INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**BACHELOR OF TECHNOLOGY (COMPUTER ENGINEERING)**
SEMESTER	**7**
COURSE TITLE	**DEVOPS ESSENTIALS**
COURSE CODE	**01CE0717**
COURSE CREDITS	**3**

Objective:

1 The goal of this course syllabus is to acquaint participants with the fundamental principles and terminology of DevOps. It covers various version control tools like Git and Mercurial, providing a deep understanding of Continuous Integration, Continuous Testing, and Continuous Deployment. Additionally, the course delves into Configuration Management using Ansible. The primary goal is to illustrate the advantages of adopting cloud-based DevOps tools and demonstrate how they can be applied to solve real-world problems effectively

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

1 Understand different actions performed through Version control tools like Git.

2 Experiment with building and automating test cases using Maven & Gradle

3 Diagnose Continuous Integration and Continuous Testing and Continuous Deployment using Jenkins

4 Analyse the configuration management using Ansible

5 Experiment to leverage Cloud-based DevOps tools using AWS

Pre-requisite of course: Cloud Computing, Operating system

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
2	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Introduction to DevOps** Devops Essentials - Introduction To AWS, GCP, Azure - Version control systems: Git and Github.	2
2	**Compile and Build Using Maven and Gradle** Introduction, Installation of Maven, POM files,, Maven Build lifecycle, Build phases(compile build, test, package) Maven Profiles,, Maven repositories(local, central, global),, Maven plugins, Maven create and build Artificats, Dependency management, Installation of Gradle, Understand build using Gradle	6

MR. HARDIK AJAYBHAI DOSHI
Digitally signed by (Name of HOD)

DR. RAJENDRASINH BAHADURSINH JADEJA
Digitally signed by (Name of Dean/ Principal)

Contents : Unit	Topics	Contact Hours
3	**Continuous Integration Using Jenkins** Install & Configure Jenkins, Jenkins Architecture Overview, , Creating a Jenkins Job, Configuring a Jenkins job,, Introduction to Plugins, Adding Plugins to Jenkins, , Commonly used plugins (Git Plugin, Parameter Plugin, HTML Publisher, Copy Artifact and Extended choice parameters)., Configuring Jenkins to work with java, Git and Maven,, Creating a Jenkins Build and Jenkins workspace.	8
4	**Configuration Management Using Ansible** Ansible Introduction, Installation, Ansible master/slave configuration, , YAML basics, Ansible modules,, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible	5
5	**Docker & DevOps Pipelines Using AWS** What is container technology? Docker introduction, How docker works,, Networking in Docker, DockerHub, Create Docker images using yaml, , Upload DockerImages to DockerHub, , Create Github/AWS Account, , Create Repository, Create a new pipeline, , Build a sample code, Modify AWS code pipelines,, deploy from github actions to EC2.	7
Total Hours		**28**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**practical 1** Build a branching model to help your team understand the Git workflow for faster integration of work	4
2	**practical 2** Maven and Gradle environmental setup for java applications.	4
3	**practical 3** Create Jenkins job and pipeline it from GitHub repo to run using build.	4
4	**practical 4** Building a CI/CD Pipeline with Jenkins	4
5	**Practical 5** Dockerizing Jenkins Pipeline.	4
6	**Practical 6** eploy web app in AWS EC2 using Ansible.	4
7	**Practical 7** Deploy Angular/React/Java/Python or any other Application in Docker Container	2
8	**Practical 8** Use Jenkins to set up a distributed pipeline that will compile and test a Maven project on two different slave nodes respectively	2
Total Hours		**28**

MR. HARDIK AJAYBHAI DOSHI
Digitally signed by (Name of HOD)

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Digitally signed by (Name of Dean/ Principal)

Textbook :

1 "A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises, Roberto Vormittag, Kindle Edition, 2016

References:

1 Linux for Beginners: An Introduction to the Linux Operating System and Command Line, Linux for Beginners: An Introduction to the Linux Operating System and Command Line, Jason Cannon,, Kindle Edition,, 2014

2 Ansible for DevOps: Server and configuration management for humans", Ansible for DevOps: Server and configuration management for humans", Jeff Geerling, Midwestern Mac, LLC, 2015

3 Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps", Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps", David Johnson, BookBaby, 2019

4 Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer, Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer, Mariot Tsitoara, Apress, 2019

Suggested Theory Distribution:

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

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
20.00	30.00	40.00	10.00	0.00	0.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory

4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1 https://www.jenkins.io/user-handbook.pdf

2 https://maven.apache.org/guides/getting-started/

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