

# CURRICULUM OF “INTERNET OF THINGS”

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**National Vocational & Technical  
Training Commission**

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## Introduction

### **Definition/ Description of the training programme for *Internet of Thing***

The Internet of Things (IoT) is a network of resource constrained nodes being capable of automating an existing manual procedure.

### **Purpose of the training programme**

The IoT 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 IoT industry

### **Overall objectives of training programme**

The overall objectives of the IoT program are producing skilled staff to:

- Computer operator
- Electricians
- Network Technicians

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

- Perform Basic Computer Installation"
- Install and configure hardware components/peripheral devices
- Prepare office documents
- Perform internet surfing and email management
- Perform installation and configuration of network cables
- Install Configure and trouble shoot switch & router
- Install system software on the devices"
- Configure hardware raid (Redundant Array of Independent Disk)
- Carry out electrical installation
- Follow Safety Rules
- Perform Basic Communication Skills

### **Trainee entry level**

The entry requirement for this qualification would be Matric with science. Age 18 years or above

### **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 11 modules. The recommended delivery time is 640 hours. Delivery of the course could therefore be full time, 5 days a week, for 36 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>
Module 1: Perform Basic Computer Installation	11	39	50
Module 2: Install system software on the devices	12	30	42
Module 3: Install/Configure hardware components/peripheral devices	12	48	60
Module 4: Prepare office documents	10	33	43
Module 5: Perform internet surfing and email management	10	51	61
Module 6: Perform installation and configuration of network cables	14	66	80
Module 7: Install, configure and troubleshoot switches & routers	9	72	81
Module 8: Configure hardware RAID (Redundant Array of Independent disk)	12	69	81
Module 9: Carry out electrical installation	12	30	42
Module 10: Follow Safety Rules	9	21	30
Module 11: Perform Basic Communication Skills	9	21	30

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

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

## Summary – overview of the curriculum

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
<b>Module 1</b> : Perform Basic Computer Installation  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to perform basic computer installation	<b>LU1.</b> Install Operating system <b>LU2.</b> Perform tasks using operating system <b>LU3.</b> Install/uninstall application Software	11	39	50
<b>Module 2</b> : Install/Configure hardware components/ peripheral devices  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Install/Configure hardware components/ peripheral devices	<b>LU1.</b> Install / configure Hardware components / peripheral devices <b>LU2.</b> Troubleshoot basic hardware errors	12	30	42

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
<b>Module 3</b> : Prepare office documents  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Prepare office documents	<b>LU1.</b> Prepare document on word <b>LU2.</b> Prepare spreadsheet <b>LU3.</b> Prepare presentation <b>LU4.</b> Create backup of office record by maintaining integrity of files <b>LU5.</b> Convert files into different formats	12	48	60
<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 internet surfing and email management	<b>LU1.</b> Perform browsing using different browsers <b>LU2.</b> Create email account	10	33	43
<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	10	51	61

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
<b>Module 6</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 and configure Utility software & device drivers <b>LU2.</b> Install Firmware <b>LU1.</b>	14	66	80
<b>Module 7</b> : Install, Configure and Troubleshoot Switches & Routers  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Install, configure and troubleshoot switches & routers	<b>LU2.</b> Install and connect network switch and router <b>LU3.</b> Configure IP Addresses <b>LU4.</b> Configure dynamic routing protocols <b>LU5.</b> Perform maintenance & troubleshooting	9	72	81



Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
<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 and configure Raid <b>LU2.</b> Boot and test the system	12	69	81
<b>Module 9</b> : Carry out electrical installation  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Carry out basic electrical installation	<b>LU1.</b> Perform Basic Electrical wiring <b>LU2.</b> Perform Connection	12	30	42

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
<b>Module 10 :</b> Contribute to work related health and safety (WHS) initiatives  <b>Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to Contribute to work related health and safety (WHS) initiatives	<b>LU1.</b> Contribute to work-related health and safety measures <b>LU2.</b> Assist in establishing work-related health and safety measures <b>LU3.</b> Evaluate the organization's work-related health and safety system	9	21	30
<b>Module 11 :</b> Perform Basic Communication Skills  <b>Module 12 Aim:</b> The aim of this module to develop advanced knowledge, skills and understanding to perform basic communication skills	<b>LU1.</b> Communicate in a team <b>LU2.</b> Follow Supervisor's instructions as per organizational SOPs <b>LU3.</b> Develop Generic communication skills at workplace	9	21	30

## Modules

### LEVEL 2

#### Module 1 : Perform Basic Computer Installation

**Objective of the module:** After this competency standard candidate will be able to perform basic computer installation.

