



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

CLOUD APPLICATION DEVELOPMENT LABORATORY								
V Semester: CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
ACSD27	Core	0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
Prerequisites: Programming with Objects								

I. COURSE OVERVIEW:

This laboratory course is designed to provide students with hands-on experience in developing applications for cloud computing environments. Students will learn how to design, develop, deploy, and manage cloud-based applications using popular platforms and services such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform. The course will also cover best practices for building secure, scalable, and reliable cloud applications.

II. COURSES OBJECTIVES:

The students will try to learn

- I. Understand the fundamentals of cloud computing and its benefits for application development.
- II. How to use cloud platforms and services to build, deploy, and manage applications.
- III. Develop skills in designing and implementing cloud-based solutions for real-world scenarios.
- IV. Gain experience in working with cloud infrastructure, storage, databases, and other key services.
- V. Understand best practices for securing, scaling, and monitoring cloud applications.

III. COURSE OUTCOMES:

At the end of the course, students should be able to:

- CO1 Design, Develop & Deploy real-world applications in the cloud computing platforms they have learned
- CO2 Develop Applications in the cloud platform.
- CO3 Design dashboards for management across cloud-based services.
- CO4 Demonstrate the ability to access the various cloud platforms used.
- CO5 Describe the methods for managing the data in the cloud and demonstrate the concepts of automation, and provisioning using the puppet tool.
- CO6 Analyze and use an appropriate framework and APIs for the task.

IV. COURSE CONTENT:

Week – 1: INTRODUCTION TO CLOUD COMPUTING

- a. Create accounts on popular cloud platforms like AWS, Google Cloud, and Azure.
- b. Exploring the dashboards and key services of each cloud provider.
- c. Creating and configuring Virtual Private Clouds (VPCs).
- d. Configuring security groups and network access control lists (ACLs).

Week – 2: VIRTUAL MACHINES AND STORAGE

- a. Creating and managing virtual machines (VMs).
- b. Cloud storage options and their use cases.
- c. Launching and configuring VMs on AWS EC2, Azure VMs, and Google Compute Engine.
- d. Setting up different cloud storage (S3, Azure Blob Storage, Google Cloud Storage).

Week – 3: CLOUD NETWORKING

- a. Setting up VPCs and configuring networking components.
- b. Creating and configuring Virtual Private Clouds (VPCs).
- c. Setting up subnets, routing tables, and internet gateways.
- d. Configuring security groups and network access control lists (ACLs).

Week – 4: CONTAINERIZATION WITH DOCKER

- a. Installing Docker and running basic commands.
- b. Creating Docker images and managing containers.
- c. Deploying containers on ECS (AWS), AKS (Azure), and GKE (Google Cloud).
- d. Creating Lambda functions (AWS), Azure Functions, and Google Cloud Functions.

Week – 5: ORCHESTRATION WITH KUBERNETES

- a. Setting up a Kubernetes cluster.
- b. Deploying and managing containerized applications with Kubernetes.
- c. Creating IAM users and groups.

Week – 6: SERVERLESS COMPUTING

- a. Creating and deploying serverless functions on AWS, Azure, and Google Cloud.
- b. Setting up triggers for serverless functions.
- c. Creating and managing S3 buckets (AWS).
- d. Working with Azure Blob Storage and Google Cloud Storage.

Week – 7: MICROSERVICES ARCHITECTURE

- a. Developing a simple microservices application.
- b. Deploying microservices on a cloud platform.
- c. Setting up monitoring dashboards
- d. Creating alerts and managing logs.

Week – 8: CONTINUOUS INTEGRATION AND CONTINUOUS DEPLOYMENT (CI/CD)

- a. Setting up a CI/CD pipeline.
- b. Automating the build, test, and deployment process.
- c. Deploying code changes using CI/CD tools.

Week – 9: MONITORING AND LOGGING

- a. Setting up monitoring and logging for cloud applications.
- b. Analyzing logs and metrics to troubleshoot issues.
- c. Creating alerts and managing logs using monitoring and logging technique.

Week – 10: SECURITY IN THE CLOUD

- a. Configuring IAM policies and roles.
- b. Implementing security best practices for cloud applications.
- c. Implementing encryption for data at rest and in transit

Week – 11: CLOUD STORAGE SOLUTIONS

- a. Implement cloud storage services.
- b. Hands-on with Amazon S3, Azure Blob Storage, Google Cloud Storage
- c. Implementing data lifecycle management and access policies.

Week – 12: COST MANAGEMENT AND OPTIMIZATION

- a. Understanding cloud pricing models.
- b. Hands-on with cost management tools: AWS Cost Explorer, Azure Cost Management, Google Cloud Billing.
- c. Strategies for optimizing cloud application costs.

V. TEXT BOOKS:

1. Cloud Native Development Patterns and Best Practices" by *John Gilbert*
2. Designing Data-Intensive Applications: "The Big Ideas Behind Reliable, Scalable, and Maintainable Systems" by *Martin Kleppmann*
3. "Building Microservices: Designing Fine-Grained Systems" by *Sam Newman*

VI. REFERENCE BOOKS:

1. *Michael J. Kavis*, "Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS).
2. *Kelsey Hightower, Brendan Burns, and Joe Beda*, Kubernetes Up & Running: Dive into the Future of Infrastructure" by
3. "AWS Certified Developer – Associate Guide: The Ultimate Certification Guide with Practice Tests and Exercises" by *Vipul Tankariya and Bhavin Parmar*

VII. ELECTRONICS RESOURCES:

1. <https://docs.aws.amazon.com/>
2. <https://docs.microsoft.com/en-us/azure/>
3. <https://cloud.google.com/docs>
4. <https://docs.docker.com/>
5. <https://kubernetes.io/docs/>

VIII. MATERIALS ONLINE

1. Course Content
2. Lab Manual