

Government of Pakistan

**National Vocational and Technical Training Commission
(NAVTTTC)**

"Prime Minister Youth Skill Development Program"



Course Contents / Lesson Plan

Course Title: HCCDA – Tech Essentials

Duration: 3 Months

Author Name	CyberVision/Huawei					
Course Title	HCCDA – Tech Essentials					
Training Objective & Outcomes	Prepare candidates for the Huawei HCCDA-Tech certification by covering cloud computing, Huawei Cloud services (ECS, VPC, OBS, RDS), Kubernetes, DevOps, microservices development, Serverless.					
Entry-level of trainees	Currently enrolled in at least the 7th semester of a bachelor’s degree program (i.e., completed 6 semesters with a transcript) OR Pursuing a graduate/postgraduate degree in a relevant field such as: • Information Technology (IT) • Computer Science • Mechatronics • Electrical or Electronics Engineering • Computer Systems Engineering Candidates who have completed a Diploma in Information Technology (DIT) and have relevant field experience such as internships, freelance work, or professional roles in IT, networking, or technical support are eligible for this program.					
Minimum Qualification of Teachers	• Minimum Qualification: Master’s degree (16 years of education) in Computer Science, Information Technology, Software Engineering, or a closely related discipline from a recognized institution. • Certification Requirement: Must be Huawei Certified — preferably HCCDA – Tech Essentials or higher. Equivalent certifications in foundational ICT technologies and networking may also be considered. • Professional Experience: Minimum of 2 years of hands-on industry experience in ICT domains such as networking fundamentals, cloud computing, virtualization, or related technical fields. • Proven ability to design and deliver technical training, conduct assessments, and mentor learners effectively. • Experience with project-based and hands-on lab learning, supporting trainees in applying core technical concepts in real-world scenarios.					
Scheme of Studies	HCCDA – Tech Essentials (3-Month Course)					
	Sr. No	Main Topics	Theory Hrs.	Practical Hrs.	Total Hrs.	Credit Hours
	1	Intro. to Cloud & Huawei Infrastructure	9.5	5.5	15	1.2
	2	Compute Services	6.75	8.25	15	1.08
	3	Storage Services	7.0	8.0	15	1.1

	4	Networking Services	7.0	8.0	15	1.1	
	5	Database Services	6.5	8.5	15	1.07	
	6	Security & IAM	6.75	8.25	15	1.08	
	7	Elasticity & Distributed Deployment	6.0	9.0	15	1.05	
	8	DevOps & CI/CD	5.25	9.75	15	1.01	
	9	Containers & Kubernetes (CCE)	5.0	10.0	15	1	
	10	Cloud Native & Microservices	5.25	9.75	15	1.01	
	11	Monitoring & Cost Optimization	6.0	9.0	15	1.05	
	12	Exam Prep. & Capstone	4.0	11.0	15	0.95	
		Total	75	105	180	13	
Course Execution Plan	Duration of the course: 3 months (12 Weeks) Theory: 42% Practical: 58% Weekly hours: 15 hours per week Total contact hours: Maximum 180 hours						
Companies offering jobs in the respective trade	• National Telecommunication Corporation (NTC) • Pakistan Telecommunication Authority (PTA) • National Information Technology Board (NITB) • Pakistan Atomic Energy Commission (PAEC) • State Bank of Pakistan (SBP) • National Database and Registration Authority (NADRA) • Pakistan Telecommunication Company Limited (PTCL) • Ignite National Technology Fund • Virtual University of Pakistan (VU) • Telenor/Jazz/Ufone/Banking Industry • Pakistan International Airlines (PIA) • Nayatel • Multinet • Cybernet (StormFiber) • Wateen Telecom • Qubee • RapidCompute • Huawei Pakistan • Ericsson Pakistan						

	• Cisco Pakistan • Dell Technologies • IBM Pakistan • Microsoft Pakistan • Toptal/ Upwork/ Turing/ Fiverr • Azure/AWS
No of Students	25 - 35
Learning Place	Classroom / Lab
Instructional Resources	• Huawei Certification Official Portal • Huawei Learning Platform (iLearningX) • HCCDA Tech Essentials Course Overview • Huawei Cloud Academy • MindSpore AI Framework • Python Programming (Jupyter & Google Colab) • FreeCodeCamp Networking Tutorials • NetworkChuck YouTube Channel • Packet Tracer by Cisco • GitHub – Open Networking Projects

