**TOC – Kubernetes Training (20 Hours)**

**Module 1: Deep Dive into Kubernetes Architecture & Networking**

* Master & Worker Components (Quick Recap)
* API Server Internals, etcd, Controllers
* Kubernetes Networking Fundamentals
* Network Policies for Isolation

**Module 2: Production-Grade Workloads**

* Understanding Pods, Lifecycle, and Multi-Container Pods (Sidecar Pattern)
* Kubernetes services and Ingress Controllers (e.g., NGINX on AKS)
* Best Practices: Resource Allocation, Probes, Labels, Affinity Rules, Pod Disruption Budgets
* Deployment Strategies: Rolling Updates, Rollbacks, recreate vs Rolling Update, Blue-Green.
* Graceful Shutdown and Pod Management in Production

**Module 3: Scalability with HPA, VPA, and KEDA**

* Horizontal and Vertical Pod Autoscalers
* Custom Metrics Adapter (Prometheus integration)
* Event-Driven Scaling using KEDA
* Production Tuning for Autoscalers

**Module 4: Secure Kubernetes Operations**

* Role-Based Access Control (RBAC) Deep Dive
* Secrets and ConfigMaps (Best Practices & Mounting Patterns)
* Network Policy Implementation (Hands-on YAML)

**Module 5 : Managing State with Persistent Storage**

* Persistent Volumes (PV), Persistent Volume Claims (PVC)
* Managing & Mounting Storage for Stateful Workloads

**Module 6: Observability & Monitoring**

* Production Monitoring with Prometheus, Grafana
* Dynatrace Integration with AKS.
* Azure Monitor for Logging
* Instrumentation Best Practices for App and Infra
* Setting up Dashboards and Threshold-Based Alerts

**Module 7: Real-World Troubleshooting & Hands-on**

* Logs, Events, and Probes for Debugging
* Advanced kubectl & kubectl-debug
* Using Events, Logs, and Metrics for Root Cause Analysis
* CrashLoopBackOff, ImagePullBackOff, OOMKilled – Real Scenarios
* Profiling and Resource Contention Detection (CPU, Memory, Throttling)

**Module 8: Final Recap & GitOps Preview**

* Recap of Key Advanced Topics
* Introduction to Helm, GitOps, and Next Learning Path
* Q&A and Feedback.