

# CURRICULUM OF “COMPUTER NETWORKING AND CLOUD COMPUTING”

“LAB ASSISTANT (NETWORK)”



June 2021



**National Vocational & Technical  
Training Commission**

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# Introduction

## **Definition/ Description of the training programme for Computer Networking and Cloud Computing -Lab Assistant (Network)**

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 are producing skilled staff to:

- Lab Assistant-Network
- Junior Assistant- Network

### **Competencies to be gained after completion of course**

- Perform Basic Computer Installation
- Configure hardware components/peripheral devices
- Prepare office documents
- Perform Internet Surfing and Email Management
- Perform installation and configuration of network cables
- Install Configure and Troubleshoot Switch & Router
- Install System Software on The Devices
- Configure Hardware Raid (Redundant Array of Independent Disk)
- Follow Safety Rules at Site
- Perform Basic Communication Skills

### **Minimum qualification of trainer**

Teaching staff qualification should be BS (EE) with specialization in computer, BS (Computer Engineering, Computer Science, Software Engineering, I.T, Computer Networks, Cyber security, Data Science, and IOT) 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 Urdu and English.

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

This curriculum comprises 15 modules. The recommended delivery time is 600 hours. Delivery of the course could therefore be full time, 5 days a week, for 6 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:

<b>Module Level-2</b>	<b>Theory<sup>1</sup> Days/hours</b>	<b>Workplace<sup>2</sup> Days/hours</b>	<b>Total hours</b>	<b>Credit hours</b>
<b>Module 1</b> Perform Basic Computer Installations	13	45	58	5.8
<b>Module 2</b> Install and Configure hardware components/peripheral devices	15	33	48	4.8
<b>Module 3</b> Prepare office documents	12	48	60	6
<b>Module 4</b> Perform Internet Surfing and email Management	15	45	60	6
<b>Module 5</b> Perform installation and configuration of network cables	12	51	63	6.3
<b>Module 6</b> Configure and Troubleshoot Switch/Router	14	66	80	8
<b>Module 7</b> Install Software on the Drives	9	81	90	9
<b>Module 8</b> Configure Hardware Raid (Redundant Array of Independent Disk)	12	69	81	8.1
<b>Module 9</b> Follow Safety Rules at Site	9	21	30	3
<b>Module 10</b> Perform Basic Communication Skills	9	21	30	3
<b>Total</b>	<b>120</b>	<b>480</b>	<b>600</b>	<b>60</b>

<sup>1</sup> Learning Module hours in training provider premises

<sup>2</sup> Training workshop, laboratory and on-the-job workplace

### 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-2

<b>Module-1</b> Perform Basic Computer Installations <b>58 hrs.</b>	<b>Module-3</b> Prepare office documents <b>60hrs.</b>	<b>Module-8</b> Configure Hardware Raid (Redundant Array of Independent Disk) <b>81hrs.</b>
<b>Module-2</b> Configure hardware components/peripheral devices <b>48 hrs.</b>	<b>Module-5</b> Perform installation and configuration of network cables <b>63 hrs.</b>	<b>Module-9</b> Follow Safety Rules at Site <b>30hrs.</b>
<b>Module-4</b> Perform Internet Surfing and Email Management <b>60 hrs.</b>	<b>Module-6</b> Install, Configure and Troubleshoot Switch/Router <b>80 hrs.</b>	<b>Module-10</b> Perform Basic Communication Skills <b>30hrs.</b>
<b>Module-7</b> Install Software on the Drives <b>90hrs.</b>		

## Summary – overview of the curriculum

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules	Credit hours
<b>Module 1:</b> Perform Basic Computer Installations  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Install/Use system software	<b>LU1.</b> Install system software <b>LU2.</b> Use Operating System	13	45	58	5.8
<b>Module 2:</b> Configure hardware components/peripheral devices  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Configure hardware components/peripheral devices	<b>LU1.</b> Install / configure Hardware components / peripheral devices <b>LU2.</b> Troubleshoot basic hardware errors	15	33	48	4.8
<b>Module 3:</b> Prepare office documents  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to draft office documents	<b>LU1.</b> Prepare document on word <b>LU2.</b> Prepare spread sheet <b>LU3.</b> Prepare presentation <b>LU4.</b> Convert files into different formats	12	48	60	6

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules	Credit hours
<b>Module 4:</b> Perform Internet Surfing and email Management  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Perform efficient web browsing and manage emails	<b>LU1.</b> Perform browsing using different browsers <b>LU2.</b> Create email account	15	45	60	6
<b>Module 5:</b> Perform installation and configuration of network cables  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Perform installation and configuration of network cables	<b>LU1.</b> Prepare network cables <b>LU2.</b> Perform maintenance & troubleshooting	12	51	63	6.3
<b>Module 6:</b> Install, Configure and troubleshoot switch and router  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to install, configure and troubleshoot switches, routers	<b>LU1.</b> Install and connect network switch and router <b>LU2.</b> Configure IP Addresses <b>LU3.</b> Configure dynamic routing protocols <b>LU4.</b> Perform maintenance &troubleshooting	14	66	80	8



Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules	Credit hours
<b>Module 7:</b> Install System software on the devices  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Install System software on the devices	<b>LU1.</b> Install Utility Software & Device Drivers <b>LU2.</b> Install Firmware	9	81	90	9
<b>Module 8:</b> Configure Hardware Raid (Redundant Array of Independent Disk)  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding Configure Hardware Raid (Redundant Array of Independent Disk)	<b>LU1.</b> Install /Configure RAID <b>LU2.</b> Boot and test the System	12	69	81	8.1
<b>Module 9:</b> Follow Safety Rules at Site  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding of follow safety rules at site	<b>LU1.</b> Maintain occupational safety and health at workplace <b>LU2.</b> USE Personal Protective and Safety Equipment (PPE) <b>LU3.</b> Perform Communication Signals	9	21	30	3

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules	Credit hours
<b>Module 10:</b> Perform basic communication skills  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Perform basic communication skills	<b>LU1.</b> Communicate in team <b>LU2.</b> Follow Supervisor's instructions as per organizational SOPs <b>LU3.</b> Develop Generic communication skills at workplace	9	21	30	3

## Modules

### Module 1: Perform Basic Computer Installations

**Objective of the module:** After this competency standard candidate will be able to install and configure system software / operating systems (windows/Linux) and resolve installation errors on computers.