DETAIL OF COURSE CONTENTS

Module Title	Learning Units	Task/Practical
INTRODUCTION TO CLOUD & HUAWEI INFRASTRUCTURE	Day 1 Introduction to cloud computing (IaaS, PaaS, SaaS)	- Define cloud computing and deployment models (Public, Private, Hybrid) - Explore IaaS, PaaS, SaaS with real-world examples - Compare traditional IT vs. cloud models - Group activity: classify services into IaaS, PaaS, SaaS
	Day 2 Benefits of cloud computing and Huawei Cloud positioning	- Explain scalability, availability, and cost-efficiency benefits - Discuss Huawei Cloud's global strategy and market - Overview of common Huawei services and use cases - Case study comparison with AWS/Azure
	Day 3 Huawei Cloud global infrastructure and architecture overview	- Understand Regions, Availability Zones (AZs), and Edge Nodes - Learn about Huawei's data center redundancy model - Draw a logical diagram of Huawei Cloud architecture - Explore the Global Infrastructure Console
	Day 4 Huawei Cloud ecosystem, partner network, and industry adoption	- Explore Huawei Cloud's Marketplace and Service Partners - Role of SI, ISV, MSP in cloud delivery - Analyze an industry use case (e.g., banking or telecom) - Identify ecosystem benefits for end-users
	Day 5 Quiz: Cloud concepts + Huawei ecosystem	Take a 25-question quiz covering Days 1–4

		• Review each answer with explanations • Address misconceptions via trainer-led discussion • Group wrap-up and Q&A
COMPUTE SERVICES	Day 6 ECS architecture, features, use cases	• Introduce ECS (Elastic Cloud Server) Architecture Components • Explore flavors/specs and billing modes • Discuss use cases (e.g., hosting, compute jobs, gaming) • Walkthrough ECS deployment Lifecycle
	Day 7 ECS creation, resizing, key operations	• Demonstrate ECS creation from console and image marketplace. • Configure OS, network, login method. • Practice resizing ECS and changing configurations. • Use CLI for basic operations.
	Day 8 Overview of BMS, Auto Scaling, and ARM-based ECS	• Explain Bare Metal Server (BMS), dedicated host use cases and limitations. • Introduce Auto Scaling Groups and policies. • Compare x86 vs ARM-based ECS. • Hands-on: review scaling scenarios
	Day 9 Practical: Deploy a Linux server on ECS	• Choose and configure an ECS flavor and image. • Launch ECS and access via SSH. • Install and start a web service (Apache/Nginx). • Test from browser via public IP
	Day 10 Practical: Configure ECS auto-scaling with rules	• Create Launch Template and AS Group. • Define scaling policies and alarms (CPU threshold). • Simulate traffic to trigger scaling.

		• Monitor scaling activity and log behavior.
Storage Services	Day 11 Overview of OBS, EVS, and SFS	• Explain Object (OBS), Block (EVS), and File (SFS) storage types. • Compare performance, cost, and use cases. • Discuss integration with ECS, databases, and backup. • Case-based matching: Pick the right storage
	Day 12 OBS buckets, file lifecycle, permission management	• Create an OBS bucket from console. • Set file lifecycle and storage class (Standard/IA/Archive). • Configure ACL and bucket policies. • Upload/download files via console, CLI and Windows APP
	Day 13 EVS and SFS use cases, performance tiers	• Create an EVS volume and attach to ECS. • Explore SFS usage in shared compute environments. • Compare general vs. high-performance tiers. • Hands-on: Format and mount EVS in Linux/Windows
	Day 14 Practical: Upload/download data to OBS & attach EVS to ECS	• Upload objects to OBS and organize using folders. • Use APIs or SDKs to access OBS programmatically. • Attach EVS and verify read/write operations. • Clean up and secure volumes and buckets.
	Day 15 Quiz + Assignment: Compare OBS vs EVS and use cases	• Take quiz on storage types and use case alignment. • Review answers and scoring in class. • Present findings on OBS vs EVS in a chosen scenario. • Assignment submission walkthrough

