

CURRICULUM OF “COMPUTER NETWORKING AND CLOUD COMPUTING” (Network and Cloud Configuration Expert)

Level-5



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**National Vocational & Technical
Training Commission**

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Introduction

Definition/ Description of the training programme for Computer Networking and Cloud Computing (Network and Cloud Configuration Expert)

In large companies, computers in the workplace need to be connected to a single unit to get work done. Whether it's a company or some other shared hub, computers need to be able to share resources to accomplish goals and Cloud Computing provides huge computation and storage resources on demand and exciting most of individuals and businesses. Large user-base is attracted to use cloud computing mainly due to pay-per-usage and on-demand resource provisioning characteristics.

Purpose of the training programme

The Computer Networking and Cloud Computing programme is to engage young people with a programme of development that will provide them with the knowledge, skills and understanding to start this career in Pakistan. The specific objectives of developing these qualifications are as under:

- Improve the professional competence of the trainees
- Provide opportunities for recognition of skills attained through non-formal or informal pathways
- Improve the quality and effectiveness of training and assessment for Computer Networking and Cloud Computing industry

Overall objectives of training programme

The overall objectives of the Computer Networking and Cloud Computing program (Network and Cloud Configuration Expert) are producing skilled staff to:

- Cloud System Administrator
- Network and Cloud Configuration Expert

Competencies to be gained after completion of course

1. Manage Repositories on Cloud Side
2. Configure Tools for Continuous Development (Dev Ops)
3. Manage Web Applications on Cloud

4. Manage Public Cloud Services
5. Set High Performance Computing (HPC) Environment on Public Cloud
6. Set up Environment for Big Data and Blockchain on Cloud
7. Perform Network Cloud security
8. Deploy hardware/software protection
9. Configure Virtual Private Networks (VPN)
10. Perform Traffic Filtration on Next Generation Firewall
11. Perform Cyber Security Functions
12. Manage and Supervise the Job Activities
13. Develop Entrepreneurial Skills
14. Practice Professionalism

Trainee entry level

The entry requirement for this qualification would be Level 4 in Computer Networking and Cloud Computing program

Minimum qualification of trainer

Teaching staff qualification should be BS (Computer Engineering, Computer Science, Software Engineering, I.T, Computer Networks, Cyber security, Data Science, and Computer Networking and Cloud Computing) or equivalent.

Recommended trainer: trainee ratio

The recommended maximum trainer: trainee ratio for this programme is 1 trainer for 25 trainees.

Medium of instruction i.e., language of instruction

Instruction will be English.

Duration of the course (Total time, Theory & Practical time)

This curriculum comprises 17 modules. The recommended delivery time is 1200 hours. Delivery of the course could therefore be full time, 5 days a week, for 12 months. Training providers are at liberty to develop other models of delivery, including part-time and evening delivery.

The full structure of the course is as follow:

Module Level-5	Theory¹ Days/hours	Workplace² Days/hours	Total hours	Credit hours
Module 1 Manage Repositories on Cloud Side	20	30	50	5
Module 2 Configure Tools for Continuous Development (Dev Ops)	28	42	70	7
Module 3 Manage Web Applications on Cloud	28	42	70	7
Module 4 Manage Public Cloud Services	32	48	80	8
Module 5 Set High Performance Computing (HPC) Environment on Public Cloud	28	42	70	7
Module 6 Set up Environment for Big Data and Blockchain on Cloud	32	48	80	8
Module 7 Perform Network Cloud security	40	60	100	10
Module 8 Deploy hardware/software protection	20	30	50	5

¹ Learning Module hours in training provider premises

² Training workshop, laboratory and on-the-job workplace

Module 9 Configure Virtual Private Networks (VPN)	28	42	70	7
Module 10 Perform Traffic Filtration on Next Generation Firewall	28	42	70	7
Module 11 Perform Cyber Security Functions	28	42	70	7
Module 12 Manage and Supervise the Job Activities	32	48	80	8
Module 13 Develop Entrepreneurial Skills	16	24	40	4
Module 14 Practice Professionalism	100	200	300	30
Total	460	740	1200	120

Sequence of the modules

Each module covers a range of learning components. These are intended to provide detailed guidance to teachers (for example the Learning Elements component) and give them additional support for preparing their lessons (for example the Materials Required component). The detail provided by each module will contribute to a standardized approach to teaching, ensuring that training providers in different parts of the country have clear information on what should be taught. Each module also incorporates the industrial needs of Pakistan.

The distribution table is shown below:

Level-5

Module:1 Manage Repositories on Cloud Side 50 hours	Module:13 Develop Entrepreneurial Skills 40 hours
Module:2 Configure Tools for Continuous Development (Dev Ops) 70 hours	Module:3 Manage Web Applications on Cloud 70 hours
Module:4 Manage Public Cloud Services 80 hours	Module:5 Set High Performance Computing (HPC) Environment on Public Cloud 70 hours
Module:6 Set up Environment for Big Data and Blockchain on Cloud 80 hours	Module:7 Perform Network Cloud security 100 hours
Module:8 Deploy hardware/software protection 50 hours	Module:9 Configure Virtual Private Networks (VPN) 70 hours
Module:10 Perform Traffic Filtration on Next Generation Firewall 70 hours	Module:11 Perform Cyber Security Functions 70 hours
Module:12 Manage and Supervise the Job Activities 80 hours	
Module:13 Practice Professionalism 300 hours	

Summary – overview of the curriculum

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 1: Manage repositories on cloud side Aim: The aim of this module to develop advanced knowledge, skills and understanding to Manage repositories on cloud side	LU1. Set up Version LU2. Control Versions of code repository	20	30	50
Module 2: Configure tools for continuous deployment (DevOps) Aim: The aim of this module to develop advanced knowledge, skills and understanding to Configure tools for continuous deployment (DevOps)	LU1. Deploy Continuous Integration System LU2. Deploy Continuous Delivery and deployment system	28	42	70
Module 3: Manage web applications on cloud Aim: The aim of this module to develop advanced knowledge, skills and understanding to Manage web applications on cloud	LU1. Manage Files for hosting LU2. Manage Databases of hosting site LU3. Configure Email for Domain LU4. Manage Security for Domain Hosting LU5. Install open-source CMS (Content Management System)	28	42	70

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 4: Manage Public Cloud Services Aim: The aim of this module to develop advanced knowledge, skills and understanding to Manage Public Cloud Services	LU1. Configure Virtual Machines LU2. Configure Virtual Network LU3. Perform Basic Security LU4. Perform Cloud Computation LU5. Create backup and restore virtual machine LU6. Deploy Provisioning and Management	32	48	80
Module 5: Set High performance computing (HPC) Environment on Public Cloud Aim: The aim of this module to develop advanced knowledge, skills and understanding to Set High performance computing (HPC) Environment on Public Cloud	LU1. Configure the servers. LU2. Set up the HPC-on-cloud	28	42	70

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 6: Set up environment big data and block chain on cloud Aim: The aim of this module to develop advanced knowledge, skills and understanding to Set up environment big data and block chain on cloud	LU1. Configure the servers LU2. Set up the Big Data and Block Chain on cloud	32	48	80
Module 7: Perform Network and Cloud security Aim: The aim of this module to develop advanced knowledge, skills and understanding to Perform Network and Cloud security	LU1. Apply Secure Service Layer (SSL) in your client server applications LU2. Perform Network and Infrastructure Security LU3. Apply Endpoint Security LU4. Perform Data Protection and Encryption LU5. Monitor Logging, Threat Detection, and Analytics LU6. Apply Identity and Access Control LU7. Perform Vulnerability and Configuration Analysis LU8. Apply Application Security LU9. Perform Security Operations and Automation	40	60	100
Module 8: Deploy hardware/software protection Aim: The aim of this module to develop advanced knowledge, skills and understanding to Deploy hardware/software protection	LU1. Protect Computer Networking and Cloud Computing gateway from cyber-Attacks LU2. Secure device to device / end to end communication	20	30	50

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 9: Configure Virtual Private Networks (VPN) Aim: The aim of this module to develop advanced knowledge, skills and understanding to Configure Virtual Private Networks (VPN)	LU1. Set up new Incoming Connection LU2. Configure the VPN for client	28	42	70
Module 10: Perform Traffic Filtration on Next Generation Firewall Aim: The aim of this module to develop advanced knowledge, skills and understanding to Perform Traffic Filtration on Next Generation Firewall	LU1. Login to a Firewall LU2. Configure Basic Firewall LU3. Configure Firewall Security Policies LU4. Perform Network Address Translation LU5. Configure Firewall User Management	28	42	70
Module 11: Perform Cyber Security Functions Aim: The aim of this module to develop advanced knowledge, skills and understanding to Perform Cyber Security Functions	LU1. Configure Reconnaissance and Foot printing LU2. Perform Scanning of networks LU3. Perform Exploitation and sniffing LU4. Secure web Applications Attack	28	42	70

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 12: Manage and Supervise the Job Activities Aim: The aim of this module to develop advanced knowledge, skills and understanding to manage and supervise the job activities	LU1. Plan for on-site operations LU2. Supervise work activities to achieve desired results LU3. Perform on- site inspection LU4. Prepare the inspection report	32	48	80
Module 13: Develop Entrepreneurial Skills Aim: The aim of this module to develop advanced knowledge, skills, and understanding to develop entrepreneurial skills	LU1. Develop a business plan LU2. Collect information regarding funding sources LU3. Develop a marketing plan LU4. Develop basic business communication skills	16	24	40
Module 14: Practice Professionalism Aim: The aim of this module to develop advanced knowledge, skills, and understanding to practice professionalism	LU1. Develop Portfolio for industry LU2. Perform Internship	100	200	300



Modules

Module 1: Manage Repositories on Cloud Side

Objective of the module: The aim of this module is to get knowledge, skills and understanding to manage version control system to store repositories on cloud side on pc at workplace.