<b>Duration:</b>	58Hours	<b>Theory:</b>	13hours	<b>Practical:</b>	45 hours
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	LearningPlace
<b>LU1.</b> Install system Software	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Prepare drive/partitions before OS installation.</li> <li>2. Format mass storage on a PC/computer</li> <li>3. Perform Partitioning of hard drive</li> <li>4. Install operating system in the PC/computers by following instructional manual.</li> <li>5. Trouble Shoot installation errors</li> </ol>	<ul style="list-style-type: none"> <li>• Define operating system</li> <li>• types of operating systems</li> <li>• Differentiate between system software and application software.</li> <li>• OS Installation process</li> <li>• Knowledge of updates and patches of operating system</li> <li>• Introduction to computer hardware</li> <li>• Types of software (system software, application software)</li> <li>• Identify and describe storage devices and its types (Primary and secondary)</li> <li>• Explain booting system, sequence</li> </ul>	<b>Total:</b> 31hrs  <b>Theory:</b> 7 hrs  <b>Practical:</b> 24hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• Operating System (Windows, Linux)</li> <li>• White board marker</li> <li>• Duster</li> </ul>	Computer Lab
				<b>Non-Consumable</b> <ul style="list-style-type: none"> <li>• White Board</li> <li>• Multimedia</li> </ul>	

	<p>6. Download and run windows/application patches</p>	<ul style="list-style-type: none"> <li>• Description of file system and its types (NTFS, FAT, EXT2, etc)</li> <li>• Describe partitioning and formatting.</li> <li>• Process of partitioning: Create volume using partitioning; Format volumes by using appropriate file system;</li> <li>• Describe operating system installation process from storage media (DVD, Mass storage, external hard disk etc.) following instructional manual</li> <li>• Introduction of troubleshooting</li> <li>• Common OS installation errors and its troubleshooting</li> <li>• OS Software installation steps</li> </ul> <p><b><u>Practical Activity</u></b></p> <ul style="list-style-type: none"> <li>• Activate the OS with the help of KEY</li> <li>• Check available OS update online</li> <li>• Download and apply updates to the OS</li> </ul>		<ul style="list-style-type: none"> <li>• Computer System</li> <li>• Bootable OS Flash drive/CD</li> </ul>	
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<b>LU2. Use Operating System</b>	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Create folders and files</li> <li>2. Copy /paste files, folder/ directories to different location (Hard drive, external storage, cloud)</li> <li>3. Move files, folder/ directories to different location (Hard drive, external storage, cloud)</li> <li>4. Rename files and directories/folder</li> <li>5. Search files / folder/directories against various search criterion (File name, date, text etc)</li> <li>6. Perform task manager operations</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of Copy, paste Move, Rename of files and folder</li> <li>• Search a files and folders</li> <li>• Personalize desktop settings</li> <li>• Personalize display settings</li> <li>• Knowledge of files extensions</li> <li>• Hide / Unhide files / folders / system files</li> <li>• Importance of backup</li> <li>• Knowledge of task Manager</li> </ul> <p><b><u>Practical Activity</u></b></p> <ul style="list-style-type: none"> <li>• Practice to create and save folder/file, copy/paste, rename and move to different locations</li> <li>• Practice to end running task using task manager</li> </ul>	<b>Total:</b> 27 hrs  <b>Theory:</b> 6 hrs  <b>Practical:</b> 21 hrs	<div>Consumable</div> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• Operating System (Windows, Linux)</li> <li>• White board marker</li> <li>• Duster</li> </ul> <div>Non-Consumable</div> <ul style="list-style-type: none"> <li>• White Board</li> <li>• Multimedia</li> <li>• Computer System</li> </ul>	Computer Lab
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## Module 2 Configure Hardware Components/Peripheral Devices

**Objective of the module:** This module covers the knowledge and skills required to install, configure and troubleshoot hardware components / peripheral devices and device drivers on computers

<b>Duration:</b>	48Hours	<b>Theory:</b>	15hours	<b>Practical:</b>	33hours
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b> Install / configure Hardware components / peripheral devices	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Configure hardware components / peripheral devices as per manuals.</li> <li>2. Select and install drivers.</li> <li>3. Perform functional test for the installed Hardware components / peripheral devices.</li> <li>4. Update/Upgrade device drivers</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of Computer hardware (Motherboard, HDD, RAM, CPU, Cards, Slots, Interfaces, Ports)</li> <li>• Knowledge of peripheral devices (webcam, printer, scanner etc.)</li> </ul> <p><b>Activity</b></p> <ul style="list-style-type: none"> <li>• Practice to install / configure printer/scanner and take print/scan any document</li> </ul>	<p><b>Total:</b> 20hrs</p> <p><b>Theory:</b> 7hrs</p> <p><b>Practical:</b> 13hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• Operating System (Windows, Linux)</li> <li>• White board marker</li> <li>• Duster</li> </ul> <p><b>Non-Consumable</b></p> <ul style="list-style-type: none"> <li>• White Board</li> <li>• Multimedia</li> </ul>	Computer Lab

				<ul style="list-style-type: none"> <li>• Computer system</li> <li>• Printer</li> <li>• Scanner</li> <li>• Webcam (digital camera)</li> <li>• DVD or BLU-RAY writer</li> <li>• Pen-drive</li> <li>• External Hard disks</li> </ul>	
<b>LU2.</b> Troubleshoot basic hardware errors	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Detect hardware errors / problems.</li> <li>2. Identify solution of hardware errors.</li> <li>3. Execute the hardware trouble shooting.</li> </ol>	<ul style="list-style-type: none"> <li>• knowledge of troubleshooting hardware errors</li> </ul> <p><b><u>Practical Activity</u></b></p> <ul style="list-style-type: none"> <li>• Practice to troubleshoot hardware errors during installation of different peripheral devices</li> </ul>	<b>Total:</b> 28hrs  <b>Theory:</b> 8hrs  <b>Practical:</b> 20hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• White board marker</li> <li>• Internet Connection</li> <li>• Web Browser</li> <li>• Search Engines</li> </ul>	Computer Lab

				<ul style="list-style-type: none"> <li>• LAN Connectivity</li> <li>• Duster</li> </ul> <div>Non-Consumable</div> <ul style="list-style-type: none"> <li>• White Board</li> <li>• Multimedia</li> <li>• Computer System</li> <li>• Printer</li> <li>• Scanner</li> <li>• Webcam (digital camera)</li> <li>• DVD or BLU-RAY writer</li> <li>• Pen-drive</li> </ul> <p>External Hard disks</p>	
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## Module 3 : Prepare Office Documents

**Objective of the module:** This module covers the knowledge and skills required to prepare office documents, take offline and online backups, and perform files conversions efficiently.