**Duration:** 50 Hours

**Theory:** 11 Hours

**Practical:** 39 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Install system Software	<b>Trainee will be able to:</b> <ul style="list-style-type: none"> <li>Prepare drive/partitions before OS installation.</li> <li>Format mass storage on a PC/computer</li> <li>Perform Partitioning of hard drive</li> <li>Install operating system in the PC/computers by following instructional manual.</li> <li>Trouble Shoot installation errors</li> <li>Download and run windows/application patches</li> </ul>	<ul style="list-style-type: none"> <li>Define operating system</li> <li>Define various types of operating systems</li> <li>Describe the 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> <li>Description of file system and its types (NTFS, FAT, EXT2, etc)</li> <li>Describe partitioning and formatting.</li> </ul>	<b>Total:</b> 31 hrs  <b>Theory:</b> 4 hrs  <b>Practical:</b> 18hrs	Computer System  Internet Connection  Operating System (Windows, Linux)  Bootable OS Flash drive/CD	Class Room and  Computer Lab

	Perform Partitioning of hard drive Trouble Shoot installation errors	<ul style="list-style-type: none"> <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> <li>• Process of activating the OS with the help of KEY</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>			
<b>LU2.</b> Use Operating System	<b>Trainee will be able to:</b> <ul style="list-style-type: none"> <li>• Create folders and files</li> </ul>	<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> </ul>	<b>Total:</b> 20 hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>• Internet Connection</li> </ul>	Computer Lab

	<ul style="list-style-type: none"> <li>Copy /paste files, folder/ directories to different location (Hard drive, external storage, cloud)</li> <li>Move files, folder/ directories to different location (Hard drive, external storage, cloud)</li> <li>Rename files and directories/folder</li> <li>Search files / folder/directories against various search criterion (File name, date, text etc)</li> <li>Perform task manager operations</li> </ul>	<ul style="list-style-type: none"> <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>	<p><b>Theory:</b></p> <p>4 hrs</p> <p><b>Practical:</b></p> <p>12 hrs</p>	<ul style="list-style-type: none"> <li>Operating System (Windows, Linux)</li> <li>White board marker</li> </ul> <p><b>Non Consumable</b></p> <ul style="list-style-type: none"> <li>White Board</li> <li>Multimedia</li> <li>Computer System</li> </ul>	
<b>LU3.</b> Install /uninstall application Software	<p><b>Trainee will be able to:</b></p> <ul style="list-style-type: none"> <li>Install application software according to instruction manual.</li> </ul>	<ul style="list-style-type: none"> <li>system requirement for installation</li> <li>Describe the benefits of software up gradation</li> <li>understanding of instruction manual</li> <li>knowledge of installation steps</li> </ul>	<p><b>Total:</b></p> <p>12 hrs</p> <p><b>Theory:</b></p> <p>3hrs</p> <p><b>Practical:</b></p>	<p>Computer System</p> <p>Internet Connection</p> <p>Web Browser</p> <p>Search Engines</p> <p>MS Office</p>	<p>Class Room</p> <p>Computer Lab</p>

	<ul style="list-style-type: none"> <li>• Troubleshoot installation errors</li> <li>• Update /upgrade application Software</li> <li>• Un-install application software</li> </ul>	<ul style="list-style-type: none"> <li>• Define malicious software and its type.</li> <li>• Knowledge of antivirus software installation</li> </ul> <p><b>Activity</b></p> <p>Practice to install and uninstall any (Open office,anti virus etc.) software</p> <ul style="list-style-type: none"> <li>• Practice to scan computer using antivirus software</li> </ul>	9 hrs	Antivirus software	
				Application Software	

## 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>	42Hours	<b>Theory:</b>	12hours	<b>Practical:</b>	30hours
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Install / configure Hardware components / peripheral devices	<b>Trainee will be able to:</b> <ul style="list-style-type: none"> <li>Configure hardware components / peripheral devices as per manuals.</li> <li>Select and install drivers.</li> <li>Perform functional test for the installed Hardware components / peripheral devices.</li> <li>Update/Upgrade device drivers</li> </ul>	<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> <b><u>Practical Activity</u></b> <ul style="list-style-type: none"> <li>Practice to install / configure printer/scanner and take print/scan any document</li> </ul>	<b>Total:</b> 20hrs  <b>Theory:</b> 6hrs  <b>Practical:</b> 12hrs	<b>Consumable</b>	Computer Lab
				<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>White Board</li> <li>Multimedia</li> <li>Computer system</li> <li>Printer</li> <li>Scanner</li> </ul>	

