

COURSE TITLE	DEVOPS FOUNDATION & INFRA AUTOMATION
COURSE CODE	05CA0404
COURSE CREDITS	4

Objective:

- 1 Explain the fundamental concepts and principles of DevOps and its significance in modern software development.
- 2 Describe Agile methodologies and how they integrate with DevOps practices for continuous delivery and improvement
- 3 Understand the role of Infrastructure Automation in enhancing deployment and scalability processes.
- 4 Demonstrate the ability to configure and manage automation using Ansible.

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

- 1 Describe the core concepts and principles of DevOps and its role in modern software development
- 2 Explain the DevOps culture, including practices and process flows for continuous integration and delivery
- 3 Apply DevOps management techniques for improving software lifecycle management.
- 4 Demonstrate the use of automation technologies in DevOps to streamline operations and deployments.
- 5 Develop and manage Ansible roles for scalable automation across multiple environments.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	INTRODUCTION TO DEVOPS & DEVOPS CULTURE, PROCESS What is DevOps?, External Drivers of Change, Silo Mentality, Local Optimization and Bureaucracy, CALMS, Full Stack, DevOps Culture, Organizational Structures, The Evolution of Teams, Lean practices & Agile practices, Value Stream Mapping	10
2	DEVOPS MANAGEMENT, TECHNOLOGY & AUTOMATION Visual Management, Agile Scrum, Incident Management, Problem Management and Kaizen, Development Pipeline, Cloud Technology, Sharing Processes, DevOps Automation Process	10

Contents : Unit	Topics	Contact Hours
3	Introduction of Automation & Ansible Playbook Introducing Ansible, Describe the fundamental concepts of Red Hat Ansible Automation Platform and how it is used, Install Red Hat Ansible Automation Platform, Implement an Ansible playbook, create an inventory of managed hosts, Write a simple Ansible playbook, and run the playbook to automate tasks on those hosts, Manage variables and facts, Write playbooks that use variables to simplify management of the playbook and facts to reference information about managed hosts	12
4	Configuration of playbooks, Ansible Roles & Troubleshoot Implement task control, manage task control, handlers, and task errors in Ansible Playbooks, Deploy files to managed hosts, Deploy, manage, and adjust files on hosts managed by Ansible, Manage complex plays and playbooks, write playbooks that are optimized for larger, Complex plays and playbooks, Simplify playbooks with roles., Use Ansible roles to develop playbooks more quickly and to reuse Ansible code, Troubleshoot Ansible, troubleshoot playbooks and managed hosts, Automate Linux administration tasks, Automate common Linux system administration tasks with Ansible.	13
Total Hours		45

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Unit 1 Install Red Hat Ansible Automation Platform on a Linux system, Configure a basic Ansible environment with a control node and managed nodes, Run a basic Ansible command using <code>ansible -m ping all</code> , List and describe the fundamental concepts of Ansible, including inventory, modules, and playbooks, Check Ansible version and configuration settings using <code>ansible --version</code> and <code>ansible-config dump</code>	15
2	Unit 2 Create an Ansible inventory file listing multiple managed hosts. Write and execute a basic Ansible playbook to install a package (e.g., <code>httpd</code> or <code>nginx</code>), Use Ansible variables in a playbook to customize configurations, Retrieve and display facts about a managed host using <code>ansible -m setup</code> , Automate user creation and permission assignment using an Ansible playbook	15
3	Unit 3 Implement task control in a playbook using <code>when</code> , <code>loop</code> , and <code>with_items</code> , Write a playbook that deploys configuration files to managed hosts using the <code>copy</code> module, Manage handlers and execute them only when necessary in an Ansible playbook, Implement error handling in Ansible using <code>ignore_errors</code> and <code>failed_when</code> , Optimize large-scale automation by organizing playbooks with roles	15

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
4	Unit 4 Create and use Ansible roles to structure playbooks efficiently, Troubleshoot common Ansible errors in playbooks and logs, Automate Linux system administration tasks (e.g., user management, firewall configuration), Write a playbook to deploy and configure a web server with Ansible, Implement system updates and package management using Ansible	15
Total Hours		60

Textbook :

- 1 The DevOps Handbook: How to Create World-Class Agility, Gene Kim, Jez Humble, Patrick Debois, John Willis, IT Revolution Press, 2016
- 2 Infrastructure as Code: Managing Servers in the Cloud, Kief Morris, O'Reilly Media, 2021

References:

- 1 Site Reliability Engineering: How Google Runs Production Systems, Site Reliability Engineering: How Google Runs Production Systems, Betsy Beyer, Chris Jones, Jennifer Petoff, Niall Richard Murphy, O'Reilly Media, 2016
- 2 Ansible for DevOps: Server and Configuration Management for Humans, Ansible for DevOps: Server and Configuration Management for Humans, Jeff Geerling, Independently Published, 2020

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	25.00	15.00	10.00	0.00

Instructional Method:

- 1 Board Work
- 2 PPT
- 3 Demo

Supplementary Resources:

- 1 <https://www.javatpoint.com/devops>
- 2 <https://spacelift.io/blog/ansible-tutorial>