering - ME (Cloud Computing)

Course File

Course Name	:	Cloud Architecture and Management
Course Code	:	CDC 5102
Academic Year	:	2024 – 25
Semester	:	I
Name of the Course Coordinator	:	Dr. PRATHIVIRAJ N
Name of the Program Coordinator	:	Mr. Sreepathy HV

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Signature of Program Coordinator with Date	Signature of Course Coordinator with Date

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Program Education Objectives (PEOs)

The overall objectives of the Learning Outcomes-based Curriculum Framework (LOCF) for **ME (Cloud Computing)**, program are as follows.

PEO No.	Education Objective
PEO 1	Develop advance knowledge and understanding of the theories, concepts, and principles related to Cloud Computing, including virtualization, distributed systems, cloud networks, security, micro services, and cloud infrastructure management services.
PEO 2	Apply critical thinking and problem-solving skills to address complex challenges in cloud computing such as scalability, resource scheduling, performance optimization and data management.
PEO 3	Gain practical, hands-on experience with global cloud provider services, DevOps tools, automation and container orchestration services through coursework and applied research experiences.



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Program Outcomes (POs)

By the end of the postgraduate program in **ME (Cloud Computing)**, graduates will be able to:

PO1	An ability to independently carry out research /investigation and development work to solve practical problems.
PO2	An ability to write and present a substantial technical report/document.
PO3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
PO4	An ability to design, develop scalable, highly available and fault-tolerant cloud solutions, services for business needs and implement well architected cloud architectures based on theoretical principles, ethical considerations, and detailed knowledge of the underlying infrastructure, applications and data.



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PO5

An ability to demonstrate knowledge of securing cloud resources, data and infrastructure and apply DevOps best practices to automate software development life cycle.

1. Course Plan

1.1 Primary Information

Course Name	:	Cloud Computing and Management [CDC 5102]
L-T-P-C	:	3-0-0-3
Contact Hours	:	36 Hours
Pre-requisite	:	Basics of Operating System
Core/ PE/OE	:	Core



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1.2 Course Outcomes (COs), Program outcomes (POs) and Bloom's Taxonomy Mapping

CO	At the end of this course, the student should be able to:	No. of Contact Hours	Program Outcomes (PO's)	BL
CO1	Interpret the cloud computing fundamentals to plan deployment of application on cloud.	8	PO4	3
CO2	Relate the role of virtualization in enabling the cloud.	8	PO1	4



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CO3	Demonstrate the use of server and network virtualization.	8	PO3	3
CO4	Relate the management and economics in cloud usage	12	PO5	4

1.3 Assessment Plan

Components	Mid-Term	Flexible Assessments (2 – 3 in number)	End semester/ Makeup examination
Duration	90 minutes	To be decided by the faculty.	180 minutes
Weightage	0.3	0.1	0.5
Typology of questions	Applying; Analyzing.	Applying; Analyzing. Understanding.	Applying; Analyzing; Understanding.
Pattern	Answer all 5 questions of 10 marks each.	Assignment: (Solving Use case using cloud services.)	Answer all 10 full questions of 10 marks each.



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Schedule	As per academic calendar.	Assignment submission: November 2023	As per academic calendar.
Topics covered	Cloud Computing Fundamentals, Overview of Virtualization	Server and Network Virtualization, Management and Cloud Services	Comprehensive examination covering the full syllabus. Students are expected to answer all questions.

1.4 Lesson Plan

L. No.	TOPICS	Course Outcome Addressed
L0	Course delivery plan, Course assessment plan, Course outcomes, Program outcomes, CO-PO mapping, reference books	---
L1	Overview of Computing Paradigm	CO1
L2	Introduction to Cloud Computing	CO1
L3	Cloud Computing definition, private, public and hybrid cloud.	CO1
L4	Cloud types; IaaS, PaaS, SaaS	CO1
L5	Benefits and challenges of cloud computing, public vs private clouds	CO1
L6	role of virtualization in enabling the cloud	CO1



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L7	Business Agility: Benefits and challenges to Cloud architecture	CO1
L8	Application availability, performance, security and disaster recovery; next generation Cloud Applications.	CO1
L9	Basics of Virtualization – Types of Virtualization Techniques	CO2
L10	Types of Virtualization Techniques – Merits and demerits of Virtualization	CO2
L11	Full Vs Para-virtualization	CO2
L12	Virtual Machine Monitor/Hypervisor	CO2
L13	Virtual Machine Basics – Taxonomy of Virtual machines	CO2
L14	Ring Levels – Process Vs System Virtual Machines	CO2
MT	Mid-Term	CO1 & CO2
L15	Ring Levels – Process Vs System Virtual Machines	CO2
L16	Emulation: Interpretation and Binary Translation - HLL Virtual Machines	CO2
L17	Introduction to Server and Network Virtualization	CO3
L18	Virtual Hardware Overview - Server Consolidation	CO3
L19	Partitioning Techniques - Uses of Virtual server Consolidation	CO3
L20	Server Virtualization Platforms	CO3
L21	Design of Scalable Enterprise Networks – Layer2 Virtualization	CO3
L22	VLAN - VFI -Layer 3 Virtualization	CO3
L23	VRF - Virtual Firewall Contexts	CO3
L24	Network Device Virtualization - Data- Path Virtualization – Routing Protocols	CO3



