Uka Tarsadia University

B. Tech.

Semester VI

DEVELOPMENT OPERATIONS
CE5027

Effective from June-2023

Syllabus version: 1.00

Subject Code	Subject Title	Teaching Scheme			
		Hours		Credits	
		Theory	Practical	Theory	Practical
CE5027	Development Operations	3	2	3	1

Subject Code	Subject Title	Theory Examination Marks		Practical Examination Marks	Total Marks
		Internal	External	CIE	
CE5027	Development Operations	40	60	50	150

Objectives of the course:

- To understand the source code management tools and automation server.
- To understand the programming of the automation process and integrate with various platforms.

Course outcomes:

Upon completion of the course, the student shall be able to,

CO1: Introduce the terminology, technology and its applications.

CO2: Introduce the concept of Automation and understand the code quality.

CO3: Demonstrate source code management tools.

CO4: Demonstrate the usage of continuous delivery and deployment management.

CO5: Demonstrate continuous delivery and deployment.

CO6: Demonstrate AWS and AZURE cloud.

Sr. No.	Topics	Hours
	Unit – I	
1	**Introduction to DevOps:** Introduction, DevOps features, Work management, Source code management, Build automation, Delivery automation, Understanding code quality, Automation of CI/CD.	6
	Unit – II	
2	**Source Code Management (GIT) and BuildAutomation (CI):** Version controlling with SVN and GIT, Branching workflows in SVN and GitHub flow, CI – Build (CI) orchestration using Jenkins automation server, Pipeline basics – Jenkins master, Node, Agent, Executor.	8

Unit – III		
3	**Automation Server and Artifact Management:** Jenkins– Continuous integration and delivery server JENKINS – CD orchestrator, Nexus, JFrogArtifactory, JFrogArtifactory as Kubernetes Registry, Helm chart for Microsoft Azure pipeline.	8
Unit – IV		
4	**Continuous Delivery and Deployment:** Software components can be released in short cycles – Extends Continuous delivery, Change is automatically deployed to production, CD flow.	8
Unit – V		
5	**Continuous Deployment:** Configuration management –Introduction to Ansible, Ansible tasks, Roles, Jinja templates, Vaults, Deployments using Ansible, Containerization with Docker, Introduction to Docker, Images and Containers, DockerFile.	9
Unit – VI		
6	**Advance Platform in DevOps:** Kubernetes(Openshift) – Introduction to Kubernetes namespace and resources, AWS and AZURE – Introduction to AWS and Azure clouds, Pipeline of AWS and Azure clouds –CI/CD.	6

Sr.No.	Development Operations (Practicals)	Hours
1	Implement Google Kubernetes Engine pipeline using cloud build for DevOps services.	2
2	Perform continuous delivery with Jenkins in the Kubernetes Engine.	4
3	Implement cloud source repositories in Google Kubernetes Engine.	4
4	Build the service of managing deployments using Kubernetes Engine in Google Kubernetes Engine.	4
5	Explore the AWS CLI - Create Service Control Policies with the help of Development Operations.	4
6	Study the Terraform and GitLab CI/CD and create the organization in AWS.	4
7	Implement Enabling of Continuous Integration with Azure Pipelines.	4
8	Develop the web application load and performance testing in Azure.	4

Text books:

1. "Version Control with Subversion", O'Reilly Media, Second edition.
2. "Version Control with Git", O'Reilly Media, Second edition.
3. Kim, Jez Humble, Patrick Debois, John Willis, "The DevOps Handbook: How to Create World-Class Agility, Reliability and Gene".

Reference books:

1. Michael Huttermann, "DevOps for Developers".
2. Joakim Verona, "Practical DevOps".
3. John Ferguson, "Jenkins: The Definitive Guide", O'Reilly Media 2011.

Course objectives and Course outcomes mapping:

- To understand the source code management tools and automation server: CO1,CO2, and CO3
- To understand the programming of the automation process and integrate it with various platforms: CO4,CO5, and CO6

Course units and Course outcomes mapping:

Unit No.	Unit Name	Course Outcomes					
		CO1	CO2	CO3	CO4	CO5	CO6
1	Introduction to DevOps	✓					
2	Source Code Management (GIT) and Build Automation (CI)		✓				
3	Automation Server and Artifact Management			✓			
4	Continuous Delivery and Deployment				✓		
5	Continuous Deployment					✓	
6	Advance Platform in DevOps						✓

Programme outcomes:

PO 1: Engineering knowledge: An ability to apply knowledge of mathematics, science, and engineering.

PO 2: Problem analysis: An ability to identify, formulates, and solves engineering problems.

PO 3: Design/development of solutions: An ability to design a system, component, or process to meet desired needs within realistic constraints.

PO 4: Conduct investigations of complex problems: An ability to use the techniques, skills, and modern engineering tools necessary for solving engineering problems.

PO 5: Modern tool usage: The broad education and understanding of new engineering techniques necessary to solve engineering problems.

PO 6: The engineer and society: Achieve professional success with an understanding and appreciation of ethical behavior, social responsibility, and diversity, both as individuals and in team environments.

PO 7: Environment and sustainability: Articulate a comprehensive world view that integrates diverse approaches to sustainability.

PO 8: Ethics: Identify and demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.

PO 9: Individual and team work: An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give/receive clear instructions.

PO 11: Project management and finance: An ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: A recognition of the need for, and an ability to engage in life-long learning.

Programme outcomes and Course outcomes mapping:

Programme Outcomes	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
PO1	✓	✓	✓			
PO2				✓	✓	
PO3	✓	✓	✓			
PO4				✓		
PO5						✓
PO6				✓		✓
PO7	✓	✓	✓			
PO8						✓

PO9					✓	✓
PO10			✓	✓		
PO11		✓			✓	
PO12						✓