				<ul style="list-style-type: none"> <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> <ul style="list-style-type: none"> <li>• Detect hardware errors / problems.</li> <li>• Identify solution of hardware errors.</li> <li>• Execute the hardware trouble shooting.</li> </ul>	<ul style="list-style-type: none"> <li>• knowledge of troubleshooting hardware errors</li> </ul> <b><u>Practical Activity</u></b> <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> 6hrs  <b>Practical:</b> 18hrs	<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> <li>• LAN Connectivity</li> <li>• Duster</li> </ul>	Computer Lab



				<b>Non Consumable</b> <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</li> <li>• BLU-RAY writer</li> <li>• Pen-drive</li> <li>• External Hard disks</li> </ul>	
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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> <ul style="list-style-type: none"> <li>Create new document / open word document</li> <li>Save document</li> <li>Set page Layout</li> <li>Perform basic Formatting (text, paragraph, page)</li> <li>Perform insert operation (picture, shapes, charts, tables, smart art, clip art, hyperlinks, page numbers, header/footers, bullets/numbering, columns) in the word document</li> </ul>	<ul style="list-style-type: none"> <li>Understanding of Word processing software (MS office, Star office, Libre Office)</li> </ul> <b>Practical Activity</b> <ul style="list-style-type: none"> <li>Practice to compose CVs,</li> </ul>	<b>Total:</b> 15hrs  <b>Theory:</b> 3hrs  <b>Practical:</b> 12hrs	<div>Consumable</div> <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> <div>Non-Consumable</div>	Computer Lab

	<ul style="list-style-type: none"> <li>• Check the spellings in the word file through dictionary</li> <li>• Print document</li> </ul>			<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> <ul style="list-style-type: none"> <li>• Create / open Spread Sheet</li> <li>• Set page Layout</li> <li>• Save Spreadsheet</li> <li>• Perform basic Formatting</li> <li>• Perform insert operation (picture, charts, smart art, clip art, hyperlinks, page numbers, header/footers, bullets / numbering) in the spread sheet</li> <li>• Insert / use arithmetic functions/formulas</li> <li>• Print Spreadsheet</li> </ul>	<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> <b><u>Practical Activity</u></b> <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</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> </ul> <b>Non-Consumable</b> <ul style="list-style-type: none"> <li>• Computer System</li> <li>• Internet Connection</li> <li>• Printer</li> </ul>	Computer Lab

		number weekly present students <ul style="list-style-type: none"> <li>Practice to prepare fee voucher according to template</li> </ul>		<ul style="list-style-type: none"> <li>Scanner</li> <li>White board</li> <li>Multimedia</li> </ul>	
<b>LU3.</b> Prepare presentation	<b>Trainee will be able to:</b> <ul 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> <li>Apply animation to slides</li> <li>Check the spellings in the presentation through available dictionary</li> </ul>	<ul style="list-style-type: none"> <li>Understanding of different presentation software (Google slides prez, MS Power point, openoffice 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> <p><b><u>Practical Activity</u></b></p> <ul style="list-style-type: none"> <li>Practice to prepare presentation with animation and 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

	<ul style="list-style-type: none"> <li>• Run presentation</li> <li>• Print presentation</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> <ul 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> </ul>	<ul style="list-style-type: none"> <li>• Knowledge of online conversion software</li> </ul> <p><b><u>Practical Activity</u></b></p> <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	<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 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:** 43 Hours

**Theory:** 10 Hours

**Practice:** 33 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Perform browsing using different browsers	<b>Trainee will be able to:</b> <ul style="list-style-type: none"> <li>Browse required data.</li> <li>Download / upload data to the internet</li> </ul>	<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> <b><u>Practical Activity</u></b> <ul style="list-style-type: none"> <li>Practice to browse different websites</li> <li>Practice to download/upload data</li> </ul>	<b>Total:</b> 23hrs  <b>Theory:</b> 5hrs  <b>Practical:</b> 18hrs	<b>Consumable</b>	Computer Lab
				<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> </ul>	

