DEVOPS

Syllabus

Course Code	23CS4601C	**Year**	III	**Semester**	II
Course Category	PE-II	**Branch**	CSE	**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	*Explain* the fundamental concepts of the **Software Development Life Cycle (SDLC)**, **Agile methodologies**, and **DevOps principles**, and their role in modern software development.	**L2**
CO2	*Use* **Git** and **software testing tools** to perform **version control**, manage source code collaboratively, and *analyze* **code quality metrics**.	**L3**
CO3	*Apply* **build automation** and **continuous integration techniques** using **Jenkins** to *design*, *implement*, *and manage* CI pipelines.	**L3**
CO4	*Apply* **continuous delivery practices**, **containerization**, **configuration management**, and **orchestration techniques** using **Docker**, **Ansible**, and **Kubernetes** for scalable application deployment.	**L4**

Contribution of Course Outcomes towards the Achievement of Program Outcomes													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	✓												
CO2			✓		✓						✓	✓	
CO3			✓		✓					✓	✓	✓	
CO4			✓		✓					✓	✓	✓	✓

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Unit No.	**Contents**	**Mapped CO**
1	**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**
2	**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, nUnit & Code Coverage with Sonar Qube, SonarQube - Code Quality Analysis.	**CO2**
3	**Build Automation-Continuous Integration(CI):** BuildAutomation,Wha tis CI Why Cl 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, CO3**
4	**Continuous Delivery (CD):** Importance of Continuous Delivery, Continuous Deployment CD Flow, Containerization with Docker: Introduction to Docker, Docker installation, Docker commands, Images & Containers, DockerFile, Running containers, Working with containers and publish to Docker Hub. **Testing Tools:** Introduction to Selenium and its features, JavaScript testing.	**CO3, CO4**
5	**Configuration Management - ANSIBLE:** Introduction to Ansible, Ansible tasks, Roles, Jinja 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.	**CO4**

Text Books

1. Joyner, Joseph., Devops for Beginners: Devops Software Development Method Guide for Software Developers and It Professionals, 1st Edition Mihails Konoplows, 2015.
2. Alisson Machado de Menezes., Hands-on DevOps with Linux,1st Edition, BPB Publications, India, 2021.

Reference Books

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10
2. Gene Kim Je Humble, Patrick Debois, John Willis. The DevOps Handbook, 1st Edition, IT Revolution Press, 2016.
3. Verona, Joakim Practical DevOps, 1st Edition, Packt Publishing, 2016.
4. Joakim Verona. Practical Devops, Ingram short title; 2nd edition (2018). ISBN10: 1788392574
5. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

Online References – DevOps

1. Atlassian, Git Tutorials and Workflows.
   Available at: https://www.atlassian.com/git/tutorials
2. Git SCM, Official Git Documentation.
   Available at: https://git-scm.com/doc
3. Jenkins Documentation, User Guide and Pipeline Documentation.
   Available at: https://www.jenkins.io/doc/
4. Docker Inc., Docker Official Documentation.
   Available at: https://docs.docker.com/
5. Kubernetes, Official Kubernetes Documentation.
   Available at: https://kubernetes.io/docs/
6. Red Hat OpenShift, OpenShift Container Platform Documentation.
   Available at: https://docs.openshift.com/
7. Ansible Community, Ansible Documentation.
   Available at: https://docs.ansible.com/
8. SonarSource, SonarQube Documentation – Code Quality and Security.
   Available at: https://docs.sonarqube.org/
9. Selenium Project, Selenium Documentation.
   Available at: https://www.selenium.dev/documentation/
10. Martin Fowler, Continuous Integration.
    Available at: https://martinfowler.com/articles/continuousIntegration.html
11. Agile Alliance, Agile Manifesto and Principles.
    Available at: https://www.agilealliance.org/agile101/
12. DevOps Institute, DevOps Foundations and Practices.
    Available at: https://www.devopsinstitute.com/resources/