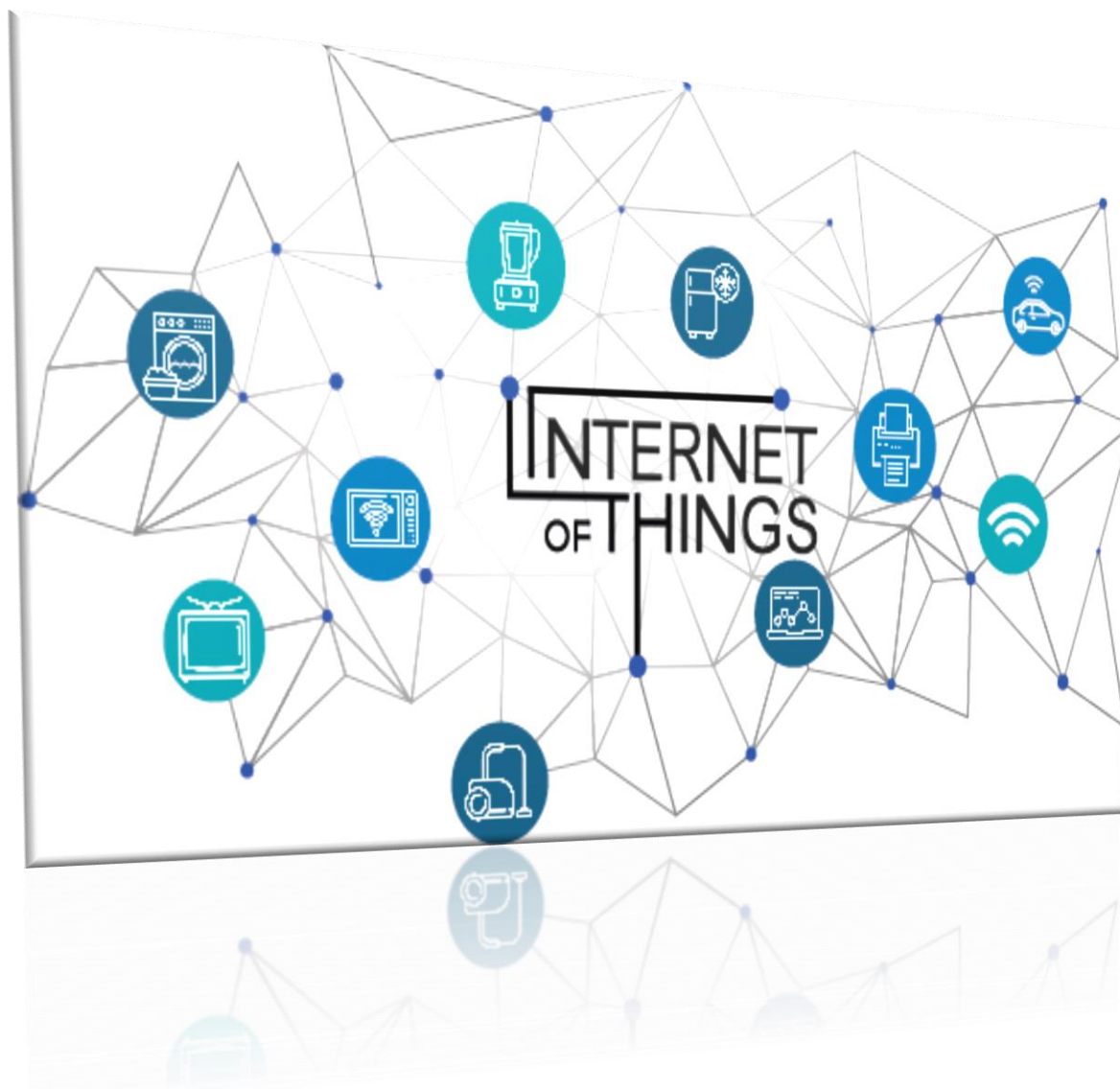




National Competency Standards for “Internet of Things (IoT)”



**National Vocational and Technical Training Commission (NAVTTTC),
Government of Pakistan**



ACKNOWLEDGEMENT

National Vocational and Technical Training Commission (NAVTTTC) extends its gratitude and appreciation to representatives of business, industry, academia, government agencies, provincial TEVTAs, sector skill councils and trade associations who spared time and extended their expertise for the development of National Vocational Qualifications for the trade of **Internet of Things (IoT)**. This work would not have been possible without the technical support of the above personnel.

