

DevOps(PCAI5030T)

Teaching Scheme

Lectures : 03 Hrs./week

Credits : 03

Examination Scheme

Term Test : 15 Marks

Teacher Assessment : 20 Marks

End Sem Exam : 65 Marks

Total Marks : 100 Marks

Prerequisite: Basic knowledge of Software Engineering

Course Objectives: The objective of this course is to familiarize learners to different development frameworks. The course also introduces students to the principles and process of software engineering and Devopps.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply software engineering principles for application development.	L3	Apply
CO2	Students will be to interpret and apply various principles, phases and activities of Agile as well as scrum methodology.	L3	Apply
CO3	Be able to understand and implement Devops principles for CI/CD.	L2	Understand
CO4	Apply testing process for application development.	L3	Apply
CO5	Students will be able to apply Configuration Management Tools using Containerization.	L3	Apply

Course Contents

Unit-I

07 Hrs.

Introduction: Software Engineering- process framework, Software Development Life Cycle (SDLC)
Process Models: Incremental and Evolutionary models.

Devops: Introduction to DevOps, History of DevOps, DevOps definition, DevOps Main Objectives, Continuous Integration & Deployment, Containers and Virtual Development, Configuration Management Tools.

Unit-II

07 Hrs.

Fundamentals of Agile Process: Need of Agile software development, Agile Manifesto and Principles, Stakeholders and Challenges, Overview of Agile Development Models: Scrum, Extreme Programming, Feature Driven Development, Crystal, Kanban, and Lean Software Development, Methods, Values, Roles, Artifacts, Stakeholders, and challenges. Business benefits of software agility.

Unit-III

06 Hrs.

Source Code Management: Version Control: GIT Features, 3-Tree Architecture, GIT Clone /Commit / Push, GIT Hub Projects, GIT Hub Management, GIT Rebase & Merge, GIT Stash, Reset, Checkout, GIT Clone, Fetch, Pull, Membership GITHUB.

Unit-IV

06 Hrs.

Continuous Integration: Continuous Delivery and Deployment, Benefits of CI/CD, Metrics to track CICD practices, Continuous integration, tools, Build & Test Applications with Continuous Integration, Scheduling build Jobs, Build Scripts, Build Pipeline, Master & Slave Node Configuration, Workspace Management, Security and plugins, Other integration tools

Unit-V

05 Hrs.

Continuous Testing: Introduction to Selenium, Installing Selenium, Creating Test Cases in Selenium WebDriver, Run Selenium Tests in Jenkins Using Maven, Functionality Testing, UI Testing, Performance Testing, Security Testing.

Unit-VI

08 Hrs.

Configuration Management in Devops: The Process of Configuration, Configuration Management in DevOps.

Configuration Management Tools Containerization: Container introduction, Docker introduction, Docker Image, Docker Installation, Working with Docker Containers, Docker Engine, Creating Containers with an Image, Working with Images, Docker Hub , Docker Trusted Registry, Docker File

& Commands.

Devops Monitoring Tool: Introduction to Nagios, Installation, Architecture.

Text Books:

1. Roger S. Pressman and Bruce R. Maxim, “Software Engineering: A Practitioner’s Approach”, 8th Edition, McGraw-Hill Education, 2019.
2. Karl Matthias & Sean P. Kane, “Docker: Up and Running, O’Reilly Publication”, 2nd Edition, 2018.
3. Len Bass, Ingo Weber, Liming Zhu, “DevOps A Software Architects Perspective”, Addison Wesley Pearson Publication, 1st Edition, 2015.
4. John Ferguson Smart, “Jenkins, The Definitive Guide”, 1st Edition, O’Reilly Publication, 2011.
5. Ryan Russell Yates, “Mastering Puppet 5: Optimize enterprise-grade environment performance with Puppet”, Packt Publishing (September 29, 2018)

Reference Books:

1. Sricharan Vadapalli, “DevOps: Continuous Delivery, Integration, and Deployment with DevOps: Dive”, Packt 2018.
2. Lisa Crispin, Janet Gregory, “Agile Testing: A Practical Guide For Testers And Agile Teams”, Pearson, 2010.
3. Janet Gregory, Lisa Crispin, “More Agile Testing: Learning Journeys for the Whole Team”, Addison Wesley, 2015.
4. Thomas Uphill, John Arundel, Neependra Khare, Hideto Saito, Hui-Chuan Chloe Lee, Ke-Jou Carol Hsu, “DevOps: Puppet, Docker, and Kubernetes”, Packt, 2017.
5. Jim Highsmith, “Agile Project Management: Creating Innovative Products”, 2nd Edition, Addison-Wesley Professional, 2009.
6. Andrew Stellman, Jennifer Greene, “Learning Agile: Understanding Scrum, XP, Lean, and Kanban”, O Reilly, 2015.

Web Links:

1. www.javatpoint.com, <https://www.javatpoint.com/devops>
2. www.guru99.com, <https://www.guru99.com/devops-tutorial.html>
3. www.tutorialspoint.com, https://www.tutorialspoint.com/devops_tutorials.htm
4. www.simplilearn.com, <https://www.simplilearn.com/tutorials/devops-tutorial>

5. www.edureka.co, <https://www.edureka.co/blog/devops-tutorial>
6. <https://www.jenkins.io>, <https://www.jenkins.io/doc/tutorials/>
7. <https://github.com>, <https://github.com/learn/devops>
8. www.dotnettricks.com, <https://www.dotnettricks.com/learn/devops>

Evaluation Scheme:

Theory :

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Best of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 65 marks.
2. Total duration allotted for writing the paper is 3 hrs.

DevOps Laboratory (PCAI5030L)

Practical Scheme

Practical : 02 Hrs./week

Credit : 01

Examination Scheme

Teacher Assessment : 25 Marks

End Sem Exam : 25 Marks

Total : 50 Marks

Course Objectives:

1. Understand DevOps Principles, and Practices.
2. Perform various GIT operations on local and remote repositories using GIT.
3. Setup and Run Selenium Tests in Jenkins Using Maven.
4. Install and Configure Pull based Software Configuration Management and provisioning tools Using Puppet.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Write a program using DevOps Practices and Principles.	L6	Create
CO2	Apply various GIT operations.	L3	Apply
CO3	Understand Docker Architecture and Container Life Cycle.	L2	Understand
CO4	Learn Software Configuration Management and provisioning using Puppet Blocks.	L2	Understand

List of Laboratory Experiments

Suggested Experiments:

1. Write code for a simple user registration form for an event. To understand DevOps: Principles, Practices, and DevOps Engineer Role and Responsibilities.
2. To understand Version Control System / Source Code Management, install git and create a GitHub account.
3. To Perform various GIT operations on local and Remote repositories using GIT Cheat-Sheet.
4. To understand Continuous Integration, install and configure Jenkins with Maven/Ant/Gradle to setup a build Job.
5. To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server.
6. To Setup and Run Selenium Tests in Jenkins Using Maven.
7. To understand Docker Architecture and Container Life Cycle, install Docker and execute docker commands to manage images and interact with containers.
8. To learn Dockerfile instructions, build an image for a sample web application using Dockerfile.
9. To install and Configure Pull based Software Configuration Management and provisioning tools using Puppet.
10. To learn Software Configuration Management and provisioning using Puppet Blocks (Manifest, Modules, Classes, Function).

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Evaluation Scheme:

Laboratory:

Continuous Assessment (A):

Laboratory work will be based on PCAI5030T with minimum 08 experiments to be incorporated. The distribution of marks for term work shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (C):

Oral/ Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.