				<ul style="list-style-type: none"> <li>Multimedia</li> </ul>	
<b>LU2.</b> Create email account	<b>Trainee will be able to:</b> <ul style="list-style-type: none"> <li>Create email accounts on various service providers</li> <li>Remove errors while Email configuration</li> <li>Send/Receive emails</li> </ul>	<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> 20hrs  <b>Theory:</b> 5hrs  <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> <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 computer hardware and networks. The underpinning knowledge regarding computer hardware and networks 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
LU1: Prepare network cable	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Select cable as per requirement (CAT5, CAT6 etc.)</li> <li>Calculate length of cable as per requirement</li> <li>Prepare cross-over and straight network cable</li> </ul>	<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> <li>Printer</li> <li>Scanner</li> <li>White Board</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) , Display Port ,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>• 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>	<b>Trainee will be able to:</b>	<ul style="list-style-type: none"> <li>• Knowledge of IP configuration, ping, DNS, ISP.</li> </ul>	<b>Total</b> 36hrs	<b>Consumable</b>	Computer Lab

Perform maintenance & troubleshooting	<ol style="list-style-type: none"> <li>1. Check the cable connectors with cable tester</li> <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 switches and routers</li> <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><b>Theory:</b></p> <p>6 hrs</p> <p><b>Practical:</b></p> <p>30hrs</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> <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 Access and configure basic Modes of Switch and Router.

**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	<p><b>The trainee will be able to:</b></p> <ul style="list-style-type: none"> <li>Install the network switch/router according to layout diagram</li> <li>Connect the switches and routers with network cables</li> </ul>	<ul style="list-style-type: none"> <li>Describe connector&amp; its functions</li> <li>Explain physical connection</li> <li>Knowledge about hyper Terminal</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. – their types, functions, advantages and applications</li> <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>	<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> <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> </ul>	Computer Lab

				<ul style="list-style-type: none"> <li>Networking Devices (Router, Modem, Hub, Firewall, Access Points, and Switches etc.)</li> <li>UPS</li> </ul>	
<b>LU2:</b> Configure IP Addresses	<b>Trainee will be able to:</b> <ul 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> </ul>	<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> <li>Understanding of Static and dynamic IP address.</li> <li>Different Classes of IP's</li> <li>Knowledge about Subnet mask</li> </ul>	<b>Total:</b> 19hrs  <b>Theory:</b> 4hrs  <b>Practical:</b> 15hrs	<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> </ul>	Computer Lab

		<ul style="list-style-type: none"> <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>		<ul style="list-style-type: none"> <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> <ul style="list-style-type: none"> <li>• Run the desired/instructed Dynamic Routing Protocols</li> <li>• Advertise the network &amp; Perform Convergence</li> <li>• Perform Network Address Translation</li> <li>• Ping the destination</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge about IGP's &amp; EGP's Routing Protocols</li> <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> </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> </ul>	Computer Lab

		<ul style="list-style-type: none"> <li>• Configure BGP using GNS3</li> </ul>		<ul style="list-style-type: none"> <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>• Power cables</li> <li>• Ethernet cables/ Serial Cables</li> <li>• VGA Cables</li> <li>• LCD Screen</li> <li>• Router</li> <li>• GNS3 simulator</li> <li>• Packet Tracer</li> </ul>	
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<b>LU4.</b> Perform maintenance & troubleshooting	<b>Trainee will be able to:</b> <ul style="list-style-type: none"> <li>• Check the network connectivity</li> <li>• Rectify duplex and speed mismatch problems</li> <li>• Diagnose common network problems</li> <li>• Identify the IP addresses assigned to computer and network</li> <li>• Detect the faults of normal operational behaviour</li> <li>• Integrate the PC's into Local Area Network (LAN) or WAN</li> </ul>	<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> <li>• Practice to diagnose and troubleshoot network to resolve issues.</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> <li>• Router software/Firmware.</li> </ul>	Computer Lab
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		<ul style="list-style-type: none"> <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>			
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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 manage a range of meetings including overseeing the meeting preparation processes, chairing meetings, organizing the minutes and reporting meeting outcomes.

**Duration:** 81hours    **Theory:** 9hours    **Practical:** 72hours

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> <ul style="list-style-type: none"> <li>• Select Utility &amp; device drivers.</li> <li>• Install application software</li> <li>• Install utility programs to improve functionality</li> <li>• Perform product activation</li> <li>• Check the utility software working in proper manner.</li> </ul>	<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> <ul style="list-style-type: none"> <li>• Practice to install the utility software</li> </ul>	<p><b>Total:</b> 57hrs</p> <p><b>Theory:</b> 5hrs</p> <p><b>Practical:</b> 51hrs</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 and configure a DVD writer</li> </ul>		<ul style="list-style-type: none"> <li>Multimedia</li> <li>Disk Tools</li> <li>Bootable DVD</li> <li>Mass storage device</li> </ul>	
<b>LU2. Install Firmware</b>	<b>Trainee will be able to:</b> <ul 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> </ul>	<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> <ul style="list-style-type: none"> <li>Practice to perform firmware update</li> </ul>	<b>Total:</b> 25hrs  <b>Theory:</b> 4hrs  <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> <li>Disk Tools</li> </ul>	Computer Lab