NAVTTTC initiated development of CBT&A based qualifications for 200 traditional / hi-tech trades under the Prime **Minister’s Hunarmand Pakistan Program**, focusing on Development & Standardization of 200 Technical & Vocational Education & Training (TVET) Qualifications. NAVTTTC efforts have received full support from the Ministry of Federal Education and Professional Training which highly facilitated progress under this initiative.

It may not be out of place to mention here that all the experts of Industry, Academia and TVET experts of TEVTAs, BTEs and PVTC work diligently for making this qualification worthy and error free for which all credit goes to them. However, NAVTTTC accepts the responsibility of all the errors and omissions still prevailing in the Qualification document.

It is also noteworthy that development of Skill Standards is a dynamic and ongoing process, and the developed skill standards needs periodic review and updating owing to the constant technological advancements, development in scientific knowledge, and growing experience of implementation at the grass root level as well as the demand of industry. NAVTTTC will ensure to keep the qualifications abreast with the changing demands of both national and international job markets.

**Dr. Nasir Khan,
Executive Director,
NAVTTTC**



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1. Introduction

The Internet of Things (IoT) is a network of resource constrained nodes being capable of automating an existing manual procedure. This IoT network is also connected to the internet to enable ease of access and user friendly configuration and monitoring. An IoT developer is an expert who completely understands the IoT network, its different components and their working. IoT developer is capable of programming sensor and hardware devices. IoT developer is capable of developing a hardware and software for IoT edge devices. He is also trained of sending the data to the cloud server. IoT developer is a specialist in utilizing resource constrained devices. IoT cloud developer is an expert who can install and configure Virtual machines on the cloud. While IoT Data scientist is the one who utilizes the data received on the cloud and saves it efficiently in the databases to train Machine Learning algorithms. IoT security is one of the hot research topic nowadays which will create many skill based jobs in the near future. An IoT developer is incomplete without the understanding and hands on experience of security protocols. In a nutshell, IoT is the start of art technology to automate the industrial, commercial and domestic procedures and there is a need to develop the resources with the required IoT skills which will not only benefit the industry but also create job opportunities for the individuals.

IoT is an ever changing field. The number of IoT nodes are increasing each day and hence their monitoring, upgrading and security needs. Therefore, industry requirement for skilled workforce is increasing which can only be managed through setting relevant competency standards in collaboration with the leading industries.

Being cognizant of this fact, National Vocational & Technical Training Commission (NAVTTC) developed competency standards for IoT system development under National Vocational Qualifications Framework (NVQF). These competency standards have been developed by a Qualifications Development Committee (QDC) and validated by the Qualifications Validation Committee (QVC) having representation from the leading IoT development houses and research labs of the country.



2. Purpose of the Qualification

The competency based NVQ has been developed to train the unskilled men and women of Pakistan on the technical and entrepreneurial skills to be employed / self-employed and inevitably set sustainable impact on their lives by enhancing their livelihood income.

The purpose of these qualifications is to set highly professional standards for IoT Experts in order to complete local and international job market. Who will serve as key elements enhancing quality of Pakistan’s IoT development sector. The specific objectives of developing these qualifications are as under:

- Improve the professional competence of IoT Hardware and Software development
- Capacitate the local community and trainers in modern CBT trainings, methodologies and processes as envisaged under NVQF
- Provide flexible pathways and progressions in IoT development houses
- Enable the trainees to perform their duties in efficient manner
- Establish a standardized and sustainable system of training in IoT industry in Pakistan
- Enabling the youth with greater employment opportunities



3. Date of Validation

The level 5 IoT qualification has been validated on 20th – 24th July 2020 at PITAC, Lahore, by the qualification validation committee (QVC) members.