Duration: 50hours **Theory:** 20 hours **Practical:** 30hours

Learning Unit	• Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Set up Version	Trainee will be able to: <ol style="list-style-type: none"> 1. Set up version control system to store repositories 2. Set up / add user accounts 3. Install / Setup local copy of repository on developer's systems 	<ul style="list-style-type: none"> • Knowledge of version control • Understanding the type of Version Control Systems • Understanding of Steps involve in installing local copy of repository • Process to signup cloud account • Managing users and on version control system <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to create user 	Theory: 10 hours Practical: 15hours Total: 25 hours	<ul style="list-style-type: none"> • Computer System • High speed internet • Cloud account 	<ul style="list-style-type: none"> • Class Rooms/ Computer Lab

		account and manage version control system			
LU2. Control Versions of code repository	Trainee will be able to: <ol style="list-style-type: none"> 1. Integrate the local copy with development environment 2. Create branches and sub branches of code repository 	<ul style="list-style-type: none"> • Knowledge about DevOps team and their operations • Overview of Containers/services • Introduction to Azure Container Registry • Knowledge of Azure Kubernetes Services • Knowledge of branches and sub branches <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to create branches and sub branches of code repository 	<p>Theory: 10 hours</p> <p>Practice: 15hours</p> <p>Total: 25 hours</p>	<ul style="list-style-type: none"> • Computer System • High speed internet • Cloud account 	<ul style="list-style-type: none"> • Computer Lab

Module 2: Configure Tools for Continuous Development (DevOps)

Objective of the module: The aim of this module is to get knowledge, skills and understanding to configuration tools for continuous development on pc at workplace.

Duration: 70hours **Theory:** 28hours **Practical:** 42hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Deploy Continuous Integration System	The trainee will be able to: <ol style="list-style-type: none"> 1. Automate the build by integrating the code of different developers 2. Automate the posting of software packages to different repositories. 3. Deploy across different environments 4. Automate the creation of environment (Dev/QA/Staging) 	<ul style="list-style-type: none"> • Understanding of automate Version control • Understanding of Continuous Integration (CI) vs Continuous Deployment (CD) • Explain types of Continuous Integration& Deployment tool or service • Understanding of the environment (like Dev/QA/Staging) • Knowledge of 	Theory: 14 hours Practical: 21 hours Total: 35 hours	<ul style="list-style-type: none"> • Computer System • High speed internet • Cloud account • Jenkins 	<ul style="list-style-type: none"> • Class Rooms/ Computer Lab

	<p>images for facilitating development and testing</p> <p>5. Automate the deployment across different environments</p>	<p>deployment across different environments</p> <ul style="list-style-type: none"> • Knowledge of DevOps <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to deploy/configure automate continuous integration of software packages to different environments 			
<p>LU2. Deploy Continuous Delivery and deployment system</p>	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> 1. Build Automation push a Docker image to the repository. 2. Release Alpha version to collect feed. 3. Release Beta version to perform testing 4. Release Production version after necessary changes 5. Deploy Manual to 	<ul style="list-style-type: none"> • Explain different types and usages of Continuous delivery systems tools • Mutable vs. Immutable Servers. • Architecting for Continuous Delivery • Knowledge of docker, its operations and tools • Different Type of software versions • Deployment Methods. 	<p>Theory:14 hours</p> <p>Practical:21 hours</p> <p>Total:35 hours</p>	<ul style="list-style-type: none"> • Computer System • High speed internet • Cloud account • Jenkins 	<ul style="list-style-type: none"> • Class Rooms • Computer Lab

	<p>production server</p> <p>6. Use tools to Automatically deploy to the production</p>	<ul style="list-style-type: none"> • Knowledge to perform testing <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to create Docker file for deployment of system • Practice to deploy/configure continuous delivery and deployment system 			
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Module 3: Manage Web Applications on Cloud

Objective: The aim of this module is to get knowledge, skills and understanding to manage web application on cloud on pc at workplace.

Duration: 70hours

Theory: 28hours

Practical: 42hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Manage files for hosting	The trainee will be able to: <ol style="list-style-type: none"> 1. Manage Files through file manager. 2. Create a Web Disk account 3. Modify and manage images 4. Set a password to protect certain directories 5. Monitor account's available space 6. Configure FTP Accounts 7. Monitor visitors that are logged into your site through FTP 8. Create your website Backup 9. Create Git repositories 	<ul style="list-style-type: none"> • Knowledge of Web hosting tools • Understanding C Panel/other hosting environment • Understanding of file manager • Differentiate Between FTP and TFTP • Understanding how to manager ftp accounts • Knowledge of creating and managing backups • Knowledge of creating/Managing Git repositories. • Monitor visitor login site (FTP) by using c panel <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to create FTP user accounts for directory access • Practice to create and manage Git repository 	<p>Theory:6 hours</p> <p>Practical: 9 hours</p> <p>Total:15 hours</p>	<ul style="list-style-type: none"> • Computer System • High speed internet • Cloud account 	<ul style="list-style-type: none"> • Computer Lab

	10. Manage Git™ repositories				
LU2. Manage Databases and domains of hosting site	The trainee will be able to: <ol style="list-style-type: none"> 1. Create Database on assigned cloud account 2. Create User 3. Add user to Database 4. Give Privilege to users modify Databases 5. Manage your domains 6. Create Addon Domain 7. Manage Subdomain 8. Configure your website available from another domain name 9. Manage redirects 10. Configure Zone Editor 	<ul style="list-style-type: none"> • Knowledge of database and its functions • Explain cloud-based database and its types • Knowledge to create database accounts and assign rights • Basic knowledge of SQL language • Knowledge of modifying structure of the database • Understand managing domains • Knowledge about Addon Domain • Describe the managing Subdomain • Knowledge of configuring website available from another domain name • Understanding the managing redirects • Understand and configure Zone Editor <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to create database accounts and assign rights 	<p>Theory: 6 hours</p> <p>Practical: 9 hours</p> <p>Total:15 hours</p>	<ul style="list-style-type: none"> • Computer System • High speed internet • Cloud account 	<ul style="list-style-type: none"> • Computer Lab

		<ul style="list-style-type: none"> Practice to create objects in database Practice to configure your website available from another domain name 			
LU3. Configure Email for Domain	The trainee will be able to: <ol style="list-style-type: none"> Create an Email Account Forwarder Route a domain's incoming mail Configure Email Filters 	<ul style="list-style-type: none"> Process of configuring Domain Email Accounts Process of Email Account Forwarder Knowledge of Routing a domain's incoming mail Understanding of Email Filters and its process <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> Practice to create email accounts Practice to create email forwarding <p>Configure filters</p>	<p>Theory: 6hours</p> <p>Practical: 9 hours</p> <p>Total:15 hours</p>	<ul style="list-style-type: none"> Computer System High speed internet Cloud account 	<ul style="list-style-type: none"> Computer Lab
LU4. Manage Security for Domain Hosting	The trainee will be able to: <ol style="list-style-type: none"> Configure SSH (Secure Shell) Access Manage IP Blocker Configure SSL (Secure Sockets Layer) / TLS (Transport Layer Security) 	<ul style="list-style-type: none"> Knowledge of SSH and different SSH clients Knowledge of configuring SSH (Secure Shell) Access knowledge of Managing IP Blocker Configuring SSL (Secure Sockets Layer) / TLS (Transport Layer Security) 	<p>Theory: 6 hours</p> <p>Practical: 9 hours</p> <p>Total: 15 hours</p>	<ul style="list-style-type: none"> Computer System High speed internet Cloud account Email account 	<ul style="list-style-type: none"> Class Rooms/ Computer Lab

		<u>Practical Activity</u> <ul style="list-style-type: none"> Practice to configure SSH (Secure Shell) Access Practice to manage IP Blocker Configure SSL 			
LU5. Install open source CMS (Content Management System)	The trainee will be able to: <ol style="list-style-type: none"> Configure of CMS Configure Database for CMS 	<ul style="list-style-type: none"> Understanding of CMS Different type of CMS Understanding of CMS architecture Process of Installation and configuring CMS e.g., using control panel Knowledge about database handling <u>Practical Activity</u> <ul style="list-style-type: none"> Configure CMS and database 	Theory: 4 hours Practical: 6 hours Total: 14hours	<ul style="list-style-type: none"> Computer System High speed internet Cloud account 	<ul style="list-style-type: none"> Class Rooms/ Computer Lab

Module4: Manage Public Cloud Services

Objective: This competency unit covers the skills and required knowledge to configure virtual machines, virtual network and perform basic security and cloud computation.