## 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.

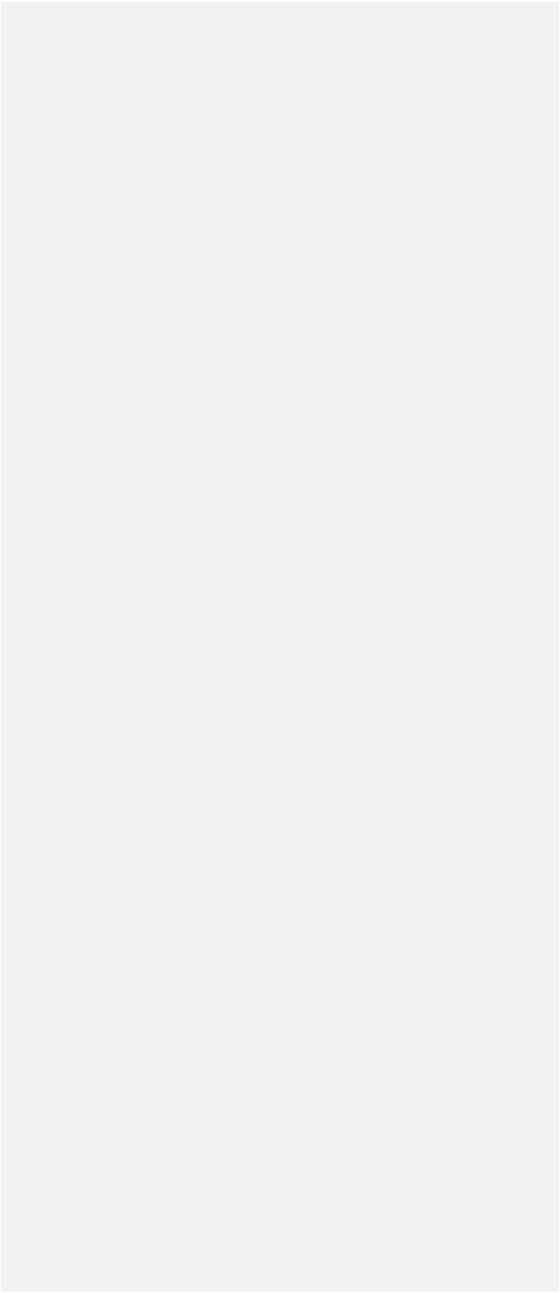
**Duration:** 81 hours      **Theory:** 12 hours      **Practical:** 69 hours

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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b>  Install/Configure RAID	<b>Trainee will be able to:</b> <ul style="list-style-type: none"> <li>Choose hardware and software RAID based controller</li> <li>Configure required RAID Levels work for HDD (Hard disk drive)</li> <li>Configure RAID Levels work for Solid State Drives (SSD) media</li> </ul>	<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>Computer system</li> <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> </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>			
LU2. Boot and test the System	<p><b>Trainee will be able to:</b></p> <ul style="list-style-type: none"> <li>• Select boot drive</li> <li>• Start Booting process</li> <li>• Check RAID's speed by (Timing, Frequency, Data rate) as guided</li> <li>• Check the performance of individual drives</li> <li>• Check the Speed affecting factor of RAID</li> </ul>	<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><u>Practical Activity:</u></b></p>	<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>• Computer system</li> <li>• Hard Disk drives and Solid State disks.</li> <li>• Software for Software based RAID.</li> </ul>	

		<ul style="list-style-type: none"><li>• Practice to check the RAID speed by frequency.</li></ul>		<ul style="list-style-type: none"><li>• Computer Network</li><li>• Internet</li><li>• Multimedia</li></ul>	
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## Module 9 : Carry out basic electrical installation

**Objective of the module:** The aim of this module to get knowledge, skills and understanding to lay cables, perform single & three phase connection, basic electric wiring and wiring test for carrying out basic electrical AC installation.