4. Date of Review

The level 5 IoT qualification has been reviewed on _____, by the qualification validation committee (QVC) members.

5. Codes of Qualifications

The International Standard Classification of Education (ISCED) is a framework for assembling, compiling and analyzing cross-nationally comparable statistics on education and training. ISCED codes for these qualifications are assigned as follows:

ISCED Classification	
Code	Description
0714-E&A(1)	1 st Level National Certificate of level-5, in “ Internet of Things”
0714-E&A(2)	2 nd Level National Certificate of level-5, in “ Internet of Things”
0714-E&A(3)	3 rd Level National Certificate of level-5, in “ Internet of Things”
0714-E&A(4)	4 th Level National Certificate of level-5, in “ Internet of Things”



6. Members of Qualification Development Committee

The following members participated in the qualification development process of the IoT qualification at PITAC, Lahore.

Date: 08 to 12 June 2020

S#	Name	Designation
1.	Dr. Adnan Noor Mian	Associate Professor – ITU, Lahore
2.	Ali Hammad	Associate Professor – UET, Lahore
3.	Sanaullah Manzoor	Research Associate & PHD Fellow – ITU, Lahore
4.	Muhammad Anghus Jamil	Managing Partner – Techno Desert
5.	Mughees Butt	Co-founder – Techno Desert
6.	Salman Shahid	Embedded Developer – Techno Desert
7.	Amir Amin	HOD – City Polytechnic
8.	Muhammad Umair	Lecturer, UET Lahore
9.	Hina Khalid	Assistant Professor – UET, Lahore
10.	Muhammad Yasir	Deputy Director – NAVTTC
11.	Muhammad Hassaan	Daccum Facilitator / BCS



7. Members of Qualification Validation Committee

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

Date: 20th -24th July, 2020

S#	Name	Designation
1.	Dr. Ahmad Mustafa	Chief Instructor, GSTC, Murree
2.	M. Abbas Khan Abbasi	HOD, KP Tevta, GPI, Mansehra
3.	Hina Khalid	Assistant Professor, UET, Lahore
4.	Danish Khan	Calibration & Testing Engineer, PCSIR, Islamabad
5.	Muzammil Hassan	AM Research, KICS-UET, Lahore
6.	Muhammad Umair	Lecturer, UET, Lahore
7.	Sanaullah Manzoor	Research Associate, PHD Fellow, ITU, Lahore
8.	Faisal Sarwar	PBTE Representative
9.	Muhammad Nouman	
10.	Muhammad Yasir	Deputy Director, NAVTTC
11.	Muhammad Hassaan	Daccum Facilitator



8. Entry Requirements

The entry requirement for this qualification would be Matric with science.

9. Regulation of the Qualification and Schedule Of Units

Not Applicable



10. Summary of Competency Standards

Sr No	Competency Standards	Occupati on	NVQF Level	Category	Estimated Contact Hours			Cr Hr
					Th	Pr	Total	
<u>Level 2</u> <u>Jr. Network Assistant</u>								
1	Perform Basic Computer Installation		Level 2	Function al	11	39	50	5
2	Install/Configure hardware components/peripheral devices		Level 2	Function al	12	30	42	4.2
3	Prepare office documents		Level 2	Function al	12	48	60	6
4	Perform internet surfing and email management		Level 2	Function al	10	33	43	4.3
5	Perform installation and configuration of network cables		Level 2	Technical	10	51	61	6.1
6	Install, configure and troubleshoot switches & routers		Level 2	Technical	14	66	80	8
7	Install system software on the devices		Level 2	Technical	9	72	81	8.1
8	Configure hardware RAID (Redundant Array of Independent disk)		Level 2	Technical	12	69	81	8.1
9	Carry out electrical installation		Level 2	Technical	12	30	42	4.2
10	Follow Safety Rules		Level 2	Generic	9	21	30	3
11	Perform Basic Communication Skills		Level 2	Generic	9	21	30	3
Total					120	480	600	60