<b>Duration:</b>	60Hours	<b>Theory:</b>	12hours	<b>Practical:</b>	48hours
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b> Prepare document on Word	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Create new document / open word document</li> <li>2. Save document</li> <li>3. Set page Layout</li> <li>4. Perform basic Formatting (text, paragraph, page)</li> <li>5. Perform insert operation (picture, shapes, charts, tables, smart art, clip art, hyperlinks, page numbers, header/footers, bullets/numbering, columns) in the word document</li> </ol>	<ul style="list-style-type: none"> <li>• Understanding of Word processing software (MS office, Star office, Libre Office)</li> </ul> <p><b><u>Practical Activity</u></b></p> <ul style="list-style-type: none"> <li>• Practice to compose CVs,</li> </ul>	<p><b>Total:</b> 15hrs</p> <p><b>Theory:</b> 3hrs</p> <p><b>Practical:</b> 12hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• White board marker</li> <li>• Duster</li> <li>• Word processing software (MS office, Star office, Libre Office)</li> </ul>	Computer Lab

	6. Check the spellings in the word file through dictionary 7. Print document			<b>Non-Consumable</b> <ul style="list-style-type: none"> <li>• Computer System</li> <li>• Internet Connection</li> <li>• Printer</li> <li>• Scanner</li> <li>• White board</li> <li>• Multimedia</li> </ul>	
<b>LU2.</b> Prepare spreadsheet	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Create / open Spread Sheet</li> <li>2. Set page Layout</li> <li>3. Save Spreadsheet</li> <li>4. Perform basic Formatting</li> <li>5. Perform insert operation (picture, charts, smart art, clip art, hyperlinks, page numbers, header/footers, bullets / numbering) in the spread sheet</li> </ol>	<ul style="list-style-type: none"> <li>• Understanding of spreadsheet</li> <li>• Knowledge of inserting / deletion rows / columns,</li> <li>• knowledge of formulas &amp; functions</li> <li>• Understanding of sorting, filtering, conditional formatting, Pivot tables, Freeze Panes</li> </ul> <p><b><u>Practical Activity</u></b></p>	<b>Total:</b> 15hrs  <b>Theory:</b> 3hrs  <b>Practical:</b> 12hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• White board marker</li> <li>• Duster</li> </ul> <b>Non-Consumable</b> <ul style="list-style-type: none"> <li>• Computer System</li> </ul>	Computer Lab

	6. Insert / use arithmetic functions/formulas 7. Print Spreadsheet	<ul style="list-style-type: none"> <li>Practice to prepare result sheet automatic grade calculation</li> <li>Practice to prepare attendance sheet and calculate average number weekly present students</li> <li>Practice to prepare fee voucher according to template</li> </ul>		<ul style="list-style-type: none"> <li>Internet Connection</li> <li>Printer</li> <li>Scanner</li> <li>White board</li> <li>Multimedia</li> </ul>	
<b>LU3.</b> Prepare presentation	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>Create / open presentation</li> <li>Set page Layout</li> <li>Save presentation</li> <li>Perform basic Formatting</li> <li>Perform insert operation (slides, picture, shapes, charts, tables, smart art, clip art, hyperlinks, page numbers, bullets / numbering) in the presentation.</li> <li>Select various template designs</li> </ol>	<ul style="list-style-type: none"> <li>Understanding of different presentation software (Google slides prezi, MS Power point, open office etc.)</li> <li>knowledge of blank / template</li> <li>describe transition effects to slides</li> <li>knowledge of animations to text and objects on slides</li> <li>Knowledge of rehearse timing</li> <li>Understanding of inserting audio / video</li> </ul>	<b>Total:</b> 15hrs  <b>Theory:</b> 3hrs  <b>Practical:</b> 12hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>Internet Connection</li> <li>White board marker</li> <li>Duster</li> <li>Internet Connection</li> <li>MS PowerPoint</li> </ul> <b>Non-Consumable</b> <ul style="list-style-type: none"> <li>Computer System</li> <li>Printer</li> <li>Scanner</li> </ul>	Computer Lab

	7. Apply animation to slides 8. Check the spellings in the presentation through available dictionary 9. Run presentation 10. Print presentation	<u><b>Practical Activity</b></u> <ul style="list-style-type: none"> <li>Practice to prepare presentation with animation and video</li> </ul>		<ul style="list-style-type: none"> <li>White Board</li> <li>Multimedia</li> </ul>	
<b>LU4.</b> Convert files into different formats	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>Identify file conversion software</li> <li>Convert files into different formats</li> <li>Use online convertor to give a practical demonstration</li> </ol>	<ul style="list-style-type: none"> <li>Knowledge of online conversion software</li> </ul> <u><b>Practical Activity</b></u> <ul style="list-style-type: none"> <li>Practice to convert different files into different formats</li> </ul>	<b>Total:</b> 15hrs  <b>Theory:</b> 3hrs  <b>Practical:</b> 12hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>Internet Connection</li> <li>White board marker</li> <li>Duster</li> <li>Internet Connection</li> </ul> <b>Non-Consumable</b> <ul style="list-style-type: none"> <li>Computer System</li> <li>Printer</li> <li>Scanner</li> <li>White Board</li> <li>Multimedia</li> </ul>	Computer Lab

## Module 4 : Perform Internet Surfing and email Management

**Objective of the module:** This module covers the knowledge and skills required to perform Browsing, Download / upload Data, create email accounts, Sort emails, Manage Address Book, archive email and Send/Receive emails.

