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| **Hardware Requirements:** | PC with i3 Processor or above. |
| **Software Requirements:** | Linux / Windows Operating System, Virtual Box / VMware. |
| **Other Requirements:** | Internet Connection for Installing Additional Packages, GitHub account, DockerHub account. |
| **Prerequisites:** | Operating System, Linux Administration, Java / Web Application Programming, and Software Engineering. |
| **Lab Objectives (LOBs):** | 1. To understand DevOps practices which aims to simplify Software Development Life Cycle.  2. To be aware of different Version Control tools like GIT, CVS or Mercurial.  3. To Integrate and deploy tools like Jenkins and Maven, which is used to build, test and deploy applications in DevOps environment.  4. To be familiarized with selenium tool, which is used for continuous testing of applications deployed.  5. To use Docker to Build, ship and manage applications using containerization.  6. To understand the concept of Infrastructure as a code and install and configure Ansible tool and to understand Kubernetes architecture. |
| **Lab Outcomes (LOs):** | Upon completion of the course, the learners will be able to:  1. Use Version Control for developing application.  2. Use Jenkins to Build and deploy Software Applications on production environment.  3. Perform Automated Testing.  4. Build Containerized Application.  5. Use Software Configuration, Provisioning & Monitoring Tools.  6. Build Application using of Serverless Computing & Microservice. |

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| **Lab No.** | **Experiment Title** | | **LOs Mapped** | **Hours** |
| 0 | Lab Prerequisites. | | - | 02 |
| 1 | Create a Sample Web Page & Upload Source Code on GitHub & Perform different Git Operation.  (Study of DevOps, Benefits of DevOps, Version Control System / Source Code Management, Install GitLab and Create a GitHub, Account, Get Familiar with the Concept of Minimum Viable Product (MVP) & Cross-Functional Teams, Git Cheat-Sheet). | | LO1 | 02 |
| 2 | Create a Jenkins CI/CD pipeline with GitLab Integration Pipeline.  (Installation of Gitlab, Introduction to CI/CD, Learn different Stage of Development Commit, Build, Test, Deploy, Installation of GitLab). | | LO1,  LO2 | 02 |
| 3 | Create Jenkins Pipeline for Building Python Project.  (Jenkins Master-Slave Architecture and Scale Your Jenkins Standalone Implementation by Implementing Slave Nodes). | | LO1,  LO2 | 02 |
| 4 | Install & Configure Docker.  (Docker Architecture and Container Life Cycle, Execute Docker Commands to Manage Images and Interact with Containers, Container and Various Operations Performed on it, Container Life Cycle, Understanding Images and Containers, Create and Implement Docker Images using Docker file, Container Lifecycle and Working with Containers). | | LO1,  LO3 | 02 |
| 5 | Build Docker Image for deploying any Web/Python/Java Application. | | LO1,  LO3 | 02 |
| 6 | Implementation using Ansible:  a. Install & Configure Ansible.  b. Install LAMP/MEAN using Ansible Playbook.  (Study about need of Ansible, YAML Syntax, Playbook). | | LO1,  LO3,  LO4 | 02 |
| 7 | Install & Configure Container Orchestration Tools Kubernetes.  (Kubernetes Cluster Architecture, Kubctl Commands, Pod Creation). | | LO1,  LO5 | 04 |
| 8 | Deployment of any Web Application on Kubernetes. | | LO1,  LO5 | 02 |
| 9 | To Perform Monitoring service using Nagios/Prometheus/Splunk | | LO1,  LO6 | 02 |
| 10 | Write AWS Lambda Function to Build Python/Java/HTML Application. | | LO1,  LO6 | 02 |
| 11 | Use of AWS/AZURE/GCP Platform to create CI/CD Pipeline. | | LO1,  LO6 | 02 |
| 12 | Perform Automation Testing using Selenium.  (Introduction to Selenium, Selenium Architecture, Selenium Web Driver). | | LO1,  LO6 | 02 |
| **Virtual Lab Links:** | | 1. http://vlabs.iitkgp.ernet.in/se/ | | | |
| **Term Work (TW):** | |  Term work should consist of a minimum of 08 experiments.   Journal must include at least 02 assignments on content of theory course “Advanced Software Engineering and Project Management” and “DevOps Lab”.   Term work evaluation shall be for Total 25 Marks (Experiments: 20 Marks, Assignments: 05 Marks).   The final certification and acceptance of term work will be based on attendance in Theory and Lab sessions, satisfactory performance of laboratory work, and minimum passing marks in term work evaluation. | | | |
| **Oral (O):** | | Oral examination will be based on the experiment list for Total 25 Marks. | | | |