11. Detail of Qualification and its Competency Standards

LEVEL 2: Jr. NETWORK ASSISTANT

0714-E&A-1. Perform Basic Computer Installation

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

Competency Unit	Performance Criteria
CU1. Install Operating system	<p>P1. Prepare drive/partitions before OS installation.</p> <p>P2. Format mass storage on a PC/computer</p> <p>P3. Perform Partitioning of hard drive</p> <p>P4. Install operating system in the PC/computers by following instructional manual.</p> <p>P5. Troubleshoot installation errors</p> <p>P6. Download and run windows/application patches</p>
CU2. Perform tasks using operating system	<p>P1. Create folders/directories</p> <p>P2. Copy files, folder/ directories to different location (Hard drive, external storage, cloud)</p> <p>P3. Move files, folder/ directories to different location (Hard drive, external storage, cloud)</p> <p>P4. Rename files and directories/folder</p> <p>P5. Search files / folder/directories against various search criterion (File name, date, text etc)</p> <p>P6. Perform task manager operations</p>
CU3. Install/uninstall application Software	<p>P1. Install application software in the PC/computers according to instruction manual.</p> <p>P2. Trouble Shoot installation errors</p> <p>P3. Update /upgrade application Software</p> <p>P7. Uninstall application software</p>

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Define different types of operating system
- Describe the OS Installation process
- Demonstrate how to apply Operating system updates/patches
- Differentiate between system software and application software.



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- Describe Installation process of application software
- Define the benefits of software upgradation

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System
2.	Internet Connection
3.	Web Browser
4.	Search Engines
5.	Internet or Intranet Connectivity
6.	UPS
7.	Operating System (Windows, Linux)

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Install operating system
- Resolve Installation errors.
- Install application software
- Install and run antivirus software
- Uninstall application software



0714-E&A-2. Install/Configure hardware components/peripheral devices

Overview: After this competency standard candidate will be able to install and configure and trouble shoot hardware components/peripheral devices and device drivers on computers

Competency Unit	Performance Criteria
CU1. Install / configure Hardware components / peripheral devices	P1. Configure hardware components / peripheral devices as per manuals. P2. Select and install drivers. P3. Perform functional test for the installed Hardware components / peripheral devices. P4. Update/Upgrade device driver
CU2. Troubleshoot basic hardware errors	P1. Detect hardware errors/problems. P2. Identify solution of hardware errors. P3. Execute the hardware trouble shooting.

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Understands OHS policies and procedures in the carrying out the work.
- Understand hardware components / devices drivers
- Knowledge of Trouble shooting installation problems/errors.

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System
2.	Internet Connection
3.	Web Browser
4.	Search Engines
5.	LAN Connectivity
6.	UPS
7.	Printer
8.	Scanner
9.	Web cam (digital camera)



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10.	DVD or BLU-RAY writer
11.	Pen-drive
12.	External Hard disks
13.	Operating System (Windows, Linux)

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Install device drivers
- Trouble shoot Hardware errors.



0714-E&A-3. Prepare office documents

Overview: After this competency standard candidate will be able to prepare office documents, take offline and online backups, perform files conversions efficiently.