Duration:	80 Hours	Theory:	32hours	Practical:	48hours
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Configure Virtual Machines	Trainee will be able to: <ol style="list-style-type: none"> 1. Create and login cloud account 2. Select Operating System for server 3. Create the Virtual machine 4. Configure accessibility using FTP/SSH 5. Conduct test for verification of allocated resources 6. Install applications on the subjected machines 	<ul style="list-style-type: none"> • knowledge of current industry-accepted Cloud Service provider services i.e EC2 Instance, Load Balancing, Auto-scaling, EBS (Elastic Block Storage), Storage in Cloud, Cloud Front, Identity Access Management (IAM), Amazon Virtual Private Cloud (VPC), Dynamo DB, AWS Management Tools, Application Services, Backup and Disaster Recovery • Introduction to Linux and Windows operating systems and cloud provider ecosystems 	Total: 15 hrs Theory: 6 hrs Practical: 9 hrs	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines • Cloud user account • CentOS • Putty • Vagrant • VirtualBox • WinSCP 	Computer Lab

		<p>like Amazon AWS, Microsoft Azure etc.</p> <ul style="list-style-type: none"> Understanding of service level agreement (SLA) <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Practice to install Linux virtual machine (VM) setup and vagrant. Launch python web server and access the content using a browser in the host machine. 			
LU2. Configure Virtual Network	<p>Trainee will be able to:</p> <ol style="list-style-type: none"> 1. Select required specification for network 2. Select resources to create virtual network 3. Launch resources to create virtual network 4. Connect hosts with virtual network 5. Test the virtual network 	<ul style="list-style-type: none"> knowledge of the virtual network and resource identification understanding of setup of virtual machine to configure virtual network of any service provider <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Deploy two virtual machines (VMs) securely communicate between VMs and connect to VMs from the internet. 	<p>Total:</p> <p>15 hrs</p> <p>Theory:</p> <p>06 hrs</p> <p>Practical:</p> <p>9 hrs</p>	<ul style="list-style-type: none"> Computer System Internet Connection Web Browser Search Engines Cloud user account CentOS Putty Vagrant VirtualBox 	Class Room/ Computer Lab

				<ul style="list-style-type: none"> WinSCP 	
LU3. Perform Basic Security	Trainee will be able to: <ol style="list-style-type: none"> 1. Select security level requirement 2. Inspect network design to detect security flaws 3. Select security operation 	<ul style="list-style-type: none"> understandings of cloud security knowledge of default security rule Explain types of Security Vulnerabilities in the Cloud Explain different firewall policies Understanding of Security lifecycle and measurements should be explained <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Practice to prepare report to select security level on Virtual machine 	Total: 10 hrs Theory: 04hrs Practical: 06 hrs	<ul style="list-style-type: none"> Computer System Internet Connection Web Browser Search Engines Cloud user account CentOS Putty Vagrant VirtualBox WinSCP 	Class Room / Computer Lab
LU4. Perform Cloud Computation	Trainee will be able to: <ol style="list-style-type: none"> 1. Select requirement and specification for applications 2. Launch cloud tool for required application 3. Assign resources to host 4. Install the required 	<ul style="list-style-type: none"> Understandings of cloud computing specification knowledge of GRID Computing, Hypervisor Technology: VMware to Xen, REST, Writely/Google Docs and Zoho, Amazon Elastic Compute Cloud 	Total: 15 hrs Theory: 6 hrs Practical:	<ul style="list-style-type: none"> Computer System Internet Connection Web Browser Search Engines Cloud user account CentOS 	Class Room/ Computer Lab

	<p>application</p> <p>5. Test the environment</p>	<p>EC2 and Mature HaaS, Microsoft Azure etc.</p> <ul style="list-style-type: none"> Implementing APP engine practice Introduction to different APIs DevOps know-how building and deploying infrastructure with cloud deployment, build and test automation technologies <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Practice to Setup APP engine on VM and test the environment 	9 hrs	<ul style="list-style-type: none"> Putty Vagrant VirtualBox WinSCP Virtual Machine (VM) 	
<p>LU5. Create backup and restore virtual machine</p>	<p>Trainee will be able to:</p> <ol style="list-style-type: none"> Create virtual machine image Create job schedule for backups Configure backup repository Restore virtual machine backups 	<ul style="list-style-type: none"> Introduction to Virtual Machine (Hypervisor, Type1, and Type 2) Linux virtual machine (VM) Setup and vagrant. backup works, and verify support requirements. Get an overview of Azure VM backup. <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Practice to create VM, backup 	<p>Total:</p> <p>15 hrs</p> <p>Theory:</p> <p>6 hrs</p> <p>Practical:</p> <p>9 hrs</p>	<ul style="list-style-type: none"> Computer System Internet Connection Web Browser Search Engines Cloud user account CentOS Putty Vagrant VirtualBox WinSCP Virtual Machine 	<p>Class Room</p> <p>Computer Lab</p>

		and restore repository.		(VM)	
LU6. Deploy Provisioning and Management	Trainee will be able to: <ol style="list-style-type: none"> 1. Select requirement and specification for deployment of resources 2. Launch the cloud tool 3. Create the resources for required tasks 4. Install the required application 5. Select the management tool 6. Make the local backup on storage device 	<ul style="list-style-type: none"> • knowledge of resources such as, computation, storage and power etc. • Understandings of application management service • connectivity of cloud services <u>Practical Activity:</u> <ul style="list-style-type: none"> • Perform backup operations 	Total: 10 hrs Theory: 4 hrs Practical: 6 hrs	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines • Cloud user account • CentOS • Putty • Vagrant • VirtualBox • WinSCP • Virtual Machine (VM) 	Class Room and Computer Lab

Module 5: Set High Performance Computing (HPC) Environment on Public Cloud

Objective: This unit covers the skills and required knowledge to set high HPC performance computing (HPC) environment on public cloud.

Duration:	70 Hours	Theory:	28 hours	Practical:	42 hours
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Configure server	Trainee will be able to: <ol style="list-style-type: none"> 1. Select GPU requirement 2. Select operating system, memory and storage 3. Add InfiniBand 	<ul style="list-style-type: none"> • Introduction of cloud provider's specifications for identification and server configuration • knowledge of AWS foundation services related to compute, network, storage, content delivery, administration and security, deployment and management, automation technologies • knowledge of Hardware/Software requirements and types of GPUs • Introduction to High bandwidth (10Gig Ethernet and above) • Knowledge Azure Batch, Azure Cycle Cloud 	Total: 35 hrs Theory: 14 hrs Practical: 21 hrs	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines • Cloud user account • CentOS • Putty • Vagrant • VirtualBox • WinSCP • Virtual Machine (VM) 	Computer Lab

		<ul style="list-style-type: none"> • Knowledge AWS Data Sync, AWS Snowball, AWS Snow mobile, AWS Direct Connect <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to choose cloud server and show specifications and list of supported services • Practice to connectivity of cloud services 			
LU2. Set up the HPC-on-cloud	<p>Trainee will be able to:</p> <ol style="list-style-type: none"> 1. Select tool for creating HPC instance 2. Perform the operation of HPC application 	<ul style="list-style-type: none"> • Introduction to HPC Clusters • Knowledge of SoftLayer HPC environment <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to set up the HPC-on-cloud instance 	<p>Total:</p> <p>35 hrs</p> <p>Theory:</p> <p>14 hrs</p> <p>Practical:</p> <p>21 hrs</p>	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines • Cloud user account • CentOS • Putty • Vagrant • VirtualBox • WinSCP • Virtual Machine (VM) 	Computer Lab

Module 6: Set up Environment for Big Data and Block Chain on Cloud

Objective: This competency unit covers the skills and required knowledge to most elastic and scalable cloud infrastructure to run your Bigdata and Blockchain applications. to understand how Bigdata and Blockchain is being used in various sectors of the industries to Know the step wise process which is required for designing a Blockchain solution

