CAS610MJ: Cloud API's and Services		
Teaching Scheme: Theory Session: Total 45 Hours	**Credit:** 03	**Examination Scheme:** **Internal (TH):** 25 Marks **External (TH):** 50 Marks **Total:** 75 Marks

Prerequisites: Basic Cloud Computing Knowledge, Programming Skills, Web Development Basics, API Knowledge, Familiarity with Cloud Services etc..

Course Objectives:

- To understand Cloud Computing Concepts
- To learn API Basics and Principles
- To interact with Cloud APIs
- To handle Authentication and Security
- To develop Serverless Solutions

Course Outcomes: On completion of the course, learners should be able to

CO#	Cognitive Domain	Course Outcomes
CO1	Understand	Understand cloud API concepts, including design, authentication, integration, and best practices for interacting with cloud services
CO2	Apply	Integrate and interact with various cloud APIs (e.g., AWS, Google Cloud, Azure) to utilize services like storage, compute, machine learning, and databases
CO3	Apply	Integrate and deploy machine learning models using cloud-based AI APIs to solve real-world problems efficiently
CO4	Understand	Understand and implement scalable, event-driven applications using serverless computing and microservices architecture
CO5	Apply	Apply learned concepts to real-world industry problems through a hands-on capstone project, demonstrating practical expertise

Unit No.	Contents	Weightage in %	No of Sessions
1	**Fundamentals of Cloud APIs** 1.1 Introduction: Cloud API, Role in Cloud Computing. 1.2 Characteristics of Cloud API 1.3 Types of Cloud API RESTful, SOAP APIs,GraphQL, Websockets 1.4 API Lifecycle Management 1.5 Cloud API request Methods 1.6 Challenges of Cloud API 1.7 Benefits of Cloud API	20	9

*Mapping of Course Outcomes for Unit 1: CO1

2	**Cloud APIs and Integration** 2.1 Cloud API Development using AWS Lambda, Azure Functions, Google Cloud Functions 2.2 Integrating Cloud Services - Connecting storage, databases, and compute services via APIs 2.3 API Authentication & Authorization - OAuth 2.0, JWT, API Keys 2.4 API Testing and Monitoring - Postman, JMeter, SoupUI, and API testing frameworks	20	9
*Mapping of Course Outcomes for Unit 2: CO2			
3	**Cloud AI & Machine Learning APIs** 3.1 AI & ML in the Cloud - Overview of AI/ML services in AWS, Google Cloud, and Azure 3.2 Vision APIs - AWS Rekognition, Google Vision AI, Azure Computer Vision 3.3 NLP & Text Processing APIs - AWS Comprehend, Google Natural Language API, Azure Text Analytics 3.4 Speech Recognition & Synthesis APIs - AWS Polly, Google Speech-to-Text, Azure Speech Services	20	9
*Mapping of Course Outcomes for Unit 3: CO3			
4	**Serverless Computing & Microservices** 4.1 Introduction to Serverless Computing, Benefits and use cases of serverless, Serverless frameworks and tools 4.2 Microservices Architecture, Monolithic vs. Microservices, Communication between Microservices 4.3 Event-Driven Programming in the Cloud, AWS EventBridge, Google Pub/Sub, Azure Event Grid 4.4 Serverless Deployment Strategies, AWS Lambda, Google Cloud Functions, Azure Functions, Serverless databases (Firebase, DynamoDB, Cosmos DB) 4.5 API Security Best Practices	20	9
*Mapping of Course Outcomes for Unit 4: CO4			
5	**Capstone Project & Industry Use Cases** 5.1 Real-World Applications of Cloud APIs, Cloud APIs in fintech, healthcare, and e-commerce 5.2 Capstone Project: Developing an end-to-end cloud-based API, Integrating Multiple Cloud Services 5.3 Industry Trends & Future of Cloud APIs	20	9
*Mapping of Course Outcomes for Unit 5: CO5			