Competency Unit	Performance Criteria
CU1. Prepare document on word	<p>P1. Create new document / open word document</p> <p>P2. Save document</p> <p>P3. Set page Layout</p> <p>P4. Perform basic Formatting (text, paragraph, page)</p> <p>P5. Perform insert operation (picture, shapes, charts, tables, smart art, clip art, hyperlinks, page numbers, header/footers, bullets/numbering, columns) in the word document</p> <p>P6. Check the spellings in the word file through dictionary</p> <p>P7. Print document</p>
CU2. Prepare spreadsheet	<p>P1. Create / open Spread Sheet</p> <p>P2. Save Spreadsheet</p> <p>P3. Set page Layout</p> <p>P4. Perform basic Formatting</p> <p>P5. Perform insert operation (picture, charts, smart art, clip art, hyperlinks, page numbers, header/footers, bullets / numbering) in the spread sheet</p> <p>P6. Use arithmetic functions/formulas</p> <p>P7. Print Spreadsheet</p>
CU3. Prepare presentation	<p>P1. Create / open presentation</p> <p>P2. Save presentation</p> <p>P3. Set page Layout</p> <p>P4. Perform basic Formatting</p> <p>P5. Perform insert operation (slides, picture, shapes, charts, tables, smart art, clip art, hyperlinks, page numbers, bullets/numbering) in the presentation.</p> <p>P6. Select various template designs</p> <p>P7. Apply animation to slides</p> <p>P8. Check the spellings in the presentation through dictionary</p> <p>P9. Run power point presentation</p> <p>P10. Print presentation</p>



CU4. Convert files into different formats

- P1.** Identify file conversion software
P2. Convert files into different formats
P3. Use online convertor to give a practical demonstration

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Demonstrate proficiency in creating a Word Document.
- Describe spread sheets, use formulas and apply necessary formats
- Explain qualities of a robust presentation.
- Write a note on Urdu Word Processing.
- Understand types of files and their conversions to various file types

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1	Computer System
2	Internet Connection
3	Search Engines
4	Internet or LAN Connectivity
5	UPS
6	DVD or BLU-RAY writer
7	Professional Office Suite (MS Office))/ Compatible office suite as per Operating System
8	In page Software
9	Application Software

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Create, open, save and print files
- Perform necessary formatting according to provided document format.
- Designs CVs
- Create result Sheet



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- Make presentation
- Convert file to different formats



0714-E&A-4. Perform internet surfing and email management

Overview: After this competency standard candidate will be able perform searching on web using various search engines. The candidate shall be able to manage email accounts efficiently and use cloud services i.e Google drive, one drive, drop box etc.

Competency Unit	Performance Criteria
CU1. Perform browsing using different browsers	P1. Browse required data. P2. Download / upload data from the internet
CU2. Create email account	P1. Create email accounts on various service providers. P2. Remove Errors while Email configuration P3. Send and receive emails

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- How to use various browsers
- Describe types of search engines
- Describe management of emails on various platforms.
- How to configure email accounts on outlook Differentiate between downloading and uploading data
- Attachments in Email

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System
2.	Internet Connection
3.	Web Browser
4.	Search Engines
5.	Internet or LAN Connectivity
6.	Operating System (Windows, Linux)

Critical Evidence(s) Required



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The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Configure email account on outlook.
- Create and send emails



0714-E&A-5. Perform installation and configuration of network cables

Overview: 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.

Competency Unit	Performance Criteria
CU1. Prepare network cables	P1. Select the type of cable as per requirement (CAT5, CAT6 etc) P2. Calculate the length of cable as per requirement P3. Prepare crossover and straight network cable
CU2. Perform maintenance & troubleshooting	P1. Check the cable connectors with cable tester P2. Check connectivity between devices (cable and switches/ routers/ hardware components) manually P3. Repair Cable if required P4. Replace connectors / hardware components if required P5. Ping all network nodes to check the connectivity P6. Check the cable connectivity with each network node P7. Conduct test to check the data rate and bandwidth of network

Knowledge & Understanding

The trainee must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards which includes the knowledge of:

- Capable to determine the cable according to speed, length and performance
- Basic knowledge about straight through and cross connection
- Knowledge and understanding of Communication Media & Connectors – Unshielded twisted-pair (UTP), shielded twisted pair (STP), Fiber Optics and coaxial cable: RJ45, RJ-11, BNC
- Understanding of color codes of CAT5 cable. 568A and 568B convention
- Knowledge about color coding of network cable
- Capable to configure the Interoperability between systems (server and work stations) and data rate as per requirement / scenario.