Duration:	80 Hours	Theory:	32 hours	Practical:	48 hours
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Configure servers	Trainee will be able to: <ol style="list-style-type: none"> 1. Select GPU requirement 2. Select the operating system, memory and storage 3. Configure the bandwidth 	<ul style="list-style-type: none"> • Knowledge Azure Batch, Azure Cycle Cloud • Knowledge AWS Athena, S3 Storage, Dynamo DB, Redshift Data Warehouse, Kinesis, Elastic search, AWS Elastic Map Reduce, Amazon • Managed Blockchain Hyperledger Fabric and Ethereum • knowledge of Hardware/Software requirements and types of GPUs (GeForce, NVIDIA RTX / Quadro, Data Centre, Titan RTX) • Knowledge of cloud servers (Grace CPU, DGX Systems, EGX Platform, HGX Platform, DRIVE Constellation) 	Total: 40 hrs Theory: 16 hrs Practical: 24 hrs	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines • Cloud user account • CentOS • Putty • Vagrant • VirtualBox • WinSCP • Virtual Machine (VM) 	Computer Lab

		<u>Practical Activity:</u> <ul style="list-style-type: none"> Practice to configure the servers according to the specifications 			
LU2. Set up the Bigdata and Blockchain on cloud	Trainee will be able to: <ol style="list-style-type: none"> Select tool for creating Bigdata and Blockchain instance Perform the operation of Bigdata and Blockchain application 	<ul style="list-style-type: none"> Basic Knowledge of Hadoop technologies: Event Hubs, Cloud Services, Web Apps, Blob Storage, SQL Azure, and HD Insight. Azure Blockchain Azure Blockchain Workbench, Azure Blockchain Development Kit knowledge of AWS foundation services related to compute, network, storage, content delivery, administration and security, deployment and management, automation technologies <u>Practical Activity</u> <ul style="list-style-type: none"> Practice to setup environment for bigdata 	Total: 40 hrs Theory: 16 hrs Practical: 24 hrs	<ul style="list-style-type: none"> Computer System Internet Connection Web Browser Search Engines Cloud user account CentOS Putty Vagrant VirtualBox WinSCP Virtual Machine (VM) 	Class Room and Computer Lab

Module 7: Perform Network and Cloud Security

Objective: After this competency standard the candidate will be able to perform network and cloud security.

Duration:	100 Hours	Theory:	40 hours	Practical:	60 hours
Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Apply Secure Service Layer (SSL) in your client server applications	The trainee will be able to: <ol style="list-style-type: none"> 1. Install OpenSSL library on server and client side. 2. Create TCP socket and apply SSL on server application 3. Generate SSL certificates for client. 4. Install these certificates on server 5. Establish SSL based client server communication 	<ul style="list-style-type: none"> • Understanding of software security and communication protocol • Understanding of transport layer protocol (TCP, UDP) • Categorize software security components • Understanding and knowledge of transport layer security • Knowledge of open SSL. <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to generate SSL certificate 	<p>Total:</p> <p>10 hrs</p> <p>Theory:</p> <p>5 hrs</p> <p>Practical:</p> <p>5 hrs</p>	<p>Consumable</p> <ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board markers <p>Non-Consumable</p> <ul style="list-style-type: none"> • C/Python IDE • Computer system • Multimedia projector 	Class room, Computer Lab

				<ul style="list-style-type: none"> • IoT Network • Arduino • Node MCU • Instructional manual • Raspberry Pi • Raspberry Pi Adapter (5V, 2A) • SD card • SD card reader • UPS • internet 	
LU2. Perform Network and Infrastructure Security	Trainee will be able to: <ol style="list-style-type: none"> 1. Collect security requirements and specifications 2. Inspect network design to detect security flaws 3. Select security operation 	<ul style="list-style-type: none"> • security requirements and specification for making network infrastructure. • security flaws to design network <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to design network 	Total: 10 hrs Theory: 4 hrs	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines 	Class Room and Computer Lab

	as per requirement	security as per requirement and specification	Practical: 6 hrs	<ul style="list-style-type: none"> Operating System (Windows, Linux) 	
LU3. Apply Endpoint Security	Trainee will be able to: <ol style="list-style-type: none"> 1. Detect malware / threats on operating system 2. Protect against malware / threats found on operating system 3. Clean threat /malware using antivirus tool 	<ul style="list-style-type: none"> knowledge of scanning capabilities of a single anti-malware engine Knowledge to recognize malware Establish host and end to end security between databases in csv file format. Explain process of cleaning malware through antivirus software <p><u>Practical activity:</u></p> <ul style="list-style-type: none"> practice to perform scanning threats and malware removal process through Antivirus 	Total: 7 hrs Theory: 3 hrs Practical: 4 hrs	<ul style="list-style-type: none"> Computer System Internet Connection Web Browser Search Engines Operating System Antivirus Software (Windows, Linux) 	Class Room and Computer Lab

LU4. Perform Data Protection and Encryption	Trainee will be able to: <ol style="list-style-type: none"> 1. Select data for protection 2. Take the backup of data 3. Protect the data using cloud service 4. Encrypt the data using available tools in the cloud. 	<ul style="list-style-type: none"> • explain data protection and Encryption for cloud-based environment. • classification of data. <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Perform data protection and encryption techniques 	<p>Total: 11 hrs</p> <p>Theory: 4 hrs</p> <p>Practical: 7 hrs</p>	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines • MS Outlook • System (Windows, Linux) 	Class Room and Computer Lab
LU5. Monitor Logging, Threat Detection, and Analytics	Trainee will be able to: <ol style="list-style-type: none"> 1. Identify log files for any malicious activity 2. Conduct monitoring of threat 3. Generate reporting/analysis 	<ul style="list-style-type: none"> • Explain various types of malicious activity from log file. • Monitor threads and malicious activity in cloud environment. <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Demonstrate the malicious activities and threads in log files 	<p>Total: 11 hrs</p> <p>Theory: 4 hrs</p> <p>Practical: 7 hrs</p>	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines • Operating System 	Class Room and Computer Lab

		and apply analytics on these to identify various pattern.		(Windows, Linux)	
LU6. Apply Identity and Access Control	Trainee will be able to: <ol style="list-style-type: none"> 1. Select Identity /rights assignment requirements and specifications 2. Enforce business user authentication 3. Apply authorization and single sign-on. 	<ul style="list-style-type: none"> • Authenticate organization's employees with your cloud providers. • Process organization's customers with your own applications (business-to-consumer) • Develop organization's employees with your own applications (business-to-employee) <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to access control on various cloud providers according to user requirement 	<p>Total: 12 hrs</p> <p>Theory: 5 hrs</p> <p>Practical: 7 hrs</p>	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines • Operating System (Windows, Linux) 	Class Room and Computer Lab

LU7. Perform Vulnerability and Configuration Analysis	Trainee will be able to: <ol style="list-style-type: none"> 1. inspect application deployments for security risks and vulnerabilities, 2. Scan with cloud tools to identify the vulnerability 3. Configure cloud tool for solutions 	<ul style="list-style-type: none"> • Cloud storage misconfiguration can quickly escalate into a major cloud security breach for an organization and its customers. • Prevent Misconfigured Cloud Storage. • Analysis of Intellectual property (IP) is undeniably one of the most valuable assets of an organization • Prevent Compliance Violations and Regulatory Actions <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to perform vulnerability and configuration setup in the cloud computing. • Practice to perform Contractual Breaches with Customers or Business Partners 	<p>Total: 12 hrs</p> <p>Theory: 5 hrs</p> <p>Practical: 7 hrs</p>	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines • Operating System (Windows, Linux) 	Class Room and Computer Lab
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LU8. Apply Application Security	Trainee will be able to: <ol style="list-style-type: none"> 1. Assess code, logic, and application inputs to detect software vulnerabilities 2. Configure cloud tool for providing solution 	<ul style="list-style-type: none"> • application security types, Static Application Security Testing, Dynamic Application Security Testing • prioritize, and remediate vulnerabilities in the cloud tool <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to Perform and configure software vulnerabilities and remediation to provide priorities in the cloud tool. 	<p>Total: 14 hrs</p> <p>Theory: 5 hrs</p> <p>Practical: 9 hrs</p>	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search Engines • Operating System (Windows, Linux) 	Class Room and Computer Lab
LU9. Perform Security Operations and Automation	Trainee will be able to: <ol style="list-style-type: none"> 1. Check security requirements and specifications 2. Use cloud tool to automate the security operations 3. Test the environment 	<ul style="list-style-type: none"> • security operations and requirements for automation. • Automate infrastructure buildout, scripts, DevOps, security monitoring and for 	<p>Total: 12 hrs</p> <p>Theory: 5 hrs</p>	<ul style="list-style-type: none"> • Computer System • Internet Connection • Web Browser • Search 	Class Room and Computer Lab

		<p>future data.</p> <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Practice to Apply the automation and test in the cloud environment to check the security operations 	<p>Practical:</p> <p>7 hrs</p>	<p>Engines</p> <ul style="list-style-type: none"> Operating System (Windows, Linux) 	
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Module 8: Deploy Hardware/software Protection

Objective: This competency unit covers the skills and required knowledge to demonstrate the basic principles of network security. It provides an introduction to the main theories and activities associated with hardware security techniques being applied in network security industry.