**Duration: 60Hours**

**Theory: 15Hours**

**Practice: 45Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b> Perform browsing using different browsers	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Browse required data.</li> <li>2. Download / upload data to the internet</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of types of browsers (Mozilla Firefox, Google Chrome, Opera, Internet Explorer etc.)</li> <li>• Understanding of different search engines (Google, Bing, Ask.com etc.)</li> <li>• Difference between downloading and uploading data</li> </ul> <p><b><u>Practical Activity</u></b></p> <ul style="list-style-type: none"> <li>• Practice to browse different websites</li> <li>• Practice to download/upload data</li> </ul>	<b>Total:</b> 32hrs  <b>Theory:</b> 8hrs  <b>Practical:</b> 24hrs	<div>Consumable</div> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• White board marker</li> <li>• Duster</li> <li>• Internet Connection</li> </ul> <div>Non-Consumable</div> <ul style="list-style-type: none"> <li>• Computer System</li> <li>• Printer</li> <li>• Scanner</li> </ul>	Computer Lab

				<ul style="list-style-type: none"> <li>• White Board</li> <li>• Multimedia</li> </ul>	
<b>LU2.</b> Create email account	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Create email accounts on various service providers</li> <li>2. Remove errors while Email configuration</li> <li>3. Send and Receive emails</li> </ol>	<ul style="list-style-type: none"> <li>• Importance of email address format</li> <li>• Understanding to management of emails on various platforms.</li> <li>• Knowledge of email account setting</li> <li>• Knowledge of POP/IMAP and (SSL/TLS)</li> </ul> <p><b><u>Practical Activity</u></b></p> <p>Practice to configure email account on MS outlook</p> <p>Practice to send and receive emails</p>	<b>Total:</b> 28hrs  <b>Theory:</b> 7hrs  <b>Practical:</b> 21hrs	<div>Consumable</div> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• White board marker</li> <li>• Duster</li> <li>• Internet Connection</li> </ul> <div>Non-Consumable</div> <ul style="list-style-type: none"> <li>• Computer System</li> <li>• Printer</li> <li>• Scanner</li> <li>• White Board</li> <li>• Multimedia</li> </ul>	Computer Lab

## Module 5 : Perform Installation and Configuration of Network Cables

**Objective of the module:** This competency unit covers the skills and required knowledge to install and configure of network cables. The underpinning knowledge regarding preparing network cables, its maintenance and troubleshooting will be sufficient to provide the basis for the job at workplace.

**Duration:** 63hours      **Theory:** 12hours      **Practical:** 51hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b> Prepare network cable	<b>The trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Select cable as per requirement (CAT5, CAT6 etc.)</li> <li>2. Calculate length of cable as per requirement</li> <li>3. Prepare cross-over and straight network cable</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of different types of cables and connectors</li> <li>• Knowledge of data rate, band width, frequency, baud rate power</li> <li>• Understanding of Time Domain Reflectometer (TDR) tester</li> <li>• Understanding of Guided Transmission media &amp; Connectors (Unshielded twisted-pair (UTP), shielded twisted pair (STP), Fibber Optics, coaxial cable)</li> <li>• Colour coding of network cables, cable jacket</li> <li>• RJ45, RJ-11, BNC Connectors</li> </ul>	<b>Total:</b> 27hrs  <b>Theory:</b> 6hrs  <b>Practical:</b> 21hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• White board marker</li> <li>• Duster</li> <li>• Internet Connection</li> </ul> <b>Non-Consumable</b> <ul style="list-style-type: none"> <li>• Computer System</li> </ul>	Computer Lab

		<ul style="list-style-type: none"> <li>• Different cable connectors like Video Graphics Array (VGA), Digital Visual Interface (DVI), High-Definition Multimedia Interface (HDMI), DisplayPort, Personal System/2 (PS/2), Universal Serial Bus (USB)</li> <li>• Understanding of colour codes of CAT5 cable. 568A and 568B convention</li> </ul> <p><b><u>Practical Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Practice to make straight - through cable using clamping tool and test using cable tester</li> <li>• Practice to make cross-over cable using clamping tool and test using cable tester</li> </ul>		<ul style="list-style-type: none"> <li>• Printer</li> <li>• Scanner</li> <li>• White Board</li> <li>• Multimedia</li> <li>• Networking Tool Kit</li> <li>• Switchers</li> <li>• Router</li> <li>• Wire stripper</li> <li>• Crimper</li> <li>• RJ45</li> <li>• RJ11</li> <li>• Wire cutter</li> <li>• Cable tester</li> <li>• network cable puncher</li> <li>• Graphic cards</li> </ul>	
<b>LU2.</b>  Perform maintenance & troubleshooting	<b>Trainee will be able to:</b>  1. Check the cable connectors with cable tester	<ul style="list-style-type: none"> <li>• Knowledge of IP configuration, ping, DNS, ISP.</li> <li>• Understanding of switches and routers</li> </ul>	<b>Total</b>  36hrs  <b>Theory:</b>	<b>Consumable</b>  • Internet Connection	Computer Lab



	<ol style="list-style-type: none"> <li>2. Check connectivity between devices (Cable and switches / routers / hardware components manually)</li> <li>3. Repair Cable</li> <li>4. Replace the connectors / hardware components if required</li> <li>5. Ping all network nodes to check the connectivity</li> <li>6. Check the cable connectivity with each network node</li> <li>7. Conduct test to check the data rate and bandwidth of network</li> </ol>	<ul style="list-style-type: none"> <li>• Understanding of network transmission mode (simplex, half and full duplex mode)</li> <li>• Knowledge of data rate as per requirement / scenario</li> </ul> <p><b><u>Practical Activity: -</u></b></p> <ul style="list-style-type: none"> <li>• Practice to transfer 2mb file from one PC to other PC in network.</li> </ul>	<p>6 hrs</p> <p><b>Practical:</b></p> <p>30hrs</p>	<ul style="list-style-type: none"> <li>• White board marker</li> <li>• Duster</li> <li>• Internet Connection</li> </ul> <div style="background-color: #cccccc; padding: 5px; margin: 10px 0;"><b>Non-Consumable</b></div> <ul style="list-style-type: none"> <li>• Computer System</li> <li>• Printer</li> <li>• Scanner</li> <li>• White Board</li> <li>• Multimedia</li> <li>• Cable taster</li> <li>• Switchers</li> <li>• Router</li> <li>• Wireless router</li> <li>• Software to test network.</li> </ul>	
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## Module 6: Install, Configure and Troubleshoot Switch / Router

**Objective of the module:** After this competency standard candidate will be able to install, configure and troubleshoot switch/router. The underpinning knowledge regarding Install and connect network switch /router and configure IP addresses will be sufficient to provide the basis for the job at workplace.