Tools & Equipment required:

S. No.	Items
1.	PPEs
2.	Networking Cables (CAT5, CAT6, Fiber optics, Coaxial)
3.	Network Switches
4.	Network Connectors like RJ45



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5.	Cable cutters and punctures
6.	Routers
7.	Cable tester
8.	Wireless network equipment

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence** (s) to be competent in this competency standard:



0714-E&A-6. Install, Configure and troubleshoot switches & routers

Overview: This competency unit covers the skills and required knowledge to install and configure IP Addresses, Protocols, hardware / software and networks. The underpinning knowledge regarding IP Addresses, Protocols, hardware / software and networks will be sufficient to provide the basis for the job at workplace.

Competency Unit	Performance Criteria
CU1. Install and connect network switch and router	P1. Install the network switch/ router according to layout diagram P2. Connect the switches and routers with network cables
CU2. Configure IP addresses	P1. Check the network connectivity P2. Assign IP Addresses as per required classification P3. Assign Network addresses
CU3. Configure dynamic routing protocols	P1. Run the desired/instructed dynamic routing protocols P2. Advertise the network & perform convergence P3. Perform network address translation P4. Ping the destination
CU4. Perform maintenance & troubleshooting	P1. Check the network connectivity P2. Rectify duplex and speed mismatch problems P3. Diagnose common network problems P4. Identify the IP addresses assigned to your computer and your network P5. Detect the faults of normal operational behavior P6. Integrate the PC's into Local Area Network (LAN) or WAN

Knowledge & Understanding

The trainee must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards which includes the knowledge of:

- Basic knowledge of services of server machines i.e. (File servers, Print servers, Mail servers, Communication servers, Database servers, Print servers, Web servers)
- Basic knowledge of industry-accepted operating system, hardware and wireless access points
- Network Components -Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, etc. – their types, functions, advantages and applications



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- Knowledge of Network Interface Card in which sends data, receives data, and controls data flow between the computer and the network.
- Differentiate between active and passive network
- Assigning static or dynamic IP's as per requirement.
- Knowledge in detail about network protocols (TCP / IP), OSI model, IPV4, IPV6, physical addresses (MAC Addresses) of network devices.
- Setting IP Address (IP4/IP6) & Subnet Mask, Classes of IP Addressing
- Types of topologies and networks including appropriate hardware and software installations with functionalities. – Star, Ring, Bus, Tree, Mesh, Hybrid.
- Type of Networks – Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN) and Internet, Ethernet, Wi-Fi, Bluetooth, Mobile Networking, Wire and wireless Networking.
- Difference between Intranet and Internet.
- Data transmission basic terms (ping, latency, packet loss, throughput, bandwidth and jitter)
- Knowledge of shared printers and other resources provided to the users of the network by servers. Resources provided include data files, printers, software, or any other items used by clients on the network.

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** to be competent in this competency standard:

- Install and connect network switch and router
- Configure IP addresses
- Configure dynamic routing protocols
- Perform maintenance & troubleshooting

Tools & Equipment required:

S. No.	Items
1.	Personal Protective Equipment
2.	Laptop / Desktop
3.	Network cable with tester
4.	Network Interface Card (NIC)
5.	Modem
6.	Router
7.	Switch
8.	Tools Kit



0714-E&A-7. Install System software on the devices

Overview: This competency unit covers the skills and required knowledge to install ,analyze, configure, optimize or maintain a computer. Computer operating systems, hardware and networks .The underpinning knowledge regarding application software and system software will be sufficient to provide the basis for the job at workplace.

Competency Unit	Performance Criteria
CU1. Install and configure Utility software & device drivers	P1. Select Utility & device drivers. P2. Install application software P3. Install utility programs to improve functionality P4. Perform product activation P5. Update the software versions
CU2. Install Firmware	P1. Check for firmware update. P2. Download the firmware P3. Update the firmware. P4. Check software working in proper manner.

Knowledge & Understanding

The trainee must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards that includes the knowledge of:

- Different type of Antivirus software.
- Knowledge of Scanning, Integrity Checking, Interception
- Knowledge of Online Virus Testing (Avast, AVG, Panda, Bitdefender, Microsoft Security Essentials
- Use of Antivirus, cause damage to a computer's software, hardware or data.
- Use of backup software for files on computer.
- Knowledge of backup software uses cloud storage to create backups.