Learning Resources

Text Books:

- Cloud Computing: A Hands-On Approach - Arshdeep Bahga and Vijay Madisetti, CreateSpace Independent Publishing Platform
- Cloud Computing: Theory and Practice, Dan C. Marinescu, Morgan Kaufmann
- Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS) - Michael J. Kavis, Wiley
- Cloud Application Architectures: Building Applications and Infrastructure in the Cloud - George Reese, O'Reilly Media

Reference Books:

- "APIs: A Strategy Guide" – Daniel Jacobson
- "RESTful Web APIs" – Leonard Richardson, Mike Amundsen
- API design guidelines from Google, AWS, and Microsoft
- "Cloud Computing: A Hands-on Approach" – Arshdeep Bahga, Vijay Madisetti
- "Designing Web APIs" – Brenda Jin, Saurabh Sahni
- AWS, Google Cloud, and Azure API documentation
- "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" – Aurélien Géron
- AI API documentation from AWS, Google Cloud, and Azure
- "Building Microservices" – Sam Newman
- "Serverless Architectures on AWS" – Peter Sbarski
- “Cloud Native Patterns" – Cornelia Davis
- Industry whitepapers and case studies from AWS, Google Cloud, and Azure

Recommended Learning Material

Online Courses:

- Google Cloud API Management Courses: Google Cloud offers training on developing and managing APIs using their Apigee API management platform.
- API Courses on Coursera: Coursera provides a variety of courses focused on APIs, including topics like RESTful API design, OAuth, API security, and cloud API integration.
- API Developer Learning Path by Google Cloud Skills Boost
- A Cloud Guru: A Cloud Guru is an online learning platform specializing in cloud computing.

Tutorials and Guides:

- Google Cloud API Gateway Tutorials
- Google Cloud APIs: Getting Started Guide
- TutorialsPoint: Cloud Computing Tutorial
- GeeksforGeeks: Cloud Computing Tutorial
- Guru99: Cloud Computing Tutorial for Beginners

Recommended Certification:

- Google Cloud - Apigee API Engineer Certification
- Microsoft Certified: Azure Developer Associate
- Certified API Developer by API University
- AWS Certified Developer – Associate
- AWS Certified Solutions Architect – Associate
- AWS Certified DevOps Engineer – Professional

PBE603MJP: Practical based on Electives IV and V

Practical Based on Cloud APIs, Services, Migration and Management

Teaching Scheme: Practical Sessions:45 Sessions (Each session of 2 Hrs)	**Credit: 03**	**Examination Scheme: Internal(Practical)**: 50 Marks **Total :50 Marks**

Prerequisites - Basic understanding of cloud computing concepts, APIs, virtualization, and system administration.

Course Objectives:

- To utilize cloud service provider APIs and SDKs for cloud operations.
- To understand and apply cloud migration strategies.
- To manage and monitor resources in cloud environments.
- To automate infrastructure provisioning and scaling.
- To evaluate performance, cost, and reliability factors of cloud deployments.

Course Outcomes: On completion of the course, learners should be able to

CO#	Cognitive Domain	Course Outcomes
CO1	Apply	Apply cloud services using API's/SDK's of providers like AWS, Azure, and GCP.
CO2	Apply	Understand and implement cloud migration strategies for transitioning applications, databases, and workloads from on-premise to cloud environments using different tools.
CO3	Apply	Develop and Implement strategies for managing and monitoring cloud resources.
CO4	Apply	Apply automation techniques for infrastructure provisioning and scaling using cloud-native and third-party tools.
CO5	Analyze	Assess and compare cloud deployments by analyzing performance, cost efficiency, reliability, and scalability to optimize operational effectiveness and decision-making.

Learning Resources

References

- AWS Documentation
- Google Cloud APIs
- Azure REST APIs
- Terraform Documentation
- Cloud Adoption Framework (Azure)
- Cloud Migration Guide (Google)