Marwadi University
Faculty of Engineering and Technology
Department of Information and Communication Technology

SubjectCode:01CT0720

Subject Name: Cloud developing

B. Tech. Year –IV (Semester VII)

Objective:

The objective of this course is to gain technical expertise in development with cloud technologies. Students would explore a scenario that provides opportunities to build a variety of infrastructures through a guided, and hands-on approach.

CreditsEarned:04Credits

Course Outcomes: After completion of this course, student will be able to:

1. Write code that interacts with Amazon DynamoDB by using the AWS SDKs
2. Configure containers
3. Develop solutions with Amazon Simple Queue Service (Amazon SQS) and Amazon Simple Notification Service (Amazon SNS)
4. create a REST API using Amazon API Gateway
5. Identify the best practices to deploy secure applications

Pre-requisite of course:
Cloud computing

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	TheoryMarks			Tutorial/ Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Introduction to Developing on AWS** Introduction, Systems development lifecycle, Steps to get started developing on AWS, Demonstration: AWS CLI installation, Fundamentals of working with the AWS SDKs	2
2	**Developing Flexible NoSQL Solutions** Introduction, Introducing AWS database options, Key concepts for DynamoDB, Partitions and data distribution, Secondary indexes, Read/write throughput, Calculating Read Capacity Units (RCUs) and Write Capacity Units (WCUs), Streams and global tables, Backup and restore, Basic operations for DynamoDB tables	5
3	**Developing REST APIs** Introducing APIs, Introducing API Gateway, creating a REST API, Integrating with API Gateway, Deploying an API, controlling access to a REST API, monitoring a REST API, Optimizing API Gateway	6
4	**Developing Event-Driven Serverless Solutions** Introducing serverless computing, Introducing Lambda, Invoking Lambda functions, setting permissions for Lambda, Authoring and configuring Lambda functions, Deploying Lambda functions, Monitoring and debugging tools for application developers, Demonstration: Using X-Ray with Lambda	6
5	**Introducing Containers and Container Services** Introducing containers, Introducing Docker containers, migrating a Web Application to Docker Containers, containers for microservices, Introducing AWS container services, Deploying applications with AWS Elastic Beanstalk	6
6	**Caching Information for Scalability** Introduction, Caching overview, Caching with ElastiCache, Caching Application Data with ElastiCache, Caching with CloudFront, Caching strategies	5
7	**Developing with Messaging Services** Processing requests asynchronously, Introducing Amazon SQS, Working with Amazon SQS messages, Configuring Amazon SQS queues, Introducing Amazon SNS, Developing with Amazon SNS, Demonstration: Working with Amazon Messaging Services, introducing Amazon Kinesis Data Streams	2
8	**Developing Secure Applications on AWS** Securing network connections, authenticating with AWS Security Token Service (AWS STS), Authenticating with Amazon Cognito, Implementing Application Authentication using Amazon Cognito	4
9	**Automating Deployment Using CI/CD Pipelines** Introducing DevOps, AWS code services for continuous integration and continuous delivery (CI/CD), Deploying applications with AWS CloudFormation, deploying applications with the AWS Serverless Application Model (AWS SAM), Automating Application Deployment Using a CI/CD Pipeline	6
	Total Hours	42

Suggested Textbooks/ Reference books:

1. John Culkin, Mike Zazon, AWS Cookbook, 1st edition, O'Reilly Media, 2021
2. Gaurav Raje, Security and Microservice Architecture on AWS, 1st edition, O'Reilly Media, 2023
3. Ralph Kihpehers, AWS: Amazon Web Services for Beginners, 1st edition, 2013
4. Mark Wilkins, Learning Amazon Web Services, Addison-Wessley Professional, 1st edition, 2019

Suggested Theory distribution:

The suggested distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve theory effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	15%	30%	20%	15%	10%

Suggested List of Experiments:

Sr No	Suggested Content
1	Setup Cloudshell and cloud9 environment.
2	Create an IAM role and instance role which can have S3 full access permission.
3	Create a Dynamo DB database that can have an automatic backup at 12:00 AM.
4	Create an API using API gateway in AWS which can trigger lambda function on invoke.
5	Create any 5 APIs using API gateway.
6	Implementing a Serverless Architecture with AWS Managed Service.
7	Create a lambda function using SDK.
8	Implement microservices architecture using containers.
9	Create any 2-container image and push it to ECR.
10	Migrating a Web Application to Docker Containers.
11	On lambda invoke trigger SNS notification to your respective mail.
12	Implementing a Messaging System Using Amazon SNS and Amazon SQS.
13	Implementing Application Authentication Using Amazon Cognito.
14	Create 2 simple websites and push their code to code commit.
15	Automating Application Deployment Using a CI/CD Pipeline.
Advance experiments	

16	To send a message to SQS from the API.
17	Convert any monolithic architecture to micro-service.
18	Create CI/CD pipeline for deploying any project.

Supplementary Resources:

1. https://awsacademy.instructure.com/courses/21018
2. https://aws.amazon.com/kubernetes/
3. https://aws.amazon.com/marketplace/pp/prodview-isd7rfyswfr4s?ref=portal_asin_url
4. https://aws.amazon.com/marketplace/pp/prodview-mm6u6prvppowc?sr=0-2&ref_=beagle&applicationId=AWSMPContessa