**Duration:** 40 Hours    **Theory:** 10 hours    **Practical:** 30 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU2:</b>  Perform Basic Electrical wiring	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Measure cables as per requirement</li> <li>Connect cables</li> <li>Solder the joints</li> <li>Insulate Joints</li> <li>Conduct wiring test as per requirement and record results</li> </ul>	<ul style="list-style-type: none"> <li>Difference between wire &amp; cable</li> <li>Explain Types of Joints</li> <li>Knowledge of stripping and insulation removing methods</li> <li>Procedure of Insulation &amp; Soldering</li> <li>Composition of solder &amp; Soldering Flux</li> <li>Define conductor and insulator</li> <li>Identification of cable gauges &amp; measurement of cables according to task</li> <li>Explain the uses of each type of wiring</li> <li>Explain different wiring systems</li> <li>Knowledge of insulation &amp; quality of Joints</li> </ul> <b>Practical Activity:</b> <ul style="list-style-type: none"> <li>Practice to make an extension wire using male and female connector</li> </ul>	<b>Total:</b> 18 hrs  <b>Theory:</b> 06 hrs  <b>Practical:</b> 12 hrs	<b>Consumable</b> Notebooks Pencils Erasers Sharpeners Cables Wires <b>Non Consumable</b> White board Multimedia Computer system Power Supply Nose Plier Plier	Electrical Lab /Workshop



		<ul style="list-style-type: none"> <li>Practice to measure the current and voltage of circuit using multimeter</li> </ul>		Insulation remover Solder Solder Wire Soldering Paste Multimeter	
<b>LU3:</b>  Perform Connection	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Draw layout diagram of circuit.</li> <li>Lay wires in duct/pipe according to layout diagram.</li> <li>Make connections according to wiring diagram.</li> <li>Insulate joints</li> <li>Connect with main supply.</li> <li>Check the function of circuit after connect the main supply</li> </ul>	<ul style="list-style-type: none"> <li>Define Voltage &amp; current</li> <li>Multi Meter usage to check the voltage &amp; current on defined task</li> <li>Describe types of wiring tests</li> <li>Introduction to continuity test &amp; its purpose</li> <li>Introduction to polarity test &amp; its purpose</li> <li>Introduction to earthling test &amp; its purpose</li> <li>Introduction to insulation test &amp; its purpose</li> <li>Recording of results in log book</li> <li>Explain the difference in series &amp; parallel circuit.</li> <li>Knowledge of AC and DC</li> <li>Knowledge of single phase and three phase</li> <li>Describe Gauges of cables</li> <li>Explain phase sequence</li> </ul>	<b>Total</b> 22 hrs  <b>Theory:</b> 04 hrs  <b>Practical:</b> 18 hrs	<b>Consumable</b> Notebooks Pencils Erasers Sharpeners Cables Wires Insulation tape Non Consumable White board Multimedia Computer system Power Supply Nose Plier Plier	Electrical Lab /Workshop

		<ul style="list-style-type: none"> <li>• Knowledge of color coding for making wiring connections</li> <li>• Types of connections used for wiring</li> <li>• Explain different wiring systems commonly used</li> </ul> <p><b>Practical Activity:</b></p> <ul style="list-style-type: none"> <li>• Practice to measure the gauge of available cable and differentiate between earth and mains in a wire</li> <li>• Practice to make a circuit board using a bulb and toggle switch and also perform circuit continuity, polarity and earthing test</li> <li>• Practice to make a series circuit using switch, lamp and bell indicator</li> <li>• Practice to make a parallel circuit using switch, lamp and bell indicator</li> </ul>		Insulation remover Solder Solder Wire Soldering Paste Vernier calliper Switch Bulb Bell indicator	
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## Module 10 Follow Safety Rules

**Objective of the module:** The aim of this module to get knowledge, skills and understanding to maintain personal health, hygiene and safety