Duration: 50 Hours

Theory: 20 Hours

Practice: 30 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Protect Computer Networking and Cloud Computing gateway from cyber-Attacks	Trainee will be able to: <ol style="list-style-type: none"> 1. Identify intruders in the communication network through vulnerability scans 2. Identify packet capture and injection in Wi-Fi attacks 3. Configure Computer Networking and Cloud Computing against cyber attack 4. Apply AES/TKIP on Computer Networking and Cloud Computing 	<ul style="list-style-type: none"> • Knowledge of Computer Networking and Cloud Computing attacks. • Understanding of Encryption/Decryption Standards • Knowledge to MAC Addresses and its use in security <u>Practical Activity</u> <ul style="list-style-type: none"> • Practice to monitor network traffic • Practice to perform Vulnerability test using NISSUS Tool 	Theory: 10 hours Practice: 15 hours Total: 25 hours	<ul style="list-style-type: none"> • Desktop PC • Notebook • Internet • NISSUS tool • Wireshark tool 	Computer Lab

	gateway 5. Apply MAC address filtering 6. Perform vulnerability test for Computer Networking and Cloud Computing gateway				
LU2. Secure device to device / end to end communication	Trainee will be able to: 1. Implement micro services by applying physical security 2. Delete, disable, or rename any default user accounts, and change all default passwords 3. Create additional accounts with limited privileges based on responsibilities 4. Update firmware's 5. Isolate Computer Networking and Cloud Computing devices by	<ul style="list-style-type: none"> • Knowledge of Wireless threats • Knowledge of Cloud Security <u>Practical Activity</u> <ul style="list-style-type: none"> • Practice to secure cloud from malicious file uploads using Clam AV • Practice to change basic default parameters of device (rename the device, set new user name/password and update the firmware of device) • Practice to configure Secure Communication between Device and Server by using SSL 	Theory:10 Hrs Practice-15 Hrs Total- 25 Hrs	<ul style="list-style-type: none"> • Desktop PC • Notebook • Internet • Ubuntu Linux • Wireshark tool • Clam AV Software 	Computer Lab

	<p>securing device to device communication through wireless PAN protocols</p> <p>6. Secure cloud and Computer Networking and Cloud Computing device connection by applying SSL</p> <p>7. Secure communication from device to gateway by encryption protocols</p>				
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Module 9: Configure Virtual Private Networks (VPN)

Objective of the module: This competency unit covers the skills and required knowledge to demonstrate the understanding of basic principles of Virtual Private Network (VPN). It provides an introduction to the set up new incoming connection and configure VPN for client

Duration:70 Hours

Theory: 28 Hours

Practice: 42 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Set up new Incoming Connection	Trainee will be able to: <ol style="list-style-type: none"> 1. Perform network adaptor setting 2. Add new incoming connection 3. set IP address 	<ul style="list-style-type: none"> • Knowledge of assigning IP addresses to interfaces <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to create incoming connection for VPN in windows OS 	Theory: 14 hours Practice: 21 hours Total: 35 hours	<ul style="list-style-type: none"> • Desktop PC • Notebook • Internet 	Computer Lab
LU2. Configure VPN for client	Trainee will be able to: <ol style="list-style-type: none"> 1. Add new incoming connection 2. Set IP address for VPN client and connect 	<ul style="list-style-type: none"> • knowledge of VPN Client Software. <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Download and install VPN Client and configure it 	Theory: 14 hours Practice: 21 hours Total: 35 hours	<ul style="list-style-type: none"> • Desktop PC • Notebook • Internet 	Computer Lab

Module 10: Perform Traffic Filtration on Next Generation Firewall

Objective: This competency unit covers the skills and required knowledge to work on Firewalls for its basic configurations, security policies configurations, Network address translation configurations and the user management.

Duration: 70 Hours

Theory:28 Hours

Practice: 42 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Login to a Firewall	Trainee will be able to: <ol style="list-style-type: none"> 1. Login to a Device through the Console Port 2. Login to the Device through Telnet 3. Login to the Device through SSH 4. Login to the Device Using the default web mode 5. Login to the Device through the web UI 	<ul style="list-style-type: none"> • knowledge of firewall • Firewall types • Knowledge of ACL • Knowledge of Telnet Protocol • Knowledge of SSH Protocol • Knowledge of putty application <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • login to the firewall via • Telnet and SSH • Practice to Assign management IP on management port and through Web UI 	Total: 11 hours Theory: 5 hours Practice: 6 hours	<ul style="list-style-type: none"> • Computer system • Internet • Putty software • GNS 3 • Firewall 	Computer Lab
LU2. Configure Basic Firewall	Trainee will be able to: <ol style="list-style-type: none"> 1. Install firewall on 	<ul style="list-style-type: none"> • knowledge of firewall commands 	Total: 15 hours	<ul style="list-style-type: none"> • Computer system 	Computer Lab

	<p>operating system.</p> <ol style="list-style-type: none"> Update firewall to the latest vendor recommended firmware Delete, disable, or rename any default user accounts, and change all default passwords Create additional accounts with limited privileges based on responsibilities Set up firewall zones and IP addresses Configure access control lists (i.e., set inbound and outbound rules) Configure other firewall services and logging 	<ul style="list-style-type: none"> Understanding of firewall and its working IP Tables / Firewalled Concept of Zones and its types Concept of allowing or denying Port Understanding of debugging <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Configure and implement different inbound and out bound rules and allow or deny different services or open and close different ports. Perform Debugging Configure the basic firewall setting using GNS3 simulator Configure Host Name Configure the time for the firewall Restore the backup of firewall if any have 	<p>Theory:6 hours</p> <p>Practice:9 hours</p>	<ul style="list-style-type: none"> Internet Putty software GNS 3 Firewall 	
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	<ol style="list-style-type: none"> 8. Perform testing on firewall configuration 9. Generate report from firewall logs 10. Perform vulnerability scans 11. Set a host name for the firewall. 12. Set the system time of the firewall. 13. Backup and restore the firewall's configuration file 				
LU3. Configure Firewall Security Policies	Trainee will be able to: <ol style="list-style-type: none"> 1. Configure IP addresses for interfaces. 2. Add the interfaces to security zones. 3. Configure firewall security policies on the CLI. 4. Configure firewall security policies on the 	<ul style="list-style-type: none"> • knowledge incoming and outbound rules <u>Practical Activity</u> <ul style="list-style-type: none"> • Configure the security policies firewall setting • Assign IP address on interfaces of firewall and enable services in firewall (ping, http, telnet etc) • Create Security Zones 	Total: 15 hours Theory: 6 hours Practice: 9 hours	<ul style="list-style-type: none"> • Computer system • Internet • Putty software • GNS 3 • Firewall 	Computer Lab

	web UI	<ul style="list-style-type: none"> Create firewall security policies through CLI and Web UI 			
LU4. Perform Network Address Translation	Trainee will be able to: <ol style="list-style-type: none"> Configure security zones Configure a security policy Configure a NAT address pool. Configure a NAT Policy A 	<ul style="list-style-type: none"> knowledge NAT, PAT rules <u>Practical Activity</u> <ul style="list-style-type: none"> Configure the NAT, PAT firewall rules 	Total: 15 hours Theory: 6 hours Practice: 9 hours	<ul style="list-style-type: none"> Computer system Internet Putty software GNS 3 Firewall 	Computer Lab
LU5. Configure Firewall User Management	Trainee will be able to: <ol style="list-style-type: none"> Create user groups Create user policies B 	<ul style="list-style-type: none"> knowledge user management in firewall <u>Practical Activity</u> <ul style="list-style-type: none"> Create the user and assign rights Configure User Groups Configure policies for user group 	Theory: 5 hours Practice: 9 hours Total: 14 hours	<ul style="list-style-type: none"> Computer system Internet Putty software GNS 3 Firewall 	Computer Lab

Module 11: Perform Cyber Security Functions

Objective: This competency unit covers the skills and required knowledge about the basic concepts used in the world of information security. This is a course that is perfect as an introductory one for individuals and students who are interested in becoming cyber security or information security professionals.