Networking Services	Day 16 Cloud networking basics: subnets, IPs, routing	• Define VPC, subnets, route tables, and CIDR blocks. • Explain public vs. private IPs and DHCP. • Identify components in a typical VPC topology. • Lab: Design a simple network layout.
	Day 17 Huawei VPC architecture + VPN and NAT Gateway	• Explore Huawei VPC components and limits. • Set up and test NAT Gateway for outbound internet. • Understand VPN Gateway site-to-site architecture and site-to-cloud • Demo: NAT + VPN scenario
	Day 18 Load Balancer (ELB) and Elastic Ips	• Compare Layer 4 (NLB) vs Layer 7 (ALB) Load Balancing. • Create ELB and configure backend pools. • Allocate and bind Elastic IPs to ECS or ELB. • Test service availability through ELB
	Day 19 Practical: Create a VPC with subnets, security groups	• Create a VPC with two subnets (public/private). • Define custom route table. • Create and apply security groups. • Deploy ECS in subnets and test communication
	Day 20 VPC scenario simulation: Web app with ELB and NAT	• Design 3-tier architecture: web, app, DB. • Deploy components in segmented subnets. • Use ELB for web tier and NAT for updates. • Simulate traffic and confirm availability
	Day 21	• Define relational (RDBMS) and non-relational (NoSQL) DBs.

	Database concepts: relational vs non-relational	• Explore structure, indexing, and ACID properties. • Discuss CAP theorem. • Use case comparisons: SQL vs NoSQL
	Day 22 Huawei RDS (MySQL), GaussDB (Distributed), DDS overview	• Create and configure an RDS instance (MySQL). • Overview of GaussDB capabilities and scaling • Explore document-based storage in DDS (MongoDB). • Compare services across performance and fit
	Day 23 Practical: Launch an RDS MySQL instance and connect from ECS	• Launch RDS MySQL and configure backup, users, parameters. • Open security group access for ECS. • Connect via MySQL client from ECS CLI. • Create a schema and test queries
	Day 24 Backup, restore, and migration basics	• Schedule automated and manual backups. • Perform a snapshot restore test. • Overview of database migration tools (DRS). • Simulate on-premise to cloud migration
	Day 25 Quiz + Assignment: Database design and setup in Huawei Cloud	• Quiz on RDBMS, DDS, Gauss features. • Review quiz in group and clarify weak points. • Design a schema based on sample app. • Submit architecture + schema assignment.
Security & IAM	Day 26 Huawei Cloud shared responsibility model	• Explain the shared responsibility model in cloud security. • Identify which party (Huawei or customer) handles what. • Analyze real incidents through this lens.

		• Map model to ECS, RDS, OBS scenarios
	Day 27 IAM: Users, groups, roles, policies	• Create IAM users and groups. • Define custom policies using JSON. • Assign permissions using roles. • Simulate a team-based access control model
	Day 28 WAF, Anti-DDoS, and KMS overview	• Enable and configure WAF for a web application. • Demonstrate Anti-DDoS behavior and thresholds. • Use KMS for key creation and binding to services. • Review dashboard logs for each service its advantages in cloud environments.
	Day 29 Practical: Secure a web app using IAM and WAF	• Set IAM least-privilege access to ECS and RDS. • Enable WAF for a public-facing web app. • Simulate attacks and monitor response. • Review audit logs for changes and access.
	Day 30 Quiz + Scenario: Simulated security breach and mitigation	• Present a simulated breach (e.g., leaked credentials). • Team-based discussion to identify gaps. • Draft a mitigation plan and implement partial fix. • Recap shared responsibility impact
Elasticity & Distributed Deployment	Day 31 Load balancing strategies in cloud	• Compare client-side, server-side, and cloud-based load balancing. • Understand Layer 4 vs Layer 7 ELB. • Study HA design patterns in multi-tier apps. • Design a reference ELB-based architecture.