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** to be competent in this competency standard:

Tools & Equipment required:

S. No.	Items
1.	Storage Devices
2.	CD Drives
3.	CDs / DVD



0714-E&A-8. Configure Hardware Raid (Redundant Array of Independent Disk)

Overview: This competency unit covers the skills and required knowledge to install, configure and manage RAID, disk volumes using the server's / workstations to be sufficient to provide the basis for the job at workplace.

Competency Unit	Performance Criteria
CU1. Install and configure Raid	P1. Choose hardware and software RAID based controller P2. Configure required RAID Levels work for HDD (Hard disk drive) P1. Configure required RAID Levels work for Solid State Drives (SSD) media
CU2. Boot and test the system	P1. Select boot drive P2. Start Booting process P3. Check RAID's speed by (Timing, Frequency, Data rate) as P4. guided P5. Check the performance of individual drives P6. Check the Speed affecting factor of RAID

Knowledge & Understanding

The trainee must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards which includes the knowledge of:

- Knowledge about booting process of different Computer manufacturers
- Knowledge about booting method through different resources i.e CDs, USB, Network at Installation level
- Basic knowledge of deploy hardware RAID in two ways i.e an external RAID Controller Card or internal RAID-on-Chip
- Basic knowledge of RAID tools.
- knowledge of most common schemes / RAID levels (RAID 0, 1, 5, 6, and 10)
- knowledge of hard disk testing tools (HD Tune) which work with RAID volumes.
- Factors Affecting RAID Speed

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** to be competent in this competency standard:

Tools & Equipment required:

S. No.	Items
1.	RAID card
2.	Hard Disk Drives / Solid State Devices



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3.	Software`s use for Virtually RAID configuration
4.	Workstation Desktop / Laptop
5.	Internet device



0714-E&A-9. Carry out Electrical Installation

Overview: This competency standard deal with the skills and knowledge required to lay cables, perform single & three phase connection, basic electric wiring and wiring test for carrying out basic electrical AC installation.

Competency Units	Performance Criteria
CU1. Perform Basic Electrical wiring	P1. Measure cables as per requirement P2. Connect cables P3. Solder the joints P4. Insulate Joints P5. Conduct wiring test as per requirement and record results
CU2. Perform Connection	P1. Draw layout of circuit P2. Lay wires in duct/pipe according to layout diagram. P3. Make connections according to wiring diagram. P4. Insulate joints P5. Connect with main supply. P6. Check the function of circuit after connect the main supply

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Define conductor.
- Differentiate between cable and wire.
- Describe the type of soldering.
- Differentiate between stripping and insulation removing.
- Describe the type of joints.
- Describe the procedure of jointing & soldering.
- Explain the composition of solder and soldering flux.
- Define the Types of cables
- Describe Gauges of cables
- Define single phase Connection
- Describe the types of joints
- Define conductor and insulator
- Explain color code of cables / phase sequence
- Explain Methods of Wiring, Types of wiring
- Describe Types of connections
- Describe types of wiring tests
- Explain different wiring systems
- Explain the uses of each type of wiring



- Describe sockets.
- What is lamp?
- Explain single pole switch circuit and its use.
- Define current, voltage, power and resistance
- Explain two-way switch circuit and its use.
- Describe two-way circuits.
- Explain series circuit and its use
- Define parallel circuit.
- Explain single pole switch circuit and its use
- Define current, voltage, power and resistance.
- Describe socket.
- Define series circuit.
- Define parallel circuit.
- Define impulse switch.
- Define power plug.
- Explain bell circuit.

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Cables.
2.	Wires
3.	Wire Stripper
4.	Plier
5.	Nose Plier
6.	Insulation remover
7.	Solder
8.	Solder Wire
9.	Soldering Paste
10.	Electrician Tool kit.
11.	Single pole switch.
12.	Lamp holder
13.	Lamp.
14.	Wooden/PVC board.
15.	PVC Pipe/Duct.
16.	PVC clamp.
17.	Screw
18.	PVC wire according to load.
19.	Circuit breaker
20.	AVO meter.