Duration: 70 Hours

Theory: 28 Hours

Practice: 42 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Configure Reconnaissance and Foot printing	Trainee will be able to: <ol style="list-style-type: none"> 1. Perform email tracking 2. Perform whois lookup 3. Find subdomain 4. Perform ping & tracert applications 	<ul style="list-style-type: none"> • knowledge of cyber security <u>Practical Activity</u> <ul style="list-style-type: none"> • Collecting information about a target using Tracing Email Software 	Total- 14 Hrs Theory-5 Hrs Practice-9 Hrs	<ul style="list-style-type: none"> • Desktop PC • Notebook • Tracing Email Software 	Computer Lab
LU2. Perform Scanning of networks	Trainee will be able to: <ol style="list-style-type: none"> 1. Perform Host scanning 2. Perform port scanning 3. Perform running services scanning 	<ul style="list-style-type: none"> • Knowledge of Scanning networks using various tools <u>Practical Activity</u> <ul style="list-style-type: none"> • Scan the network using NMAP and angry scanner tool 	Total: 19 hours Theory: 7 hours Practice: 12 hours	<ul style="list-style-type: none"> • Desktop PC • Notebook • NMAP, Angry Scanner software 	Computer Lab

LU3. Perform Exploitation and Sniffing	Trainee will be able to: <ol style="list-style-type: none"> 1. Perform exploit with metasploite framework 2. Perform hash cracking 3. Install sniffing tool 4. Perform Sniffing with better cap 	<ul style="list-style-type: none"> • Basic Knowledge of Exploiting networks • Knowledge of sniffing network • Knowledge of Hash cracking • Knowledge of Session Hijack <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Practice to perform hash cracking • Perform Man in the Middle Attack using Cain & Abel • Perform Wireshark lab and verify the traffic 	Total: 20 hours Theory: 8 hours Practice: 12 hours	<ul style="list-style-type: none"> • Desktop PC • Notebook • Kali Linux • Metasploite framework • Sniffing software 	Computer Lab
LU4. Secure web Applications Attack	Trainee will be able to: <ol style="list-style-type: none"> 1. Perform Cross site scripting (xss) 2. Perform authentication broken 	<ul style="list-style-type: none"> • Knowledge of XSS scripting and web application attack <p><u>Practical Activity</u></p> <ul style="list-style-type: none"> • Perform Session hijacking using ZAP tool 	Total: 17 hours Theory: 8 hours Practice: 9 hours	Desktop PC Notebook Windows Server Kali Linux ZAP Tool	Computer Lab

Module 12: Manage and Supervise the Job Activities

Objective of the module: The aim of this module to get knowledge, skills and understanding to manage and supervise the job activities

Duration: 80 hours

Theory: 32 hours

Practical: 48hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Plan for on-site operations	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> 1. Consult with the client to obtain required information 2. Prepare SOPs in accordance with the identified requirements. 3. Prepare the process flow diagram in order to achieve Quality outcome. 4. Break down work of activities into small achievable components and efficient sequences 5. Recognize site hazards and the personal protective equipment (PPE) and safety procedures 	<ul style="list-style-type: none"> • Explain principles of planning and project management • Explain roles and responsibilities for different levels of site supervision. • Explain planning method for on-site operations • Knowledge about process flow diagram • Understanding of health and safety standards • Understanding of house keeping 	<p>Total:15hrs</p> <p>Theory:6hrs</p> <p>Practical:9 hrs</p>	<ul style="list-style-type: none"> • Notebooks • Pencils • White board marker • White board • Multimedia • Internet • Computer system 	Class Room / workplace

	<p>specified for job</p> <ol style="list-style-type: none"> 6. Organize site induction for support personnel as required 7. Plan housekeeping activities prior to and post completion of work 	<p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to prepare activities plan for a specific job order including break down of activities, recognize site hazards, prepare the demand of required equipment's and man power. 			
<p>LU2: Supervise work activities to achieve desired results</p>	<p>The trainee will be able to:</p> <ol style="list-style-type: none"> 1. List and arrange required resources prior to commencement of work 2. Recognize the areas of work which could result in a delay of work etc 3. Allocate responsibility to required team members to avoid conflicts 4. Review work plan in response to new information, urgent requests, changed situations or instructions from concern personnel 5. Cooperate with team members to achieve common goals 	<p>• Understanding about causes of delay in work etc</p> <p>• Explain documentation and record system of the inspection body</p> <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Practice to manage task allocation to team member for the specific crushing job order, trace out the weak area of work and review the work plan. 	<p>Total: 15 hrs</p> <p>Theory: 6 hrs</p> <p>Practical: 9hrs</p>	<ul style="list-style-type: none"> • Notebooks • Pencils • White board marker • White board • Multimedia • Internet • Computer system 	<p>Class Room/ workplace</p>

LU3: Perform on- site inspection	The trainee will be able to: <ol style="list-style-type: none"> 1. Conduct inspection of work according to inspection plan 2. Identify defects and deficiencies at workplace 3. Record defects and deficiencies with evidence at workplace (if required) 4. Check the actions taken for rectification at workplace 5. Record the non-compliance and expected breaches at workplace 	<ul style="list-style-type: none"> • Describe the information relevant to inspection activities and document preparation for recoding inspection results. • Differentiate various types of deficiencies in inspection activities • Describe site problems and recommended corrective actions • Describe the procedure to perform on- site inspection 	25 hrs Theory: 10 hrs Practical: 15 hrs	<ul style="list-style-type: none"> • Notebooks • Pencils • White board marker • White board • Multimedia • Internet • Computer system 	Class Room/ workplace
		Practical Activity: <ul style="list-style-type: none"> • Conduct inspection of crushing plant with emphasizes on deficiencies and defects in process & production including collection of samples of material & product and collect pictorial evidence etc. 			

LU4: Prepare the inspection report.	The trainee will be able to: <ol style="list-style-type: none"> 1. Collect and review the information relevant to inspection activities for recoding in section results 2. Verify the integrity of information supplied by other party as a part of the inspection process 3. Record inspection observations and findings 4. Recommend the necessary corrective actions for tackling the identified problems 	<ul style="list-style-type: none"> • Explain the procedure to prepare the inspection report. • Understanding about third/other party inspection process • Explain reporting standards <u>Practical Activity:</u> <ul style="list-style-type: none"> • Prepare the inspection report with respect to standards 	Total: 25 hrs Theory: 10 hrs Practical: 15 hrs	<ul style="list-style-type: none"> • Notebooks • Pencils • Whit board marker • White board • Multimedia • Internet • Computer system 	Class Room
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Module 13: Develop Entrepreneurial Skills

Objective: After the completion of this module, the Trainee will be able to develop skill and competence required to develop a business plan and marketing plan.

Duration: 40 hours **Theory:** 16 hours **Practical:** 24 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU 1 Develop a business plan	The trainee will be able to: <ol style="list-style-type: none"> 1. Conduct market survey to collect information 2. Select the best option in terms of cost, service, quality, sales, profit margin, overall expenses 3. Compile the information collected through the market survey, in the business plan format 	<ul style="list-style-type: none"> • Describe market survey and types of information collected such as: <ul style="list-style-type: none"> ✓ Customer /demand ✓ Tools, equipment, machinery and furniture with rates ✓ Raw material ✓ Supplier ✓ Credit / funding sources ✓ Marketing strategy ✓ Market trends ✓ Overall expenses ✓ Profit margin • Explain market survey tools such as questionnaire, interview, observation etc. • Explain elements of business plan • State the procedure to fill the business plan format <p>Practical Activity:</p> <ul style="list-style-type: none"> • Conduct market survey and formulate business plan in terms of feasibility, investment potential, risk, and completeness. 	Total 15hrs Theory: 6 hrs Practical: 12 hrs	<ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker • White board • Multimedia 	<ul style="list-style-type: none"> • Class Room • Simulated environment

LU 2 Collect information regarding funding sources	The trainee will be able to: <ol style="list-style-type: none"> 1. Identify the available funding sources based on their terms and conditions, maximum loan limit, payback time, interest rate 2. Choose the best available option according to investment requirement 3. Prepare documents according to the loan agreement requirement 4. Include the information of funding sources in the business plan 	<ul style="list-style-type: none"> • Explain different funding sources • Describe the documents required to get loan to start a new business <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Prepare the documents for financial feasibility for external investment / loan for the business plan. • Prepare loan documents. 	Total 15 hrs Theory: 4 hrs Practical: 6 hrs	<ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker • White board • Multimedia 	<ul style="list-style-type: none"> • Class Room • Simulated environment
LU 3 Develop a marketing plan	The trainee will be able to: <ol style="list-style-type: none"> 1. Collect information required to devise marketing plan Prepare marketing 	<ul style="list-style-type: none"> • Prepare the product promotion strategy • State elements of business plan • Describe 7 Ps of marketing • Prepare human resource strategy plan. 	Total 5hrs Theory: 2 hrs Practical: 3 hrs	<ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board marker 	<ul style="list-style-type: none"> • Class Room • Simulated environment

	plan for new business	<u>Practical Activity:</u> <ul style="list-style-type: none"> Devise marketing strategy for product promotion 		<ul style="list-style-type: none"> White board Multimedia 	
LU 4 Develop basic business communication skills	The trainee will be able to: <ol style="list-style-type: none"> Communicate with internal customers and external customers Use different modes of communication to communicate internally and externally e.g.: presentation, speaking, writing, listening, visual representation, reading etc. Use specific business terms used in the market 	<ul style="list-style-type: none"> Describe 7 Ps of business communications Explain different modes of communication and their application in the industry Describe business terms used in the industry Describe organization's procedures and policy related to information and communication system, protocol and procedures <u>Practical Activity:</u> <ul style="list-style-type: none"> Practice to prepare a report about shortage of labour Practice to play a role to communicate with customer about the product. 	Total 5 hrs Theory: 2 hrs Practical: 3 hrs	<ul style="list-style-type: none"> Notebooks Pencils Erasers Sharpeners White board marker White board Multimedia 	<ul style="list-style-type: none"> Class Room Simulated environment