**Duration:** 30 hours    **Theory:** 9 hours    **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>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Identify the safety signs and symbols</li> <li>Erect barricades, hoardings, signage in the hazardous areas</li> <li>Maintain housekeeping</li> <li>Report unsafe condition to immediate supervisor (shift person)</li> </ul>	<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> <b>Practical Activity:</b> <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>	<b>Total</b> 9hrs <b>Theory:</b> 3 hrs <b>Practical:</b> 6 hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpeners</li> <li>White Board Marker</li> </ul> <b>Non Consumable</b> <ul style="list-style-type: none"> <li>White board</li> <li>Multimedia</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>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Identify risk associated with job to be done</li> <li>Select PPE according to job</li> <li>Wear PPE according to job</li> <li>Store PPE at Designated place after use</li> </ul>	<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> <li>Describe the procedure to wear full body harness</li> </ul> <b>Practical Activity:</b> <ul style="list-style-type: none"> <li>Demonstrate to select PPEs for specific job.</li> <li>Practice to wear full body harness and anchorage</li> </ul>	<b>Total:</b> 9 hrs <b>Theory:</b> 3hrs <b>Practical:</b> 9hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpeners</li> <li>White Board Marker</li> </ul> <b>Non Consumable</b> <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>	<ul style="list-style-type: none"> <li>Class Room</li> <li>Simulated environment</li> </ul>
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<b>LU3:</b> Perform communication signals	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Identify different types of communication hand signals.</li> <li>Use appropriate hand signals as per situation</li> </ul>	<ul style="list-style-type: none"> <li>Understanding of different types of communication signals</li> <li>Explain different types of hand signals</li> <li>Explain the importance of hand signals</li> </ul> <b>Practical Activity:</b> <ul style="list-style-type: none"> <li>Demonstrate the hand signals for different activities</li> </ul>	<b>Total</b> 9hrs <b>Theory:</b> 3 hrs <b>Practical:</b> 6 hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpeners</li> <li>White Board Marker</li> </ul> <b>Non Consumable</b> <ul style="list-style-type: none"> <li>White board</li> <li>Multimedia</li> <li>Safety manuals</li> </ul>	<ul style="list-style-type: none"> <li>Class Room</li> <li>Simulated environment</li> </ul>
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## Module 11 : Perform Basic Communication Skills

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

**Duration:** 30 hours    **Theory:** 9 hours    **Practical:** 21hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1.</b>  Demonstrate the basic communication skills	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>• Demonstrate the listening skills</li> <li>• Demonstrate the reading skills</li> <li>• Demonstrate the writing skills</li> <li>• Demonstrate the speaking skills</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge of communication skills (7Cs of effective communication)</li> <li>• Describe verbal and non-verbal communication</li> <li>• Explain reporting techniques</li> </ul> <p><b>Practical Activity:</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>	<b>Total:</b> 15 hrs  <b>Theory:</b> 5hrs  <b>Practical:</b> 10hrs	<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> </ul> <div>Non Consumable</div> <ul style="list-style-type: none"> <li>• White board</li> </ul>	Class Room

<b>LU2.</b> Follow Supervisor's instructions	<b>The trainee will be able to:</b> <ul style="list-style-type: none"> <li>Carry out the instructions of the supervisor</li> <li>Report to the supervisor as per organizational SOP's given standards</li> </ul>	<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> <b>Practical Activity:</b> <ul style="list-style-type: none"> <li>Prepare different office reports</li> </ul>	<b>Total:</b> 15 hrs  <b>Theory:</b> 4hrs  <b>Practical:</b> 11hrs	<b>Consumable</b> <ul style="list-style-type: none"> <li>Notebooks</li> <li>Pencils</li> <li>Erasers</li> <li>Sharpeners</li> <li>White board marker</li> </ul> <b>Non Consumable</b> <ul style="list-style-type: none"> <li>White board</li> </ul>	<ul style="list-style-type: none"> <li>Class Room</li> </ul>
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## General assessment guidance for “*Internet of Things*”

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 Internet of Thing:

- Work performances, for example Create a simple app using app inventor that connects with Arduino board over Bluetooth and receive the sensor data to be displayed.
- Work Performances, for example Develop a regulated power supply that will power up your digital circuit
- Demonstrations, for example Design a Fan dimmer circuit.



- 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 Internet of Thing include:

- Work products, IOT 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 “Internet of Things”**

This curriculum consists of 101 modules

1. Perform Basic Computer Installation"
2. Install and configure hardware components/peripheral devices
3. Prepare office documents

4. Perform internet surfing and email management
5. Perform installation and configuration of network cables
6. Install Configure and trouble shoot switch & router
7. Install system software on the devices"
8. Configure hardware raid (Redundant Array of Independent Disk)
9. Carry out electrical
10. Follow Safety Rules at Site
11. Perform Basic Communication Skills

## 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** Install and configure hardware components/peripheral devices
- Module 3** Prepare office documents
- Module 4** Perform internet surfing and email management
- Module 5** Perform installation and configuration of network cables
- Module 6** Install Configure and trouble shoot switch & router
- Module 7** Install system software on the devices"
- Module 8** Configure hardware raid (Redundant Array of Independent Disk)
- Module 9** Carry out electrical
- Module 10** Follow Safety Rules at Site
- Module 11** Perform Basic Communication Skills

