

DevOps

Course Code	23DS4701C	Year	IV	Semester	I
Course Category	PEC	Branch	CSE (Data Science)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Software Engineering
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes

Upon Successful completion of course, the student will be able to		
CO1	Describe the DevOps architecture, lifecycle, and principles, including its relationship with Agile methodology and SDLC phases to understand its role in software development	L2
CO2	Apply version control and source code management using Git, including branching, remote repositories, and collaboration features to demonstrate their role in efficient software development	L3
CO3	Use automation tools like Jenkins, Docker, and Ansible to implement continuous integration and continuous delivery pipelines in DevOps workflows	L3
CO4	Analyze containerization and orchestration strategies using Kubernetes and OpenShift to evaluate deployment efficiency, scalability, and fault tolerance.	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3: Substantial, 2: Moderate, 1: Slight)

[illegible]

Syllabus		
Unit No	Contents	Map ped CO
I	Introduction to DevOps: Introduction to SDLC, Agile Model. Introduction to DevOps. DevOps Features, DevOps Architecture, DevOps Lifecycle, Understanding Workflow and principles, Introduction to DevOps tools, Build Automation, Delivery Automation, Understanding Code Quality, Automation of CI/ CD. Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples	CO1
II	Source Code Management (GIT): The need for source code control, The history of source code management, Roles and code, source code management system and migrations. What is Version Control and GIT, GIT Installation, GIT features, GIT workflow, working with remote repository, GIT commands, GIT branching, GIT staging and collaboration. Unit testing-Code coverage: Junit, n Unit& Code Coverage with Sonar Qube, Sonar Qube - Code Quality Analysis	CO1, CO2, CO4
III	Build Automation - Continuous Integration (CI): Build Automation, what is CI Why CI is Required, CI tools, Introduction to Jenkins (With Architecture), Jenkins workflow, Jenkins master slave architecture, Jenkins Pipelines. Pipeline Basics: Jenkins Master, Node, Agent, and Executor Freestyle Projects& Pipelines, Jenkins for Continuous Integration, Create and Manage Builds, User Management in Jenkins Schedule Builds, Launch Builds on Slave Nodes.	CO1, CO2, CO4
IV	Continuous Delivery: Importance of continuous delivery, continuous deployment CD Flow. Containerization with Docker: Introduction to Docker, Docker installation, Docker commands, Images & Containers, Docker File, running containers, working with containers and publish to Docker Hub. Testing Tools: Introduction to Selenium and its features, Java Script testing.	CO1, CO3, CO4
V	Configuration Management - ANSIBLE: Introduction to Ansible, Ansible tasks Roles, Jinja2 templating, Vaults, Deployments using Ansible. Containerization using Kubernetes (OpenShift): Introduction to Kubernetes Namespace& Resources, CI/CD - On OCP, BC, DC & ConfigMaps, Deploying Apps on Openshift Container Pods. Introduction to Puppet master and Chef.	CO1, CO3, CO4

Learning Resources
Text Books
1. DevOps for Beginners: DevOps Software Development Method Guide for Software Developers and IT Professionals, Joseph Joyner, 1st Edition, 2015, Mihails Konoplow. 2. Hands-on DevOps with Linux, Alisson Machado de Menezes, 1st Edition, 2021, BPB Publications, India.
References
1. DevOps: A Software Architect's Perspective, Len Bass, Ingo Weber, Liming Zhu, 1st Edition, 2015, Addison-Wesley. 2. The DevOps Handbook, Gene Kim, Jez Humble, Patrick Debois, John Willis, 1st Edition, 2016, IT Revolution Press. 3. Practical DevOps, Joakim Verona, 1st Edition, 2016, Packt Publishing. 4. Practical DevOps, Joakim Verona, 2nd Edition, 2018, Ingram Short Title. 5. DevOps Tools from Practitioner's Viewpoint, Deepak Gaikwad, Viral Thakkar, 1st Edition, 2019, Wiley Publications
E-Recourses and other Digital Material

1. https://onlinecourses.nptel.ac.in/noc21_cs14/preview
2. https://onlinecourses.nptel.ac.in/noc22_cs18/preview