Module 14: Practice Professionalism

Objective of the module: This competency standard deal with learning the competencies needed to develop portfolio for industry. You can perform internship. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Duration: 300 hours **Theory:** 100 hours **Practical:** 200 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU 1 Develop Portfolio for industry	The trainee will be able to: <ol style="list-style-type: none"> 1. Select previous assignments for portfolio 2. Work on previous selected assignments for portfolio 3. Compile variety of assignments for portfolio 4. Make Professional Portfolio for industry 5. Develop Digital Portfolio for industry 	<ul style="list-style-type: none"> • Describe different styles/format of portfolio • Explain the importance of portfolio <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Compile important assignments • Prepare folder for assignments manually • Prepare portfolio digitally 	Total 50 hrs Theory: 25 hrs Practical: 25 hrs	<ul style="list-style-type: none"> • Notebooks • Pencils • Erasers • Sharpeners • White board • Multimedia 	<ul style="list-style-type: none"> • Class Room • Simulated environment
LU 2	The trainee will be able	<ul style="list-style-type: none"> • Explain ethics for work/internship • Describe the importance of 	Total	<ul style="list-style-type: none"> • Notebooks 	<ul style="list-style-type: none"> • Class Room

Perform Internship	to: <ol style="list-style-type: none"> 1. Prepare for internship <ul style="list-style-type: none"> • Personal Presentation • Portfolio Presentation 2. Interview preparation 3. Demonstrate Ethics for Internship 4. Identify Industry for internship 5. Perform Internship in Industry <ul style="list-style-type: none"> • Fill the Performa of Internship 5. Report the performance of internship 	internship <ul style="list-style-type: none"> • Explain importance of personal grooming for professional life <u>Practical Activity:</u> <ul style="list-style-type: none"> • Practice of presentation • Prepare CV for internship • Prepare report on performance of internship • Perform internship 	250hrs Theory: 75hrs Practical: 175 hrs	<ul style="list-style-type: none"> • Pencils • Erasers • Sharpeners • White board • Multimedia 	<ul style="list-style-type: none"> • Workplace
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General assessment guidance for “Computer Networking and Cloud Computing” (*Network and Cloud Configuration Expert*)

Good practice in Pakistan makes use of sessional and final assessments, the basis of which is described below. Good practice by vocational training providers in Pakistan is to use a combination of these sessional and final assessments, combined to produce the final qualification result.

Sessional assessment is going on all the time. Its purpose is to provide feedback on what students are learning:

- To the student: to identify achievement and areas for further work
- To the teacher: to evaluate the effectiveness of teaching to date, and to focus future plans.

Assessors need to devise sessional assessments for both theoretical and practical work. Guidance is provided in the assessment strategy

Final assessment is the assessment, usually on completion of a course or module, which says whether or not the student has "passed". It is – or should be – undertaken with reference to all the objectives or outcomes of the course, and is usually fairly formal. Considerations of security – ensuring that the student who gets the credit is the person who did the work – assume considerable importance in final assessment.

Methods of assessment

For lessons with a high quantity of theory, written or oral tests related to learning outcomes and/ or learning content can be conducted. For workplace lessons, assessment can focus on the quality of planning the related process, the quality of executing the process, the quality of the product and/or evaluation of the process.

Methods include direct assessment, which is the most desirable form of assessment. For this method, evidence is obtained by direct observation of the student's performance.

Examples for direct assessment of Computer Networking and Cloud Computing (Network and Cloud Configuration Expert)

:

- Work performances, for example Create a simple app for cloud computing architecture on web and Network.
- Work Performances, for example Develop a Computer Network security environment
- Demonstrations, for example Design a cloud computing configuration and networking.
- Direct questioning, where the assessor would ask the student why he is preparing for a particular application.
- Paper-based tests, such as short answer questions on health and safety, communication skills etc.

Indirect assessment is the method used where the performance could not be watched and evidence is gained indirectly.

Examples for indirect assessment of Computer Networking and Cloud Computing include:

- Work products, Computer Networking and Cloud Computing Project portfolio
- Workplace documents, such as a report on health and safety etc.

Indirect assessment should only be a second choice. (In some cases, it may not even be guaranteed that the work products were produced by the person being assessed.)

Principles of assessment

All assessments should be valid, reliable, fair and flexible:

Fairness means that there should be no advantages or disadvantages for any assessed person. For example, it should not happen that one student gets prior information about the type of work performance that will be assessed, while another candidate does not get any prior information.

Validity means that a valid assessment assesses what it claims to assess, for example, let's imagine if you have thousands of sensors, collecting various data all around us. A solution that scale would be to have these microcontrollers sending data securely to the Cloud.

Reliability means that the assessment is consistent and reproducible. The results for the particular application should be the same.

Flexibility means that the assessor has to be flexible concerning the assessment approach. For example, if there is a power failure during the assessment, the assessor should modify the arrangements to accommodate the students' needs.

Assessment strategy for “Computer Networking and Cloud Computing” (*Network and Cloud Configuration Expert*)

This curriculum consists of 14 modules

1. Manage Repositories on Cloud Side
2. Configure Tools for Continuous Development (Dev Ops)
3. Manage Web Applications on Cloud
4. Manage Public Cloud Services
5. Set High Performance Computing (HPC) Environment on Public Cloud
6. Set up Environment for Big Data and Blockchain on Cloud
7. Perform Network Cloud security
8. Deploy hardware/software protection
9. Configure Virtual Private Networks (VPN)
10. Perform Traffic Filtration on Next Generation Firewall
11. Perform Cyber Security Functions
12. Manage and Supervise the Job Activities
13. Develop Entrepreneurial Skills
14. Practice Professionalism

Sessional assessment

The Sessional assessment for all modules shall be in two parts: theoretical assessment and practical assessment. The Sessional marks shall contribute to the final qualification.

Theoretical assessment for all learning modules must consist of a written paper lasting at least half-hour per module. This can be short answer questions.

For practical assessment, all procedures and methods for the modules must be assessed on a sessional basis. Guidance is provided below under Planning for assessment.

Final assessment

Final assessment shall be in two parts: theoretical assessment and practical assessment. The final assessment marks shall contribute to the final qualification.

The final theoretical assessment shall consist of short-answer questions. This part shall cover the technical, functional and generic modules:

For Level -5

1. Manage Repositories on Cloud Side
2. Configure Tools for Continuous Development (Dev Ops)
3. Manage Web Applications on Cloud
4. Manage Public Cloud Services
5. Set High Performance Computing (HPC) Environment on Public Cloud
6. Set up Environment for Big Data and Blockchain on Cloud
7. Perform Network Cloud security
8. Deploy hardware/software protection
9. Configure Virtual Private Networks (VPN)
10. Perform Traffic Filtration on Next Generation Firewall
11. Perform Cyber Security Functions

- 12.** Manage and Supervise the Job Activities
- 13.** Develop Entrepreneurial Skills
- 14.** Practice Professionalism

For the final practical assessment each student shall be assessed over a period of one day, with Four hour sessions for each student. During this period, each student must be assessed on his/her ability to the following parameters of Computer Networking and Cloud Computing;

- Area of responsibility
- Tasks
- Guards
- Resources and duties

Complete list of tools and equipment

Sr#	Description	Quantity
1.	Bootable OS Flash drive/CD	05(5 student groups /01 for each group)
2.	C/Python IDE	Free
3.	USB 1.1 standard	10
4.	USB 2.0	10
5.	RJ-11 (Registered Jack)	10
6.	RJ-45 (Registered Jack)	10
7.	F-Type	10
8.	ST (Straight Tip) and SC (Subscriber Connector or Standard Connector)	10
9.	Fiber LC (Local Connector)	10
10.	Cable tester	05
11.	Card reader	50
12.	Computer	25
13.	Computer system	25
14.	DC\AC supply	25
15.	Digital clock	3
16.	DVD or BLU-RAY writer	25
17.	External Hard disks	05
18.	Firewall	Free(built-in ,in each Operating system)
19.	Firmware(s)	Down load regarding hardware from internet
20.	Flash Drive	5
21.	Solid State disks.(flash drive)	25
22.	Hard disks(internal)	25
23.	Instructional manual	5
24.	Internet	1
25.	Mass Storage	5
26.	Mouse	25