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.	Android Studio	Free
2.	Arduino Uno	25
3.	USB mini wire	25
4.	Audio signal generator.	20
5.	AutoCAD software	5
6.	AVO meter/ Digital multimeter	25
7.	Backup software	Free
8.	Bluetooth module	30
9.	Bootable DVD	30
10.	Bootable OS Flash drive/CD	30
11.	Bread board	25
12.	Bread board / Basic electronics trainer kit	25
13.	Bread board / Digital Trainer Kit.	25
14.	Breadboard	25
15.	C IDE	Free
16.	C/C++ IDE	Free
17.	C/Python IDE	Free
18.	Card reader	50
19.	Circuit Breaker.	25
20.	Computer Networks	1
21.	Computer System Minimum 5th generation with 8 GB RAM and SSD	25
22.	Connecting Wires (FF, FM etc)	10 buses
23.	DC supply (5 V)	25
24.	DC\AC supply	25
25.	Digital clock	3
26.	Digital Multimeter	25

27.	Digital Trainer Kit.	20
28.	DLD trainer	20
29.	Dual trace Oscilloscope 0-20MHZ	20
30.	DVD or BLU-RAY writer	25
31.	Electrician Tool kit.	1
32.	ESP32	25
33.	External Hard disks	5
34.	Flash Drive	5
35.	Function Generator	25
36.	Hard Disk drives and Solid State disks.	25
37.	Instructional manual	5
38.	Insulation remover	25
39.	Internet	1
40.	Java IDE	2
41.	Keyborad	25
42.	Lamp holder	120
43.	Laptop	01
44.	Load (Lamp)	120
45.	Logic Probe.	5
46.	LoRA concentrator board	5
47.	LoRa module	5
48.	Manageable switch	4
49.	Mass Storage	5
50.	Modem/DSL	2
51.	Mouse	25
52.	MQTT broker	25
53.	MS Office	2
54.	MS Power BI	2
55.	Multi Meter	5
56.	Multimedia projector	1
57.	Networking Devices (Router, Modem, Hub, Firewall, Access Points, Switches etc)	2 Sets

58.	Networking Tool Kit	4 kits
59.	NFC	4
60.	Nodemcu Board	4
61.	NodeMCU module	4
62.	Nose Plier	25
63.	Office Suit	2
64.	OS Bootable Mass storage device	2
65.	Oscilloscope	5
66.	Pi Controller	50
67.	Plier	50
68.	Potentiometer	5
69.	Printer	2
70.	Projector	01 for each lab/class
71.	Projector screen	01 for each lab/class
72.	Python IDE	2
73.	RAID	2
74.	RAID card	2
75.	RAM	2 of each type
76.	RapidMiner (CD/Mass Storage)	2
77.	Raspberry Pi Adapter (5V, 2A)	4
78.	Raspberry Pi module	4
79.	Raspberry pi	4
80.	RFID antennas	2
81.	RFID reader	2
82.	Rheostat	2
83.	ROM	5
84.	Router	4
85.	Router software/Firmware.	2
86.	RS232 interfaces	25

87.	Scanner	2
88.	Screw	5
89.	SD card	5
90.	SD card reader	5
91.	Series board.	25
92.	Server machine	1
93.	Signal generator	5
94.	Simulator (Packet Tracer)	2
95.	Smartphone	2
96.	Software Development kit	2
97.	Software for Software based RAID.	2
98.	Software to test network.	2
99.	Solder	5
100.	Source of data sheets	2
101.	SPI Interface	5
102.	Step down Transformer	25
103.	Step down Transformer (Normal and center tapped)	25
104.	System (Windows, Linux)	2
105.	Tool kit.	5
106.	Trainer	5
107.	Troubleshooting software.	2
108.	UART transmitter	120
109.	USART transmitter	5
110.	USB micro cable	5
111.	USB mini cable	5
112.	Valid public cloud subscription	1
113.	Voltmeter	12
114.	VPN software.	2
115.	Vulnerability scanning tool	2
116.	Webcam	2
117.	Webcam (digital camera)	2



118.	Weka Software (CD/Mass Storage)	01
119.	White board	1 each class/lab
120.	Wifi module	5
121.	Wifi router	02
122.	Wire Tester	02
123.	Wireless router	02
124.	ZigBee modules	5

## 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
Perform Basic Computer Installation"	50	5
Install and configure hardware components/peripheral devices	42	4.2
Prepare office documents	60	6
Perform internet surfing and email management	43	4.3
Perform installation and configuration of network cables	61	6.1
Install Configure and trouble shoot switch & router	80	8
Install system software on the devices"	81	8.1
Configure hardware raid (Redundant Array of Independent Disk)	81	8.1
Carry out electrical installation	42	4.2
Follow Safety Rules	30	3
Perform Basic Communication Skills	30	3