**Duration:** 80 hours    **Theory:** 14 hours    **Practical:** 66 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b> Install and connect network switch /router	<b>The trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Install the network switch/router according to layout diagram</li> <li>2. Connect the switches and routers with network cables</li> </ol>	<ul style="list-style-type: none"> <li>• Describe connector&amp; its functions</li> <li>• Explain physical connection</li> <li>• Knowledge about HyperTerminal</li> <li>• Console cable and rollover cable.</li> <li>• Knowledge of basic Switch / Router</li> <li>• Knowledge of HyperTerminal Software</li> <li>• Understanding of ports</li> <li>• Understanding of Network Components Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, etc. –</li> </ul>	<b>Total:</b> 19hrs  <b>Theory:</b> 4hrs  <b>Practical:</b> 15hrs	<div>Consumable</div> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• White board marker</li> <li>• Duster</li> <li>• Internet Connection</li> </ul> <div>Non-Consumable</div> <ul style="list-style-type: none"> <li>• Computer System</li> <li>• Printer</li> <li>• Scanner</li> </ul>	Computer Lab

		<p>their types, functions, advantages and applications</p> <ul style="list-style-type: none"> <li>Knowledge of routers/ switches</li> </ul> <p><b><u>Practical Activity:</u></b></p> <ul style="list-style-type: none"> <li>Practice to install Router/Switch through the Console Port</li> </ul>		<ul style="list-style-type: none"> <li>White Board</li> <li>Multimedia</li> <li>Networking Devices (Router, Modem, Hub, Firewall, Access Points, and Switches etc.)</li> <li>Instructional manual</li> <li>UPS</li> </ul>	
<b>LU2:</b> Configure IP Addresses	<p><b>Trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>Check the network connectivity</li> <li>Assign IP Addresses as per IP plan</li> <li>Assign Network addresses</li> </ol>	<ul style="list-style-type: none"> <li>Understanding of IP addresses,</li> <li>Terminals of switches/Routers</li> <li>Knowledge of MAC address</li> <li>Duplex mode, Gateways</li> <li>Basic configuration of Switch / Router</li> <li>Explain Ping</li> <li>Explain Internet Protocol (IP) network and IP addresses.</li> </ul>	<p><b>Total:</b></p> <p>19hrs</p> <p><b>Theory:</b></p> <p>4hrs</p> <p><b>Practical:</b></p> <p>15hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>Internet Connection</li> <li>White board marker</li> <li>Duster</li> <li>Internet Connection</li> </ul>	Computer Lab

		<ul style="list-style-type: none"> <li>• Understanding of Static and dynamic IP address.</li> <li>• Different Classes of IP's</li> <li>• Knowledge about Subnet mask</li> <li>• Knowledge of default Gateway</li> <li>• Knowledge about DNS Server Addresses.</li> </ul> <p><b><u>Practical Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Practice to assign IP address to different network devices</li> </ul>		<b>Non-Consumable</b> <ul style="list-style-type: none"> <li>• Computer System</li> <li>• Printer</li> <li>• Scanner</li> <li>• White Board</li> <li>• Multimedia</li> <li>• Networking Devices (Router, Access Points, Switches etc.)</li> <li>• Simulator (Packet Tracer)</li> <li>• Instructional manual</li> <li>• UPS</li> </ul>	
<b>LU3.</b> Configure Dynamic Routing Protocols	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Run the desired/instructed</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge about IGP's &amp; EGP's Routing Protocols</li> </ul>	<b>Total:</b> 15hrs  <b>Theory:</b>	<b>Consumable</b> <ul style="list-style-type: none"> <li>• Internet Connection</li> </ul>	Computer Lab

	<p>Dynamic Routing Protocols</p> <ol style="list-style-type: none"> <li>2. Advertise the network &amp; Perform Convergence</li> <li>3. Perform Network Address Translation</li> <li>4. Ping the destination</li> </ol>	<ul style="list-style-type: none"> <li>• Administrative Distance (AD), Cost/Metric &amp; best path calculation</li> </ul> <p><b><u>Practical Activity</u></b></p> <ul style="list-style-type: none"> <li>• Configure RIP V2 using GNS3</li> <li>• Configure OSPF in multi areas using GNS3</li> <li>• Configure BGP using GNS3</li> </ul>	<p>3hrs</p> <p><b>Practical:</b></p> <p>12hrs</p>	<ul style="list-style-type: none"> <li>• White board marker</li> <li>• Duster</li> <li>• Internet Connection</li> </ul> <p><b>Non-Consumable</b></p> <ul style="list-style-type: none"> <li>• Computer System</li> <li>• Printer</li> <li>• Scanner</li> <li>• White Board</li> <li>• Multimedia</li> <li>• Power cables</li> <li>• Ethernet cables/ Serial Cables</li> <li>• VGA Cables</li> <li>• LCD Screen</li> <li>• Router</li> <li>• GNS3 simulator</li> </ul>	
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				<ul style="list-style-type: none"> <li>• Packet Tracer</li> </ul>	
<b>LU4.</b> Perform maintenance & troubleshooting	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Check the network connectivity</li> <li>2. Rectify duplex and speed mismatch problems</li> <li>3. Diagnose common network problems</li> <li>4. Identify the IP addresses assigned to computer and network</li> <li>5. Detect the faults of normal operational behaviour</li> <li>6. Integrate the PC's into Local Area Network (LAN) or WAN</li> </ol>	<ul style="list-style-type: none"> <li>• Wireless LAN adapter Wi-Fi or "Ethernet adapter"</li> <li>• Knowledge of Latency, Packet Loss and Jitter</li> <li>• Data transmission mode (Simplex, half duplex, full duplex).</li> <li>• Port security and violation modes.</li> <li>• Data transmission basic terms (ping, throughput and bandwidth)</li> <li>• Conduct Test include data files, printers, software, or any other items used by clients on the network.</li> </ul> <p><b><u>Practical Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Practice to test the connectivity of network and check latency and throughput of data transmission.</li> </ul>	<b>Total:</b> 27hrs  <b>Theory:</b> 3hrs  <b>Practical:</b> 24hrs	<div>Consumable</div> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• White board marker</li> <li>• Duster</li> <li>• Internet Connection</li> </ul> <div>Non-Consumable</div> <ul style="list-style-type: none"> <li>• Computer System</li> <li>• Printer</li> <li>• Scanner</li> <li>• White Board</li> <li>• Multimedia</li> <li>• Router</li> <li>• Switches</li> </ul>	Computer Lab

