

COURSE OUTCOMES:

At the end of the course, the student shall be able to

- CO1: Illustrate the importance and principles of DevOps and JIRA tool for ALM. (L2)
- CO2: Utilize tools for version control and infrastructure as code. (L3)
- CO3: Demonstrate the use of Ansible for security and management. (L2)
- CO4: Practice containerizing an application using Docker and Kubernetes. (L3)
- CO5: Summarize observability and troubleshooting of an application. (L2)

UNIT-I:

(10 Lectures)

The World without DevOps: Overview, Problem Case Definition, Benefits of Fixing Application Development Challenges, DevOps Adoption Approach through Assessment, Solution Dimensions. - (Textbook 1)

Application Lifecycle Management: JIRA - (Textbook 1)

Learning Outcomes : At the end of the unit, the student shall be able to

1. Outline the importance and benefits of DevOps. (L2)
2. Understand the role of ALM in DevOps. (L2)
3. Understand project management using JIRA. (L2)

UNIT-II:

(10 Lectures)

Source Code Management : Asks from a Source Code Management tool, GIT as Version Control System -(Textbook 1)

Setting Up a Virtual Machine : Creating a VM with vagrant- Anatomy of a Vagrantfile, Basic Vagrant commands - (Textbook 2)

Configure VM with Ansible: Key Ansible concepts, Ansible playbook, Basic Ansible commands - (Textbook 2)

Learning Outcomes : At the end of the unit, the student shall be able to

1. Understand Source Code Management. (L2)
2. Explain the concept of Virtual Machines. (L2)
3. Create and configure Virtual machines. (L3)

UNIT-III:

(10 Lectures)

Using Ansible to manage password, users and groups: Enforcing Complex Passwords , Linux User Types, Linux Groups, Updating the VM, Testing User and Group Permissions - (Textbook 2)

Using Ansible to configure SSH - Understanding and Activating Public Key Authentication, Adding Two-Factor Authentication, Provisioning the VM - (Textbook 2)

Controlling User Commands with Sudo: What is Sudo?, Installing the Greeting Web Application, Anatomy of a sudoers File, Provisioning the VM, Testing Permissions - (Textbook 2)

Automating and testing Host-based Firewall: Planning the Firewall Rules, Automating UFW Rules , Provisioning the VM, Testing the Firewall - (Textbook 2)

Learning Outcomes : At the end of the unit, the student shall be able to

1. Illustrate the use of Ansible. (L2)
2. Summarize the automation of basic security hygiene on Virtual Machine. (L2)

3. Understand host-security improvement. (L2)

UNIT-IV:

(10 Lectures)

Docker : Docker from 30,000 Feet , Installing and Testing Docker, Containerizing a Sample Application , Other Docker Client Commands , Testing the Container - (Textbook 2)

Orchestrating with Kubernetes: Kubernetes from 30,000 Feet, Kubernetes Workload Resources, Deploying the Sample telnet-server Application , Testing the Deployment and Services - (Textbook 2)

Deploying code: CI/CD in Modern Application Stacks, Setting Up Your Pipeline, Other CI/CD Tooling - (Textbook 2), Architecture of Microservices, Applications and case studies of DevOps.

Learning Outcomes : At the end of the unit, the student shall be able to

1. Understand the concept of containerization. (L2)
2. Explain orchestration of containers. (L2)
3. Construct CI/CD pipeline for deployment. (L3)

UNIT-V:

(10 Lectures)

Observability: Monitoring an application, Metrics, Golden signals, Alerts - (Textbook 2)

Troubleshooting hosts: Troubleshooting and Debugging: A Primer, Scenarios - High Load Average, High Memory Usage, High IO wait, Hostname Resolution Failure, Out of Disk Space - (Textbook 2)

Site Reliability Engineering: Introduction, Principles and best practices. (Textbook 1)

Learning Outcomes : At the end of the unit, the student shall be able to

1. Understand the monitoring of health and performance of a service. (L2)
2. Interpret the Golden Signals monitoring pattern. (L2)
3. Compare SRE and Devops. (L2)

Text Books:

1. Deepak Gaikwad, Viral Thakkar, *DevOps Tools: from practitioner's point of view*, Wiley, 1st Edition, 2019
2. Bradley Smith, *DevOps for the Desperate: A Hands-On Survival Guide* - No Starch Press, 1st Edition, 2022

Reference Books:

1. Gene Kim, Jez Humble, Patrick Debois, John Willis, *The DevOps Handbook*, 3rd Edition, 2016

Web References:

1. <https://www.coursera.org/learn/uva-darden-continous-delivery-devops>
2. <https://www.coursera.org/learn/devops-culture-and-mindset>
3. <https://git-scm.com/docs>