	Day 32 Auto-scaling with distributed app architecture	• Review Auto Scaling (AS) triggers and thresholds. • Define policies based on CPU/network metrics. • Explore lifecycle hooks and health checks. • Simulate a scaling event in a demo architecture
	Day 33 Hands-on: Configure load balancer for a 3-tier architecture	• Launch web, app, and DB layers in ECS. • Set up ELB for the web layer. • Route traffic and test failover. • Monitor backend pool health
	Day 34 Scenario-based tuning for high availability	• Identify single points of failure in architecture. • Add redundancy with AS/ELB/NAT Gateway. • Introduce active-active and active-standby strategies. • Stress test for resilience.
	Day 35 Practical: Deploy an app with elasticity rules	• Deploy app with AS-enabled ECS. • Define scale-out and scale-in policies. • Integrate with ELB and NAT Gateway. • Run tests to trigger auto-scaling and observe logs
DevOps & CI/CD	Day 36 DevOps principles and Huawei CodeHub overview	• Explain DevOps lifecycle (plan, code, build, test, release, monitor). • Introduce Git and CodeHub basics. • Clone a project and explore commit history. • Set up team-based repo access.
	Day 37 CloudBuild and CloudDeploy tools for automation	• Understand CI/CD flow with Huawei CloudBuild. • Create a build template and define steps. • Set up CloudDeploy with target environments.

		• Link CodeHub repo to CloudBuild.
	Day 38 Terraform basics for IaC	• Introduction to Infrastructure as Code and Terraform syntax. • Install Terraform CLI and configure Huawei provider. • Write a script to deploy ECS. • Apply changes and verify resources
	Day 39 Practical: Build and deploy via CloudBuild + CodeHub	• Commit source code with YAML pipeline config. • Trigger CI on code push. • Deploy application using CloudDeploy. • Monitor pipeline logs and resolve issues.
	Day 40 Assignment: CI/CD pipeline from Git commit to deployment	• Define your CI/CD use case and target stack. • Set up a full pipeline using Cloud tools. • Write documentation for each stage. • Submit working project + demo presentation.
Containers & Kubernetes (CCE)	Day 41 Docker fundamentals: images, containers, Dockerfile	• Explain containerization vs virtualization • Compare Docker image layers and best practices • Analyze a sample Docker file line by line • Discuss Docker security and image registry concepts
	Day 42 Kubernetes basics: Pods, Services, Deployments	• Understand Kubernetes architecture and core components. • Define Pods, ReplicaSets, Services, Deployments. • Write and apply basic YAML manifests. • Run kubectl commands to interact with cluster
	Day 43 Huawei CCE service walkthrough	• Introduction to Huawei CCE (architecture and supported features)

		• CCE dashboard overview and configurations • Discuss RBAC and security settings in Huawei CCE • Monitoring integrations (CloudEye, LTS)
	Day 44 Kubernetes deployment strategies & maintenance	• Theoretical overview of different update strategies (Rolling, Blue-Green, Canary) • Autoscaling with HPA/VPA concepts and parameters • Best practices for limits, probes, config maps, and secrets Case discussion: troubleshooting failed deployment
	Day 45 Scaling, updates, and monitoring in CCE	• Create deployment YAML for Nginx or sample web app • Deploy on Huawei CCE cluster • Expose service and test endpoint • View logs and metrics via CloudEye limits and probes.
Cloud Native & Microservices	Day 46 Benefits of cloud native transformation	• Define cloud native: containers, microservices, DevOps, serverless. • Discuss benefits: speed, scalability, agility. • Introduce CNCF landscape and open-source tools. • Map Huawei Cloud services to native paradigms
	Day 47 Microservices vs monoliths, introduction to Huawei ASM	• Compare monoliths and microservices architectures. • Identify challenges in decomposing monoliths.