27.	MS Office	05
28.	Multimedia projector display screen	2
29.	Networking Tool Kit	5 kits
30.	Printer	2
31.	Projector	01 for each lab/class
32.	Projector screen	01 for each lab/class
33.	RAID	2
34.	RAID card	2
35.	RAM	2 of each type
36.	ROM	5
37.	Router	5
38.	Router software/Firmware.	2
39.	Scanner	2
40.	Screw	5
41.	SD card	5
42.	SD card reader	5
43.	Server machine	2
44.	Signal generator	5
45.	Simulator (Packet Tracer)	5
46.	Smartphone	2
47.	Software for Software based RAID.	2
48.	Software to test network.	2
49.	Solder	5
50.	System (Windows, Linux)	2
51.	Tool kit.	5
52.	Trainer	5
53.	Troubleshooting software.	2
54.	USB micro cable	5
55.	USB mini cable	5
56.	Valid public cloud subscription	01 (free available- google drive,amazon,emails etc.)
57.	Voltmeter	10

58.	VPN software.	best free available VPN software's for windows or Any other Operating System
59.	Vulnerability scanning tool	best free available on open source
60.	Webcam for PC	2
61.	Webcam (digital camera)	2
62.	White board	1 each class/lab
63.	Wifi module	5
64.	Wifi router	02
65.	Wire Tester	02
66.	Wireless router	02
67.	UPS	25(One for each computer at least 20 mints back up)
68.	24 port layer2 switch	03
69.	24 port layer 3 switch	03
70.	Access point	03
71.	Ethernet cables/	One role
72.	Windows Server OS	Down load Free products available on open source
73.	Windows Server OS 2019/2016 etc	Down load Free products available on open source
74.	Zoom Application	Down load Free products available on open source
75.	Google meet application	google meet application download for pc
76.	CCTV/IP Cameras	03 with all accessories
77.	NVR	03

78.	Rack	03
79.	Temperature maintain device	05
80.	Physical security	As per requirement of labs and institute
81.	Environmental protection devices	As per requirement of labs and institute
82.	Tools (Operation & Safety) kits	05
83.	Keyboard	25
84.	Hypervisor software	Free available Down load
85.	Tracing Email Software	Free available Down load
86.	NMAP, Angry Scanner software	Free available Down load from open source
87.	Windows Server Kali Linux	Free available Down load from open source
88.	Cain & Abel Tool	Free available Down load from open source
89.	ZAP Tool	Free available Down load from open source
90.	BNC, CAT6 Connector	05 each type
91.	Coaxial cable	50 meter
92.	DVR	02
93.	Freelance platforms	Free available on open source
94.	Email services	Free available on open source
95.	Console Cable	50 meter
96.	Switch	03
97.	Rollover Cable	50 meter
98.	Tools Kit	05
99.	Virtual machine	Down load Free VM Software for Windows, Linux & Mac

100.	Anaconda Software	Down load latest version of Anaconda Software
101.	Router software/ Firmware.	Down load from open source
102.	JDK 8+ Tool	Java downloads for Open JDK 8
103.	JRE	Java Runtime Environment (JRE) down load
104.	Eclipse IDE	Eclipse IDE for Java Developers for PC (Open-source Download)
105.	Java EE	Available for down load on open source
106.	Java FX	Available for down load on open source
107.	Spring boot	Available for down load on open source
108.	Spring web	Available for down load on open source
109.	Spring boot CLI	Available for down load on open source
110.	Maven	Available for down load on open source
111.	Microsoft Office	Available for down load on open source
112.	Any Tool for Creating Prototype	Use any one of best free prototyping tools on an open form
113.	MS vision	Available for down

		load on open source
114.	ServiceDesk plus	Available for down load on open source
115.	FreshService	Available for down load on open source
116.	SolarWind service Desk	Available for down load on open source
117.	Cockpit	Available for down load on open source
118.	Cain And Abel	Available for down load on open source
119.	Ettercap	Available for down load on open source
120.	John the Ripper	Available for down load on open source
121.	Nessus	Available for down load on open source
122.	Nmap	Available for down load on open source
123.	Adapter (5V, 2A)	15
124.	Screwdriver (for slotted and Phillip's head screws)	15
125.	Wire cutters and strippers	15
126.	Needle-nosed pliers	15
127.	Utility knife	15
128.	Small flashlight	20
129.	Adjustable wrench	10
130.	Small container to hold screws	15
131.	Heat sink compound	10
132.	Grounding Strap	20
133.	Network Interface Card	25

List of consumable supplies

1. Note books
2. Inventory registers
3. Pen
4. Pencils
5. Sharpeners
6. Erasers
7. White board markers (Different colours)
8. A4 papers
9. Valid cloud subscription
10. LEDs
11. Female to female header wires
12. Male to female header wires
13. Jumper wires
14. Resistances, capacitors, diodes, Zener diode, relays, transistor etc.
15. PVC wires
16. Digital gates
17. Diac,
18. Triac,
19. FETs
20. RJ 45,
21. Category 5 & 6 cable
22. Coaxial cable
23. DVD RWR
24. Soldering wire
25. Soldering paste
26. Two-way switch
27. One way switch
28. AND gate (7408 2-input Quad)
29. Coupling capacitors
30. DIAC
31. Diodes
32. FET (JFET/MOSFET)
33. Humidity Sensor
34. IC 74147
35. IC 7445 BCD to decimal decoder

36. Inductors
37. Lamp
38. LM741 IC
39. Load (LED)
40. MOSFET
41. NAND gate (7400 2-input Quad)
42. Network cable CAT5,CAT6
43. NOR gate (7402 2-input Quad)
44. Power diodes (general purpose, Fast recovery & Schottky)
45. Push Button
46. PVC Pipe/Duct.
47. Resistive load
48. RFID tags
49. Safety procedures
50. Safety signs
51. SCR
52. Seven segment display
53. Single pole switch
54. Socket
55. Solenoid Valves
56. Temperature Sensor
57. Test Indicator.
58. TRIAC
59. UJT
60. White Board marker
61. Wooden/PVC board.
62. X-NOR gate (74266 2-input Quad)
63. X-OR gate (7486 2-input Quad)
64. Zener Diode
65. IR Sensor
66. IR Ultrasonic Sensor
67. NOT gate (7404 Hex NOT gate)
68. NOT gate (7404 Hex)
69. Occupancy Sensor
70. One 7404 IC – hex inverter (NOT gate)
71. OR gate (7410 3-input)
72. OR gate 7432 2-input Quad

Credit values

The credit value of the National Certificate is defined by estimating the amount of time/ instruction hours required to complete each competency unit and competency standard. The NVQF uses a standard credit value of 1 credit = 10 hours of learning (Following Higher Education Commission (HEC) guidelines).

The credit values are as follows:

Competency Standard	Estimate of hours	Credit
Module 1: Manage Repositories on Cloud Side	50	5
Module 2: Configure Tools for Continuous Development (Dev Ops)	70	7
Module 3: Manage Web Applications on Cloud	70	7
Module 4: Manage Public Cloud Services	80	8
Module 5: Set High Performance Computing (HPC) Environment on Public Cloud	70	7
Module 6: Set up Environment for Big Data and Blockchain on Cloud	80	8
Module 7: Perform Network Cloud security	100	10
Module 8: Deploy hardware/software protection	50	5
Module 9: Configure Virtual Private Networks (VPN)	70	7
Module 10: Perform Traffic Filtration on Next Generation Firewall	70	7
Module 11: Perform Cyber Security Functions	70	7
Module 12: Manage and Supervise the Job Activities	80	8

Competency Standard	Estimate of hours	Credit
Module 13: Develop Entrepreneurial Skills	40	4
Module 14: Practice Professionalism	300	30
Total	1200	120

Members of Curriculum Validation Committee

The following members participated in the qualification validation process at PITAC, Lahore.

Date:20th to 24th Dec, 2021

S#	Name	Designation
1.	Ms Saima Asghar	DACUM expert, Lahore
2.	Mr Muzammil Hasan	Manager Research, KICS, UET, Lahore
3.	Mr Muhammad Akram	Manager Telecom Networks, Faisalabad
4.	Mr Kashif Bashir	Manager KICS, UET Lahore
5.	Mr Azhar Hussain	Sr Team Lead systems, Orient petroleum, Inc Islamabad
6.	Mr Ameer Hamza	Network Manager, ST&IT department KPK Peshawar
7.	Engr Muhammad Aleem	Industrial Automation Department University of Sargodha (CBT&A assessor)
8.	Dr Ahmad Mustafa	PTEVTA, Lahore
9.	Mr Atif Bashir	Project Manager, NCBA &E west Canal, Lahore
10.	Muhammad Abdul Moez	Structural Engineer, RMCE Lahore
11.	Mr. Sadiq Orakzai	Director Academics, KPK TEVTA
12.	Mr Faisal Sarwar	IPS, PBTE Lahore
13.	Mr Abdul Basit	Assistant Programmer, DM&R division, NESPAK Islamabad
14.	Ms Sheeba ch	Networking In charge, Bahria University Islamabad.
15.	Ms Samia Amir Hamza	CBT Assessor, Expert, GCU Faisalabad