		<ul style="list-style-type: none"> <li>• Practice to diagnose and troubleshoot network to resolve issues.</li> <li>• Practice to perform basic configuration of duplex modes and change the speed on ports</li> <li>• Practice to create a small physical network using 4 computers with Network connecting devices and cables.</li> <li>• Practice to test connectivity with a host on a network using the PING utility and Tracert command.</li> </ul>		<ul style="list-style-type: none"> <li>• Router software/Firmware are.</li> </ul>	
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## Module 7: Install System Software on The Devices

**Objective of the module:** This unit describes the skills and knowledge required to install system software on the devices. The underpinning knowledge regarding Install Utility Software & Device Drivers and Install Firmware will be sufficient to provide the basis for the job at workplace

**Duration:** 90hours      **Theory:** 9hours      **Practical:** 81hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1:</b> Install Utility Software & Device Drivers	<p><b>The trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Select Utility&amp; device drivers.</li> <li>2. Install application software</li> <li>3. Install utility programs to improve functionality</li> <li>4. Perform product activation</li> <li>5. Check the utility software working in proper manner.</li> </ol>	<ul style="list-style-type: none"> <li>• Describe utility software and its types</li> <li>• Disk tools and its example.</li> <li>• Finding and installing device drivers.</li> <li>• Version control and updating Software</li> <li>• Describe bookmarks, links and shortcuts.</li> <li>• Knowledge of Windows registry setting.</li> <li>• Explain Auto run option.</li> <li>• Knowledge of customization of utility software</li> </ul> <p><b><u>Practical Activity:</u></b></p>	<p><b>Total:</b> 62hrs</p> <p><b>Theory:</b> 5hrs</p> <p><b>Practical:</b> 57hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Internet Connection</li> <li>• White board marker</li> <li>• Duster</li> <li>• Internet Connection</li> </ul> <p><b>Non-Consumable</b></p> <ul style="list-style-type: none"> <li>• Computer System</li> <li>• Printer</li> <li>• Scanner</li> <li>• White Board</li> </ul>	Computer Lab



		<ul style="list-style-type: none"> <li>Practice to install the utility software</li> <li>Practice to Install and configure a DVD writer</li> </ul>		<ul style="list-style-type: none"> <li>Multimedia</li> <li>Disk Tools</li> <li>Instructional manual</li> <li>UPS</li> <li>Bootable DVD</li> <li>Mass storage device</li> </ul>	
<b>LU2.</b> Install Firmware	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>Check for firmware update.</li> <li>Download the firmware</li> <li>Update the firmware</li> <li>Check software working in proper manner.</li> </ol>	<ul style="list-style-type: none"> <li>Describe firmware and its importance</li> <li>Knowledge of downloading and updating firmware.</li> </ul> <p><b><u>Practical Activity:</u></b></p> <p>Practice to perform firmware update</p>	<p><b>Total:</b></p> <p>28hrs</p> <p><b>Theory:</b></p> <p>4hrs</p> <p><b>Practical:</b></p> <p>24hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>Internet Connection</li> <li>White board marker</li> <li>Duster</li> <li>Internet Connection</li> </ul> <p><b>Non-Consumable</b></p> <ul style="list-style-type: none"> <li>Computer System</li> <li>Printer</li> <li>Scanner</li> </ul>	Computer Lab

				<ul style="list-style-type: none"> <li>• White Board</li> <li>• Multimedia</li> <li>• Disk Tools</li> <li>• Instructional manual</li> <li>• UPS</li> <li>• Bootable DVD</li> <li>• Mass storage device</li> </ul>	
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## Module-8: Configure Hardware Raid (Redundant Array of Independent Disk)

**Objective of the module:** The aim of this module is to get knowledge, skills and understanding to install, configure and manage RAID, disk volumes using the servers / workstations for the job at workplace.

**Duration:** 81 hours    **Theory:** 12 hours    **Practical:** 69 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b>  Install/Configure RAID	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Choose hardware and software RAID based controller</li> <li>2. Configure required RAID Levels work for HDD (Hard disk drive)</li> <li>3. Configure RAID Levels work for Solid State Drives (SSD) media</li> </ol>	<ul style="list-style-type: none"> <li>• Concept of Disk Array</li> <li>• RAID Level and Level Characteristics</li> <li>• Explain RAID tools.</li> <li>• Types of hardware RAID and its requirement</li> <li>• Types of Software RAID and its requirements.</li> <li>• RAID Controller / Cards.</li> <li>• software used for software-based RAID</li> <li>• RAID level for deployment based for different requirements Basic knowledge of BIOS and its</li> </ul>	<b>Total-</b>  39hr  <b>Theory-</b>  6hr  <b>Practical-</b>  33hr	<ul style="list-style-type: none"> <li>• Server machine</li> <li>• RAID card</li> <li>• OS Bootable DVD</li> <li>• OS Bootable Mass storage device</li> <li>• Computer system</li> <li>• Hard Disk drives and Solid-State disks.</li> </ul>	Class Room  Training Workshop  Lab/ Field Visit

