

## Qualification Pack



# Automotive IIOT Application Technician

QP Code: ASC/Q6413

Version: 2.0

NSQF Level: 3.5

Automotive || 153, GF, Okhla Industrial Area, Phase 3  
New Delhi 110020 || email:garima@asdc.org.in

## Qualification Pack

### Contents

ASC/Q6413: Automotive IIOT Application Technician .....	3
<i>Brief Job Description</i> .....	3
Applicable National Occupational Standards (NOS) .....	3
<i>Compulsory NOS</i> .....	3
<i>Qualification Pack (QP) Parameters</i> .....	3
ASC/N9803: Organize work and resources (Manufacturing) .....	5
DGT/VSQ/N0102: Employability Skills (60 Hours) .....	11
ASC/N6432: Support in integration of machines, robots and automation system, IIOT Sensors using industrial networking protocols and I/O Link .....	19
ASC/N6433: Perform remote monitoring, controlling and fetching of vital machine data of the devices connected in the IIOT network .....	25
ASC/N6434: Carry out maintenance and troubleshooting of I/O link master and IIOT network devices .....	29
Assessment Guidelines and Weightage .....	32
<i>Assessment Guidelines</i> .....	32
<i>Assessment Weightage</i> .....	33
Acronyms .....	34
Glossary .....	36

## Qualification Pack

### ASC/Q6413: Automotive IIOT Application Technician

#### Brief Job Description

Individual at this job is responsible for Integrating Machines, robots, and Automation Systems, IIOT sensors using I/O Master Link and Establish Healthy Communication using Network Protocols, Remote Monitoring and Controlling within an organization for all its processes, the new development, production and Application Phases.

#### Personal Attributes

The person should be organized, team-oriented and can work independently for long hours. He should be result-oriented, keen observers and have an eye for detail and quality. The individual should also be able to demonstrate skills for information order, imagination, oral expression, analytical approach, deductive reasoning, and comprehension.

#### Applicable National Occupational Standards (NOS)

##### Compulsory NOS:

1. [ASC/N9803: Organize work and resources \(Manufacturing\)](#)
2. [DGT/VSQ/N0102: Employability Skills \(60 Hours\)](#)
3. [ASC/N6432: Support in integration of machines, robots and automation system, IIOT Sensors using industrial networking protocols and I/O Link](#)
4. [ASC/N6433: Perform remote monitoring, controlling and fetching of vital machine data of the devices connected in the IIOT network](#)
5. [ASC/N6434: Carry out maintenance and troubleshooting of I/O link master and IIOT network devices](#)

#### Qualification Pack (QP) Parameters

<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Production Engineering
<b>Country</b>	India
<b>NSQF Level</b>	3.5

## Qualification Pack

<b>Credits</b>	14
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/2144.0801
<b>Minimum Educational Qualification &amp; Experience</b>	8th grade pass with 2 years of NTC with 1 Year of experience OR 8th grade pass with 3 Years of experience of relevant experience OR 10th grade pass and pursuing continuous schooling OR 11th grade pass
<b>Minimum Level of Education for Training in School</b>	
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	20 Years
<b>Last Reviewed On</b>	NA
<b>Next Review Date</b>	31/03/2025
<b>NSQC Approval Date</b>	31/03/2022
<b>Version</b>	2.0
<b>Reference code on NQR</b>	2022/AUT/ASDC/05562
<b>NQR Version</b>	2

## Qualification Pack

### ASC/N9803: Organize work and resources (Manufacturing)

#### Description

This NOS unit is about implementing safety, planning work, adopting sustainable practices for optimising use of resources

#### Scope

The scope covers the following :

- Maintain safe and secure working environment
- Health and hygiene
- Perform work as per quality standards
- Effective waste management practices
- Material/energy conservation practices

#### Elements and Performance Criteria

##### *Maintain safe and secure working environment*

To be competent, the user/individual on the job must be able to:

- PC1.** identify hazardous activities and the possible causes of risks or accidents in the workplace
- PC2.** follow safe working practices while dealing with hazards to ensure safety of self and others
- PC3.** carry out routine check of the machine for identifying potential hazards
- PC4.** use appropriate protective clothing/equipment for specific tasks and work
- PC5.** follow safety hazards and preventive techniques during fire drill
- PC6.** report any identified breaches in health, safety and security policies and procedures to the designated person

##### *Health and hygiene*

To be competent, the user/individual on the job must be able to:

- PC7.** ensure workstation and equipment are regularly clean and sanitized
- PC8.** clean hands with soap, alcohol-based sanitizer regularly
- PC9.** avoid contact with ill people and self-isolate in a similar situation
- PC10.** wear and dispose PPEs regularly and appropriately
- PC11.** report advanced hygiene and sanitation issues to appropriate authority
- PC12.** follow stress and anxiety management techniques

##### *Perform work as per quality standards*

To be competent, the user/individual on the job must be able to:

- PC13.** ensure that work is accomplished as per the requirements within the specified timeline
- PC14.** ensure team goals are given preference over individual goals

##### *Effective waste management practices*

To be competent, the user/individual on the job must be able to:

- PC15.** follow the fundamentals of 5S for waste management

## Qualification Pack

- PC16.** segregate waste into different categories
- PC17.** follow processes specified for disposal of hazardous waste
- PC18.** identify recyclable, non-recyclable and hazardous waste
- PC19.** dispose non-recyclable, recyclable and reusable waste appropriately at identified location

### *Material/energy conservation practices*

To be competent, the user/individual on the job must be able to:

- PC20.** identify ways to optimize usage of material in various tasks/activities/processes
- PC21.** check for spills/leakages in various tasks/activities/processes
- PC22.** plug spills/leakages and escalate to appropriate authority if unable to rectify
- PC23.** check if the equipment/machine is functioning normally before commencing work and rectify wherever required
- PC24.** report malfunctioning (fumes/ sparks/emission/vibration/noise) and lapse in maintenance of equipment
- PC25.** ensure electrical equipment and appliances are properly connected and turned off when not in use

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** organisation procedures for health, safety and security, individual role and responsibilities in this context
- KU2.** the organisation's emergency procedures for different emergency situations and the importance of following the same
- KU3.** evacuation procedures for workers and visitors
- KU4.** how and when to report hazards as well as the limits of responsibility for dealing with hazards
- KU5.** potential hazards, risks and threats based on the nature of work
- KU6.** preventative and remedial actions to be taken in case of exposure to toxic material
- KU7.** various types of fire extinguisher
- KU8.** various types of safety signs and their meaning
- KU9.** appropriate first aid treatment relevant to different condition e.g. bleeding, minor burns, eye injuries etc.
- KU10.** relevant standards, procedures and policies related to 5S followed in the company
- KU11.** the various materials used and their storage norms
- KU12.** efficient utilisation of material and water
- KU13.** basics of electricity and prevalent energy efficient devices
- KU14.** common practices of conserving electricity
- KU15.** common sources and ways to minimize pollution
- KU16.** categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics
- KU17.** usage of different colors of dustbins

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**KU18.** waste management techniques

**KU19.** significance of greening

### Generic Skills (GS)

User/individual on the job needs to know how to:

**GS1.** read safety instructions/guidelines

**GS2.** modify work practices to improve them

**GS3.** ask for clarifications from superior about the job requirement

**GS4.** work with supervisors/team members to carry out work related tasks

**GS5.** complete tasks efficiently and accurately within stipulated time

**GS6.** inform/report to concerned person in case of any problem

**GS7.** make timely decisions for efficient utilization of resources

**GS8.** write reports such as accident report, in at least English/regional language

**GS9.** be punctual and utilize time efficiently

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### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Maintain safe and secure working environment</i>	<b>11</b>	<b>5</b>	-	<b>7</b>
<b>PC1.</b> identify hazardous activities and the possible causes of risks or accidents in the workplace	2	1	-	2
<b>PC2.</b> follow safe working practices while dealing with hazards to ensure safety of self and others	2	-	-	1
<b>PC3.</b> carry out routine check of the machine for identifying potential hazards	2	1	-	1
<b>PC4.</b> use appropriate protective clothing/equipment for specific tasks and work	2	1	-	1
<b>PC5.</b> follow safety hazards and preventive techniques during fire drill	2	1	-	1
<b>PC6.</b> report any identified breaches in health, safety and security policies and procedures to the designated person	1	1	-	1
<i>Health and hygiene</i>	<b>7</b>	<b>5</b>	-	<b>2</b>
<b>PC7.</b> ensure workstation and equipment are regularly clean and sanitized	2	2	-	1
<b>PC8.</b> clean hands with soap, alcohol-based sanitizer regularly	1	1	-	1
<b>PC9.</b> avoid contact with ill people and self-isolate in a similar situation	1	-	-	-
<b>PC10.</b> wear and dispose PPEs regularly and appropriately	1	-	-	-
<b>PC11.</b> report advanced hygiene and sanitation issues to appropriate authority	1	1	-	-
<b>PC12.</b> follow stress and anxiety management techniques	1	1	-	-
<i>Perform work as per quality standards</i>	<b>5</b>	<b>3</b>	-	<b>2</b>
<b>PC13.</b> ensure that work is accomplished as per the requirements within the specified timeline	2	2	-	1



### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC14.</b> ensure team goals are given preference over individual goals	3	1	-	1
<i>Effective waste management practices</i>	<b>15</b>	<b>10</b>	-	<b>4</b>
<b>PC15.</b> follow the fundamentals of 5S for waste management	3	2	-	1
<b>PC16.</b> segregate waste into different categories	2	1	-	-
<b>PC17.</b> follow processes specified for disposal of hazardous waste	2	2	-	1
<b>PC18.</b> identify recyclable, non-recyclable and hazardous waste	4	2	-	1
<b>PC19.</b> dispose non-recyclable, recyclable and reusable waste appropriately at identified location	4	3	-	1
<i>Material/energy conservation practices</i>	<b>12</b>	<b>7</b>	-	<b>5</b>
<b>PC20.</b> identify ways to optimize usage of material in various tasks/activities/processes	2	1	-	1
<b>PC21.</b> check for spills/leakages in various tasks/activities/processes	2	1	-	1
<b>PC22.</b> plug spills/leakages and escalate to appropriate authority if unable to rectify	2	1	-	-
<b>PC23.</b> check if the equipment/machine is functioning normally before commencing work and rectify wherever required	2	2	-	1
<b>PC24.</b> report malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment	2	1	-	1
<b>PC25.</b> ensure electrical equipment and appliances are properly connected and turned off when not in use	2	1	-	1
<b>NOS Total</b>	<b>50</b>	<b>30</b>	-	<b>20</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N9803
<b>NOS Name</b>	Organize work and resources (Manufacturing)
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Generic
<b>Occupation</b>	Generic
<b>NSQF Level</b>	3
<b>Credits</b>	1.5
<b>Version</b>	3.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	31/03/2025
<b>NSQC Clearance Date</b>	31/03/2022

## Qualification Pack

### DGT/VSQ/N0102: Employability Skills (60 Hours)

#### Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

#### Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Setting
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

#### Elements and Performance Criteria

##### *Introduction to Employability Skills*

To be competent, the user/individual on the job must be able to:

- PC1.** identify employability skills required for jobs in various industries
- PC2.** identify and explore learning and employability portals

##### *Constitutional values - Citizenship*

To be competent, the user/individual on the job must be able to:

- PC3.** recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.
- PC4.** follow environmentally sustainable practices

##### *Becoming a Professional in the 21st Century*

To be competent, the user/individual on the job must be able to:

- PC5.** recognize the significance of 21st Century Skills for employment
- PC6.** practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

##### *Basic English Skills*

To be competent, the user/individual on the job must be able to:

## Qualification Pack

- PC7.** use basic English for everyday conversation in different contexts, in person and over the telephone
- PC8.** read and understand routine information, notes, instructions, mails, letters etc. written in English
- PC9.** write short messages, notes, letters, e-mails etc. in English

### *Career Development & Goal Setting*

To be competent, the user/individual on the job must be able to:

- PC10.** understand the difference between job and career
- PC11.** prepare a career development plan with short- and long-term goals, based on aptitude

### *Communication Skills*

To be competent, the user/individual on the job must be able to:

- PC12.** follow verbal and non-verbal communication etiquette and active listening techniques in various settings
- PC13.** work collaboratively with others in a team

### *Diversity & Inclusion*

To be competent, the user/individual on the job must be able to:

- PC14.** communicate and behave appropriately with all genders and PwD
- PC15.** escalate any issues related to sexual harassment at workplace according to POSH Act

### *Financial and Legal Literacy*

To be competent, the user/individual on the job must be able to:

- PC16.** select financial institutions, products and services as per requirement
- PC17.** carry out offline and online financial transactions, safely and securely
- PC18.** identify common components of salary and compute income, expenses, taxes, investments etc
- PC19.** identify relevant rights and laws and use legal aids to fight against legal exploitation

### *Essential Digital Skills*

To be competent, the user/individual on the job must be able to:

- PC20.** operate digital devices and carry out basic internet operations securely and safely
- PC21.** use e- mail and social media platforms and virtual collaboration tools to work effectively
- PC22.** use basic features of word processor, spreadsheets, and presentations

### *Entrepreneurship*

To be competent, the user/individual on the job must be able to:

- PC23.** identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research
- PC24.** develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion
- PC25.** identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

### *Customer Service*

To be competent, the user/individual on the job must be able to:

- PC26.** identify different types of customers
- PC27.** identify and respond to customer requests and needs in a professional manner.