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L25	Introduction to Management and Cloud Services	CO4
L26	Reliability, availability and security of services deployed from the cloud	CO4
L27	Reliability, availability and security of services deployed from the cloud	CO4
L28	Performance and scalability of services, tools and technologies used to manage cloud services deployment	CO4
L29	tools and technologies used to manage cloud services deployment;	CO4
L30	Cloud Computing infrastructures available for implementing cloud based services	CO4
L31	Service Management in Cloud Computing - Service Level Agreements(SLAs)	CO4
L32	Billing & Accounting - Comparing Scaling Hardware: Traditional vs. Cloud	CO4
L33	Economics of scaling: Benefitting enormously	CO4
L34	Managing Data - Looking at Data, Scalability & Cloud Services	CO4
L35	Database & Data Stores in Cloud - Large Scale Data Processing	CO4
L36	Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business need	CO4



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1.5 References

1. Barrie Sosinsky, “Cloud Computing Bible”, Wiley-India, 2010
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, “Cloud Computing: Principles and Paradigms”, Wiley, 201
3. Nikos Antonopoulos, Lee Gillam, “Cloud Computing: Principles, Systems and Applications”, Springer, 2012. Ronald L. Krutz, Russell Dean Vines, “Cloud Security: A Comprehensive Guide to Secure Cloud Computing”, Wiley-India, 2010
4. <https://in.coursera.org/learn/cloud-computing-basic>

1.6 Other Resources (Online, Text, Multimedia, etc.)

1. Web Resources: Blog, Online tools and cloud resources.
2. Journal Articles.



1.7 Course Timetable

1 st Semester CDC				Room: Cloud Lab				
	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5
MON		CAM						
TUE								
WED		CAM						
THU								
FRI		CAM						
SAT								

1.8 Assessment Plan

COs					
CO No.	CO Name	Mid-Term (Max. 50)	Assignment (Max. 20)	End Semester (Max. 100)	CO wise Weightage
CO1	Interpret the cloud computing fundamentals to plan deployment of application on cloud.	20		20	0.20



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CO2	Relate the role of virtualization in enabling the cloud.	30		30	0.30
CO3	Demonstrate the use of server and network virtualization.	-	10	20	0.25
CO4	Relate the management and economics in cloud usage	-	10	30	.25
	Marks (weightage)	0.3	0.2	0.5	1.0

Note:

- In-semester Assessment is considered as the Mid-Term Assessment (MA) in this course for 50 marks, which includes the performances in class participation, assignment work, class tests, mid-term tests, quizzes etc.
- End-semester examination (ESE) for this course is conducted for a maximum of 100 and the same will be scaled down to 50.
- End-semester marks for a maximum of 50 and IA marks for a maximum of 50 are added for a maximum of 100 marks to decide upon the grade in this course.

Weightage for CO1 = (IT1 marks for CO1 / 2.5 + IT2 marks for CO1 / 2.5 + Assignment marks for CO1 + ESE marks for CO1 / 2)/100
= (25/2.5 + 0 + 0 + 20/ 2)/100 = 0.2



1.9 Assessment Details

The assessment tools to be used for the Current Academic Year (CAY) are as follows:

Sl. No.	Tools	Weightage	Frequency	Details of Measurement (Weightage/Rubrics/Duration, etc.)
1	Mid-Term	0.3	1	<ul style="list-style-type: none">• Performance is measured using Mid-Term attainment level.• Reference: question paper and answer scheme.• Mid-Term is assessed for a maximum of 50 marks and scaled down to 30 marks.
2	Assignments	0.2	2	<ul style="list-style-type: none">• Performance is measured using assignments/quiz attainment level.• Assignments/quiz are evaluated for a maximum of 20 marks.
3	ESE	0.5	1	<ul style="list-style-type: none">• Performance is measured using ESE attainment level.• Reference: question paper and answer scheme.• ESE is assessed for a maximum of 100 marks and scaled down to 50 marks.



1.10 Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5
CO1				Y	
CO2	Y				
CO3			Y		
CO4					Y
Average Articulation Level	*		*	*	*