		<ul style="list-style-type: none"> <li>• Knowledge of hard disk testing tools (HD Tune) which work with RAID volumes.</li> <li>• Factors Affecting RAID Speed</li> </ul> <p><b><u>Practical Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Practice to install RAID tools and services</li> <li>• Practice to change the boot device from BIOS</li> <li>• Practice to check the uptime of RAID.</li> </ul>		<ul style="list-style-type: none"> <li>• Software for Software based RAID.</li> <li>• Computer Network</li> <li>• Internet</li> <li>• Multimedia</li> <li>• Instructional manual</li> <li>• UPS</li> <li>• Flash drive</li> <li>• Hard disk</li> </ul>	
<b>LU2.</b> Boot and test the System	<p><b>Trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Select boot drive</li> <li>2. Start Booting process</li> <li>3. Check RAID's speed by (Timing, Frequency, Data rate) as guided</li> <li>4. Check the performance of individual drives</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge about booting process working</li> <li>• Booting from various devices (Mass storage, Hard disk, Network)</li> <li>• Knowledge about factors affect RAID</li> <li>• Process to check RAID speed by time, frequency and data rate</li> </ul>	<p><b>Total-</b> 42hr</p> <p><b>Theory-</b> 6hr</p> <p><b>Practical-</b> 36hr</p>	<ul style="list-style-type: none"> <li>• Server machine</li> <li>• RAID card</li> <li>• OS Bootable DVD</li> <li>• OS Bootable Mass storage device</li> <li>• Computer system</li> </ul>	

	<p><b>5. Check the Speed affecting factor of RAID</b></p>	<p><b><u>Practical Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Practice to check the RAID speed by frequency.</li> </ul>		<ul style="list-style-type: none"> <li>• Hard Disk drives and Solid-State disks.</li> <li>• Software for Software based RAID.</li> <li>• Computer Network</li> <li>• Internet</li> <li>• Multimedia</li> <li>• Instructional manual</li> <li>• UPS</li> <li>• Flash drive</li> <li>• Hard disk</li> </ul>	
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## Module-9: Perform Basic Communication Skills

**Objective of the module:** The aim of this module is to get knowledge, skills and understanding to perform basic communication skills.

**Duration:** 30 hours      **Theory:** 09 hours      **Practical:** 21 hours

Learning Unit	• Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b> Communicate in a team	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Treat team members with respect</li> <li>2. Maintain positive relationships to achieve common organizational goals</li> <li>3. Get work related information from team</li> <li>4. Identify interrelated work activities to avoid confusion</li> <li>5. Adopt communication skills, which are designed in a team.</li> </ol>	<ul style="list-style-type: none"> <li>• Explain different types of communication</li> <li>• Understanding of management</li> <li>• Knowledge of co-worker's ethics</li> </ul> <p><b><u>Practical Activity</u></b></p> <ul style="list-style-type: none"> <li>• Practice of Communication with co-workers/clients at workplace</li> </ul>	<b>Total:</b> 12hrs  <b>Theory:</b> 3hrs  <b>Practical:</b> 9 hrs	<div>Consumable</div> <ul style="list-style-type: none"> <li>• White board marker</li> <li>• Duster</li> <li>• Note book</li> <li>• Pen</li> </ul> <div>Non-Consumable</div> <ul style="list-style-type: none"> <li>• White Board</li> <li>• Multimedia</li> <li>• Computer system</li> <li>•</li> </ul>	Class room

	<p>6. Identify problems in communication with a team</p> <p>7. Resolve Communication barrier through discussion and mutual agreement</p>				
<p><b>LU2.</b> Follow Supervisor's instructions as per organizational SOPs</p>	<p><b>Trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Receive the instructions from Supervisor</li> <li>2. Carry out the instructions of the supervisor</li> <li>3. Report to the supervisor as per organizational SOPs</li> </ol>	<ul style="list-style-type: none"> <li>• Explain the note taking procedure</li> <li>• Understanding of the standard procedure to prepare the report</li> </ul> <p><b><u>Practical Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Prepare different office reports</li> </ul>	<p><b>Total:</b> 6 hrs</p> <p><b>Theory:</b> 3 hrs</p> <p><b>Practical:</b> 3 hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White board marker</li> <li>• Duster</li> </ul> <p><b>Non-Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• Computer</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> </ul>
<p><b>LU3.</b> Develop Generic</p>	<p><b>Trainee will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Develop basic reading skills</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of communication skills (7Cs of effective communication)</li> <li>• Describe verbal and non-verbal communication</li> </ul>	<p><b>Total:</b> 12 hrs</p> <p><b>Theory:</b> 3 hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> </ul>

communication skills at workplace	<p>2. Develop basic writing Skills</p> <p>3. Develop basic listening skills</p>	<ul style="list-style-type: none"> <li>• Explain reporting techniques</li> </ul> <p><b><u>Practical Activity</u></b></p> <ul style="list-style-type: none"> <li>• Practice to listen to the audio and write down</li> <li>• Practice to note down the instructions given by the supervisor</li> </ul>	<p><b>Practical:9</b> hrs</p>	<ul style="list-style-type: none"> <li>• Sharpeners</li> <li>• White board marker</li> <li>• Duster</li> </ul> <p>Non-Consumable</p> <ul style="list-style-type: none"> <li>• White board</li> </ul>	
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## Module-10: Follow Safety Rules at Site

**Objective of the module:** The aim of this module is to get knowledge, skills and understanding to follow safety rules at site

**Duration:** 30hours      **Theory:** 09hours      **Practical:** 21 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b> Maintain occupational safety and health at workplace	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Identify basic safety signs and symbols</li> <li>2. Erect barricades, hoardings, signage in the hazardous areas</li> <li>3. Maintain housekeeping</li> <li>4. Report unsafe condition to immediate supervisor (shift position)</li> </ol>	<ul style="list-style-type: none"> <li>• Knowledge of different types of hazards</li> <li>• Explain unsafe working conditions</li> <li>• Understanding of health and safety signs and symbols</li> <li>• Explain housekeeping</li> <li>• Understanding of different methods of dealing with hazard</li> </ul> <p><b><u>Practical Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Practice to identify the physical hazards in mock situation and apply control measures, safety sign and barricade.</li> </ul>	<p><b>Total:</b> 13 hrs</p> <p><b>Theory:</b> 6 hrs</p> <p><b>Practical:</b> 7 hrs</p>	<p><b>Consumable</b></p> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White Board Marker</li> <li>• Duster</li> </ul> <p><b>Non-Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• </li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> <li>• Simulated environment</li> </ul>

