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| **Course Code** | 18CSE316J | **Course Name** | ESSENTIALS IN CLOUD AND DEVOPS | **Course Category** | *E* | *Professional Elective* | L | T | P | C |
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| **Pre-requisite Courses** | *Nil* | | **Co-requisite Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *Networking and Communications* | | | **Data Book / Codes/Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | | *The purpose of learning this course is to:* | |  | **Learning** | | |  | **Program Learning Outcomes (PLO)** | | | | | | | | | | | | | | |
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| **CLR-1 :** | To introduce students to the basic concepts and techniques of the entire application Lifecycle | | | |  | 1 | 2 | 3 |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **CLR-2 :** | Understanding of the Quality Assurance throughout the application lifecycle | | | |  | Level of Thinking (Bloom) | Expected Proficiency (%) | Expected Attainment (%) |  | Engineering Knowledge | Problem Analysis | Design & Development | Analysis, Design, Research | Modern Tool Usage | Society & Culture | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO - 1 | PSO - 2 | PSO – 3 |
| **CLR-3 :** | Understanding of the Security Terms integrated with development and Operations | | | |  |  |
| **CLR-4 :** | To study the various use of technology stack and tooling for reliability | | | |  |  |
| **CLR-5 :** | To study the various deploying code and Provisioning Infrastructure | | | |  |  |
| **CLR-6 :** | To introduce students to the basic concepts and techniques of the entire application Lifecycle | | | |  |  |
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| **Course Learning Outcomes (CLO):** | | | | *At the end of this course, learners will be able to:* | |  |
| **CLO-1 :** | Analyses the entire application lifecycle through techniques | | | | | *3* | *80* | *70* |  | *L* | *H* | *-* | *H* | *L* | *-* | *-* | *-* | *L* | *L* | *-* | *H* | *-* | *-* | *-* |
| **CLO-2 :** | Identify and apply quality and security throughout the lifecycle | | | | | *3* | *85* | *75* |  | *M* | *H* | *L* | *M* | *L* | *-* | *-* | *-* | *M* | *L* | *-* | *H* | *-* | *-* | *-* |
| **CLO-3 :** | Suggest and ensure a good quality for any given application updates and infrastructure changes | | | | | *3* | *75* | *70* |  | *M* | *H* | *M* | *H* | *L* | *-* | *-* | *-* | *M* | *L* | *-* | *H* | *-* | *-* | *-* |
| **CLO-4 :** | Apply the appropriate computing resources elastic and responsive to frequent changes. | | | | | *3* | *85* | *80* |  | *M* | *H* | *M* | *H* | *L* | *-* | *-* | *-* | *M* | *L* | *-* | *H* | *-* | *-* | *-* |
| **CLO-5 :** | Design systems by using micro services architecture, decouples large, complex systems into simple independent projects | | | | | *3* | *85* | *75* |  | *H* | *H* | *M* | *H* | *L* | *-* | *-* | *-* | *M* | *L* | *-* | *H* | *-* | *-* | *-* |
| **CLO-6 :** | Modify existing traditional software development and management process to improve speed enabled organization | | | | | *3* | *80* | *70* |  | *L* | *H* | *-* | *H* | *L* | *-* | *-* | *-* | *L* | *L* | *-* | *H* | *-* | *-* | *-* |