		• Overview of Huawei ASM (Application Service Mesh). • Demonstrate traffic management with ASM
	Day 48 Serverless architecture using FunctionGraph	• Introduction to event-driven and serverless concepts. • Explore Huawei FunctionGraph use cases and triggers. • Create a basic Python or Node.js function. • Test invocation from OBS or API Gateway.
	Day 49 Practical: Create serverless function and integrate into app	• Write function logic for image processing or notification. • Trigger via OBS bucket upload or HTTP request. • Link output to another Huawei service (e.g., OBS/SMN). • Validate flow and handle errors.
	Day 50 Assignment: Microservice deployment using FunctionGraph + ASM	• Plan and diagram a microservice solution with 2–3 services. • Deploy services using CCE and FunctionGraph. • Use ASM for traffic control and observability. • Submit code, architecture, and brief demo video.
Monitoring & Cost Optimization	Day 51 Huawei CloudEye for monitoring	• Overview of CloudEye and supported services. • Configure metrics collection for ECS, RDS, and ELB. • Set up basic alarms and thresholds. • Visualize system performance with CloudEye dashboards
	Day 52 Logging service (LTS) + alert configuration	• Enable and configure Log Tank Service (LTS) for ECS.

		• Use log query to find events (e.g., access, error). • Create alert rules based on log patterns. • Integrate logs with CloudEye alerts
	Day 53 Cost estimation tools and optimization techniques	• Navigate the Huawei Billing Center. • Use the cost calculator and pricing estimator. • Set up budget alerts and cost control policies. • Identify unused or underutilized resources for cleanup
	Day 54 Practical: Set up monitoring for ECS + RDS + CCE	• Enable CloudEye for all major services in a demo stack. • Set thresholds for CPU, disk, and DB queries. • Test alerting by simulating load. • Tune alarms to reduce false positives
	Day 55 Quiz: Scenario-based monitoring and optimization problems	• Present 2–3 real-world cost or monitoring scenarios. • Group solve each with architecture review and config. • Take a timed quiz (15 questions) on optimization. • Peer explanation of tricky questions.
Exam Preparation & Capstone	Day 56 Full-length mock exam (with section analysis)	• Attempt a 60-minute simulated HCCDA-Tech exam (single/multi-choice, scenarios). • Score and analyze performance by domain (compute, storage, DevOps, etc.). • Discuss the most missed questions in peer groups.

		Trainer-led deep dive on 3–5 challenging areas.
	Day 57 Domain-wise exam question practice + tips	- Review and solve practice questions by category: ECS, RDS, CI/CD, CCE, IAM. - Trainer shares common traps and time-saving tips. - Group discussion on reasoning for multiple correct answers. - Final Q&A: “Ask Me Anything” before the exam
	Day 58 Capstone project: Planning and architecture design	- Finalize problem statement and use case (e.g., scalable eCommerce, video app, microservice API). - Design service architecture using Huawei tools (ECS, OBS, RDS, ELB, CCE, etc.). - Map IAM, VPC, scaling, and logging plans. - Trainer approval of designs.
	Day 59 Capstone implementation: deployment and monitoring	- Deploy core infrastructure based on the Day 58 plan. - Configure pipelines, monitoring, and security. - Run functional and performance tests. - Document all steps with screenshots and CLI logs
	Day 60 Capstone presentations + feedback + certification registration support	- Present project architecture and live demo (10 min/team). - Receive feedback from trainer and peers. - Final checklist for Huawei exam registration. - Closing session: certifications, resources, and next steps.

LIST OF MACHINERY / EQUIPMENT

For the Class of 35 Students (3-Month Course)

S.No	Name of Item	Quantity	Unit
1.	High-performance PCs/Laptops (8GB+ RAM)	25 - 35	Units
2.	Internet Connectivity (50 Mbps min)	1	Setup
3.	Projector with Screen	1	Unit
4.	Whiteboard & Markers	1	Set
5.	UPS/Power Backup	1	Unit

LIST OF CONSUMABLE MATERIAL

For the Class of 25 Students (3-Month Course)

S. No	Name of Items	Unit
1.	Writing Notebooks	30
2.	Pens (Blue/Black)	60
3.	Markers (Whiteboard)	10
4.	Whiteboard Dusters	2
5.	Printing Paper (A4)	5 Reams
6.	File Folders	30