<b>LU2. USE</b>  Personal Protective and Safety Equipment (PPE)	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Identify risk associated with job to be done</li> <li>2. Select PPE according to job</li> <li>3. Wear PPE according to job</li> <li>4. Store PPE at designated place after use</li> </ol>	<ul style="list-style-type: none"> <li>• Describe the types of Personal protective equipment (PPEs)</li> <li>• Describe the procedure to identify risk associated with job to be done</li> <li>• Importance of personal protective equipment</li> <li>• Describe the Maintenance and cleaning of PPEs</li> </ul> <p><b><u>Practical Activity:</u></b> Demonstrate to select PPEs for specific job.</p>	<b>Total:</b>  9 hrs  <b>Theory:</b>  2 hrs  <b>Practical:</b>  7 hrs	<div>Consumable</div> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> <li>• Sharpeners</li> <li>• White Board Marker</li> <li>• Duster</li> </ul> <div>Non-Consumable</div> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• PPEs (Safety glasses, Ear muffs/ear plugs, Protective Gloves, Cap, Safety shoes etc.)</li> </ul>	
<b>LU3. Perform Communication Signals</b>	<b>Trainee will be able to:</b> <ol style="list-style-type: none"> <li>1. Identify different types of</li> </ol>	<ul style="list-style-type: none"> <li>• Understanding of different types of communication signals</li> </ul>	<b>Total:</b>  8 hrs	<div>Consumable</div> <ul style="list-style-type: none"> <li>• Notebooks</li> <li>• Pencils</li> <li>• Erasers</li> </ul>	<ul style="list-style-type: none"> <li>• Class Room</li> </ul>

	<p>communication hand signals.</p> <p><b>2.</b> Use appropriate hand signals as per situation.</p>	<ul style="list-style-type: none"> <li>• Explain different types of hand signals</li> <li>• Explain the importance of hand signals</li> </ul> <p><b><u>Practical Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Demonstrate the hand signals for different activities</li> </ul>	<p><b>Theory:</b></p> <p>1 hr</p> <p><b>Practical:</b></p> <p>7 hrs</p>	<ul style="list-style-type: none"> <li>• Sharpeners</li> <li>• White Board Marker</li> <li>• Duster</li> </ul> <p><b>Non-Consumable</b></p> <ul style="list-style-type: none"> <li>• White board</li> <li>• Multimedia</li> <li>• Safety manuals</li> </ul>	<p>Simulated environment</p>
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## **General assessment guidance for “Computer Networking and Cloud Computing” Lab Assistant (Network)**

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 “Lab Assistant (Network)”:

- Work performances, for example installation and configuration of network cables
- Work Performances, for example Install configure and trouble shoot switch & router

- Demonstrations, for example Configure Hardware Raid (Redundant Array of Independent Disk)
- Direct questioning, where the assessor would ask the student why he/she 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, 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” “Lab Assistant (Network)”:**

This curriculum consists of 10 modules

1. Perform Basic Computer Installation
2. Configure hardware components/peripheral devices

3. Prepare office documents
4. Perform internet surfing and email management
5. Perform basic communication skills
6. Perform installation and configuration of network cables
7. Install configure and trouble shoot switch and router
8. Install system software on the devices
9. Configure hardware RAID (Redundant Array of Independent disk)
10. Follow safety rules

## **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 -2**

- Module 1: Perform Basic Computer Installation
- Module 2: Configure hardware components/peripheral devices
- Module 3: Prepare office documents
- Module 4: Perform internet surfing and email management
- Module 5: Perform basic communication skills
- Module 6: Perform installation and configuration of network cables
- Module 7: Install configure and trouble shoot switch and router
- Module 8: Install system software on the devices
- Module 9: Configure hardware RAID (Redundant Array of Independent disk)
- Module 10: Follow safety rules

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 security services;

- 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	Cable tester	5
3	Computer system	25
4	DVD or BLU-RAY writer	25
5	External Hard disks	5
6	Instructional manual	5
7	Internet	1
8	MS Office	5
9	Networking Tool Kit	5 kits
10	Printer	2
11	Projector screen	01 for each lab/class
12	RAID	2
13	RAID card	2
14	RAM	2 of each type
15	ROM	5
16	Router	5
17	Router software/Firmware.	2
18	Scanner	2
19	Screw	5
20	SD card	5
21	SD card reader	5
22	Server machine	2
23	Simulator (Packet Tracer)	5
24	Software for Software based RAID.	2
25	Software to test network.	2
26	System (Windows, Linux)	2
27	Troubleshooting software.	2

28	Webcam for PC	2
29	Webcam (digital camera)	2
30	White board	1 each class/lab
31	Wireless router	2
32	UPS	25(One for each computer at leats 20 mints back up)
33	Console Cable	50 meter
34	Switch	3
35	Rollover Cable	50 meter
36	Tools Kit	5
37	Router software/ Firmware.	Down load from open source
38	Wire cutters and strippers	15
39	Needle-nosed pliers	15
40	Utility knife	15
41	Small flashlight	20
42	Adjustable wrench	10
43	Small container to hold screws	15
44	Heat sink compound	10
45	Grounding Strap	20
46	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 colors)
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 Security Services 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
<b>Module:1</b> Perform Basic Computer Installation	58	5.8
<b>Module:2</b> install/Configure hardware components/peripheral devices	48	4.8
<b>Module:3</b> Prepare office documents	60	6
<b>Module:4</b> Perform internet surfing and email management	60	6
<b>Module:5</b> Perform basic communication skills	30	3
<b>Module:6</b> Perform installation and configuration of network cables	63	6.3
<b>Module:7</b> Install configure and trouble shoot switch & router	80	8
<b>Module:8</b> Install system software on the devices	90	9
<b>Module:9</b> Configure Hardware Raid (Redundant Array of Independent Disk)	81	8.1
<b>Module:10</b> Follow safety rules at site	30	3

## Members of Curriculum Validation Committee

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

**Date:** 20<sup>th</sup> to 24<sup>th</sup> 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 Incharge, Bahria University Islamabad.
15.	Ms Samia Amir Hamza	CBT Assessor, Expert, GCU Faisalabad