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21.	Test Indicator.
22.	Series board.
23.	Test Indicator.
24.	Fluorescent Tube.
25.	Electrician Tool kit.
26.	Two-way switch
27.	Socket
28.	Bulb
29.	Switch

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Perform cross or twist joint.
- Make T joint for cable.
- Make Britannia joint for cable
- Enlist the name of Electrical wiring test.
- Perform short circuit test on electrical wiring.
- Perform open circuit test on electrical wiring.
- Perform continuity test on electrical wiring
- Perform single and three phase connection



0714-E&A-10. Follow Safety Rules

Overview: This competency standard covers the skills and knowledge required to work according to personal health and safety protocol at crushing plant site. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Unit	Performance Criteria
CU1. Maintain occupational safety and health at workplace	P1. Identify basic safety signs and symbols P2. Erect barricades, hoardings, signage in the hazardous areas P3. Maintain housekeeping P4. Report unsafe condition to immediate supervisor (shift position)
CU2. USE Personal Protective and Safety Equipment (PPE)	P1. Identify risk associated with job to be done P2. Select PPE according to job P3. Wear PPE according to job P4. Store PPE at Designated place after use
CU3. Perform Communication Signals	P1. Identify different types of communication hand signals. P2. Use appropriate hand signals as per situation.

Knowledge& Understanding

The student must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards. This includes the knowledge of:

- Types of hazards
- Verbal and non-verbal (Hand Signals) communication
- Basic first aid treatment
- Safety signs and symbols
- Manual handling of loads
- Standard procedure of handling, storing and stacking material.
- Usage of Appropriate PPE for different situations

Critical Evidence(s) Required

The candidate needs to produce following critical evidence (s) to be competent in this competency standard:

- Use of PPE according to hazard/job
- Keep the workplace clean and tidy
- Balance the load while handling manually
- Use of first aid kit



Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. Items No.	
1	Fire Extinguisher
2	Safety Equipment (Safety Shoes, Safety Gloves, Safety Goggles, Safety Helmet and Ear Plugs etc.)
3	Smoke Detecting Alarm
4	First Aid Kit



0714-E&A-11. Perform Basic Communication Skills

Overview: This unit describes the skills and knowledge required to assist in the development of basic communication competence by providing information regarding different forms of communication and their appropriate use. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Unit	Performance Criteria
CU1. Communicate in a team	<p>P1. Treat team members with respect</p> <p>P2. Maintain positive relationships to achieve common organizational goals</p> <p>P3. Get work related information from team</p> <p>P4. Identify interrelated work activities to avoid confusion</p> <p>P5. Adopt communication skills, which are designed in a team.</p> <p>P6. Identify problems in communication with a team</p> <p>P7. Resolve Communication barrier through discussion and mutual agreement</p>
CU2. Follow Supervisor's instructions as per organizational SOPs	<p>P1. Receive the instructions from Supervisor</p> <p>P2. Carry out the instructions of the supervisor</p> <p>P3. Report to the supervisor as per organizational SOPs</p>
CU3. Develop Generic communication skills at workplace	<p>P1. Develop basic reading skills</p> <p>P2. Develop basic writing skills</p> <p>P3. Develop basic listening skills</p>

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Reporting techniques
- Application of Work ethics
- Good communication skills (7Cs of effective communication)
- Workplace dress code
- The role of team members and functionality of the teams
- Team dynamics
- Basic Reading Skills
- Basic Writing skills
- Basic Verbal communication skills
- Basic Problem solving skills
- Basic Self-Management Skills



National Competency Standards for “Internet of Things (IoT)”



- Basic Technology Skills
- Basic Interview Skills

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1	Printer
2	Projector
3	LED screen
4	Computer

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Maintain effective communication with colleagues and supervisors
- Prepare different office reports