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| Duration (hour) | | **INTRODUCTION** | **LINUX and SCRIPTING** | TERRAFORM&ANSIBLE | DOCKER &KUBERNTESE | DevOpsOPERATION and MANAGEMENT |
| **S-1** | SLO-1 | *Introduction to Cloud Fundamentals* | *Bash Shell Scripting Overview* | *Infrastructure as Code Defined* | *Docker Engine Architecture* | *DevOps Foundations and Automatic Testing* |
| SLO-2 | *Fundamentals of AWS* | *Basics Steps to Write and Execute Bash Shell Scripting With an Example* | *Impotence and Consistency* | *Docker Image* | *Statergy for Application Deploymenet* |
| **S-2** | SLO-1 | Managing IAM | *List of General Purpose Commands and Help to Understand the Usage of a Command* | *Push or Pull*  *Benefits of Infrastructure as Code* | *Basic Container Operations* | *Monitoring* |
| SLO-2 | Introduction to S3 simple storage service | *Redirection Operators and STDIN, STDOUT & STDERR* | *Describe plugin based architecture* | *Interacting with a Running Container* |
| **S-3** | SLO-1 | *Security* | *Complete Echo Command* | *Working with Data in Terraform*  *Input Variable Syntax*  *Terraform Data Types* | *Inspecting a Container* | *Introduction to GIT ,Gradle, Selinium, Jenkins* |
| SLO-2 | *EC2 Instance* | *Working with Variables* | *Adding Outputs to the Configuration*  *Validate the Configuration*  *Using the Validate Command* | *Copying Contents into ContainerPublishingPorts,Troubleshooting Docker Daemon* |
| **S**  **4-5** | **SLO-1** | ***Lab1: Creating AWS*** | ***Lab 4:* Installation of Linux** | ***Lab7:Handle Terraform and provider installation and versioning*** | ***Lab 10: Installing Docker Service with Configuration*** | ***Lab 13: Installation of GIT, Gradle, Selinium, Jenkins*** |
| SLO-2 |
| **S-6** | SLO-1 | *Creating AWS Account, Identity and Access Management (IAM) Basics* | *Practice with grep Command and Usage of Patterns in grep Command*  *Cut command Practice with cut Command*  *awk command* | *Need of Ansible* | *Kubernetes Architecture* | *Case Study 1: Three Tier web application using docker and Kubernetes* |
| SLO-2 | *Input and Output Commands for Shell Scripting* | *Architecture and Process flow of Ansible* | *Kubernets-Scheduling* |
| **S-7** | SLO-1 | *Adding an IAM Admin - GENERAL ACCOUNT*  *Adding an IAM Admin User - PRODUCTION ACCOUNT* | *Command Chaining using Logical operators* | *Package, Services* | *Logging & Monitoring* | *Case Study 2:Infrastructure as Code Using Terraform (Modules)* |
| SLO-2 | *Scheduling jobswith crontab* | *Ansible Module Fundamentals* | *Cluster Maintenance* |
| **S-8** | SLO-1 | *Access Keys* | *Configure networking and hostname resolution statically or dynamically* | *Advanced Execution -gather\_facts*  *Accelerated Mode and Pipelining* | *Security &Storage* | *Case Study 3:Configuration Management using Ansible (Roles)* |
| SLO-2 |
| **S**  **9-10** | **SLO-1** | ***Lab 2: Creating Access keys and setting up AWS*** | ***Lab 5:*** | ***Lab 8: How to install Ansible*** | ***Lab 11: Deployment of kubeadm*** | ***Lab 14 :Mini project on the above technology*** |
| SLO-2 |
| **S-11** | SLO-1 | *EC2 Basics* | *Configure network services to start automatically at boot* |  | *Choosing Kubernets infrastructure* | *Case Study 1: Application code management using Git* |
| SLO-2 | *EC2 Creation* | *Start, stop, and check the status of network services* | *Troubleshooting, Testing and Validation* | *Creating Helm charts* |
| **S-12** | SLO-1 | *EC2 Storage services* | *Configure HTTP server log files* | *Syntax-Check & Dry-Run: syntax-check* | *Role Based Access Control* | *Case study 2:Building CI/CD pipeline to deploy new version of Application (Jenkins)* |
| SLO-2 | *Simple automation with cloud formation* | *Trobuleshootingkubernets* |
| **S-13** | SLO-1 | *Virtual Private cloud* | *Restrict access to a web page, Manage and configure containers* | *Debuggig* | *Designing a Kubernets cluster* | *Case Study3:Bulding Monitoring for application* |
| SLO-2 | *Router R3 fundamentals* | *Helm* |
| **S**  **14-15** | **SLO-1** | ***Lab 3: Instance creation EC2 S3 life cycle configuration*** | ***Lab 6: Manage and configure Virtual Machines*** | ***Lab 9: Create Roles in Ansible*** | ***Lab 12:*Installing Kubernetes without Helm** | ***Lab 15 : Mini Project on the above technology*** |
| SLO-2 |

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| **Learning**  **Resources** | 1. The DevOps Handbook, Gene Kim, Jez Humble, Patrick Debois, John Allspaw and John WillisJason Bell, IT revolutionPress,2016. 2. The DevOps Adoption Playbook: A Guide to Adopting DevOps in a Multi-Speed IT Enterprise.Sanjeev Sharma 1st Edition ,Wiley,2017. | 1. Mastering Linux Shell Scripting : A practical guide to Linux command-line, Bash scripting, and Shell programming, Andrew Mallett Mokhtar Ebrahim ,Ingram short title,Second Edition,2018. |

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| ***Learning Assessment*** | | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA) (60% weightage)* | | | | | *Final Examination*  *(40% weightage)* | |
| *CLA-1*  *(20%)* | | *CLA-2*  *(25%)* | | *CLA-3 (15%)* |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| *Level 1* | *Remember* | *20%* | *20%* | *20%* | *20%* | *20%* | *20%* | *20%* |
| *Understand* |
| *Level 2* | *Apply* | *20%* | *20%* | *20%* | *20%* | *20%* | *20%* | *20%* |
| *Analyze* |
| *Level 3* | *Evaluate* | *10%* | *10%* | *10%* | *10%* | *20%* | *10%* | *10%* |
| *Create* |
|  | *Total* | *100 %* | | *100 %* | | *100 %* | *100 %* | |

# CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

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| **Course Designers** |  |  |
| Experts from Industry  EPAM | Experts from Higher Technical Institutions | Internal Experts  Dr.L.Anand  Dr.R.Radhika |