## Qualification Pack

**PC28.** follow appropriate hygiene and grooming standards

*Getting ready for apprenticeship & Jobs*

To be competent, the user/individual on the job must be able to:

**PC29.** create a professional Curriculum vitae (Résumé)

**PC30.** search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

**PC31.** apply to identified job openings using offline /online methods as per requirement

**PC32.** answer questions politely, with clarity and confidence, during recruitment and selection

**PC33.** identify apprenticeship opportunities and register for it as per guidelines and requirements

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

**KU1.** need for employability skills and different learning and employability related portals

**KU2.** various constitutional and personal values

**KU3.** different environmentally sustainable practices and their importance

**KU4.** Twenty first (21st) century skills and their importance

**KU5.** how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

**KU6.** importance of career development and setting long- and short-term goals

**KU7.** about effective communication

**KU8.** POSH Act

**KU9.** Gender sensitivity and inclusivity

**KU10.** different types of financial institutes, products, and services

**KU11.** how to compute income and expenditure

**KU12.** importance of maintaining safety and security in offline and online financial transactions

**KU13.** different legal rights and laws

**KU14.** different types of digital devices and the procedure to operate them safely and securely

**KU15.** how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.

**KU16.** how to identify business opportunities

**KU17.** types and needs of customers

**KU18.** how to apply for a job and prepare for an interview

**KU19.** apprenticeship scheme and the process of registering on apprenticeship portal

## Generic Skills (GS)

User/individual on the job needs to know how to:

**GS1.** read and write different types of documents/instructions/correspondence

**GS2.** communicate effectively using appropriate language in formal and informal settings

## Qualification Pack

- GS3.** behave politely and appropriately with all
- GS4.** how to work in a virtual mode
- GS5.** perform calculations efficiently
- GS6.** solve problems effectively
- GS7.** pay attention to details
- GS8.** manage time efficiently
- GS9.** maintain hygiene and sanitization to avoid infection

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	<b>1</b>	<b>1</b>	-	-
<b>PC1.</b> identify employability skills required for jobs in various industries	-	-	-	-
<b>PC2.</b> identify and explore learning and employability portals	-	-	-	-
<i>Constitutional values - Citizenship</i>	<b>1</b>	<b>1</b>	-	-
<b>PC3.</b> recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
<b>PC4.</b> follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	<b>2</b>	<b>4</b>	-	-
<b>PC5.</b> recognize the significance of 21st Century Skills for employment	-	-	-	-
<b>PC6.</b> practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
<i>Basic English Skills</i>	<b>2</b>	<b>3</b>	-	-
<b>PC7.</b> use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
<b>PC8.</b> read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
<b>PC9.</b> write short messages, notes, letters, e-mails etc. in English	-	-	-	-
<i>Career Development &amp; Goal Setting</i>	<b>1</b>	<b>2</b>	-	-

## Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC10.</b> understand the difference between job and career	-	-	-	-
<b>PC11.</b> prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
<i>Communication Skills</i>	<b>2</b>	<b>2</b>	-	-
<b>PC12.</b> follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
<b>PC13.</b> work collaboratively with others in a team	-	-	-	-
<i>Diversity &amp; Inclusion</i>	<b>1</b>	<b>2</b>	-	-
<b>PC14.</b> communicate and behave appropriately with all genders and PwD	-	-	-	-
<b>PC15.</b> escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
<i>Financial and Legal Literacy</i>	<b>2</b>	<b>3</b>	-	-
<b>PC16.</b> select financial institutions, products and services as per requirement	-	-	-	-
<b>PC17.</b> carry out offline and online financial transactions, safely and securely	-	-	-	-
<b>PC18.</b> identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
<b>PC19.</b> identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
<i>Essential Digital Skills</i>	<b>3</b>	<b>4</b>	-	-
<b>PC20.</b> operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
<b>PC21.</b> use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
<b>PC22.</b> use basic features of word processor, spreadsheets, and presentations	-	-	-	-



## Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Entrepreneurship</i>	<b>2</b>	<b>3</b>	-	-
<b>PC23.</b> identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
<b>PC24.</b> develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
<b>PC25.</b> identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
<i>Customer Service</i>	<b>1</b>	<b>2</b>	-	-
<b>PC26.</b> identify different types of customers	-	-	-	-
<b>PC27.</b> identify and respond to customer requests and needs in a professional manner.	-	-	-	-
<b>PC28.</b> follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship &amp; Jobs</i>	<b>2</b>	<b>3</b>	-	-
<b>PC29.</b> create a professional Curriculum vitae (Résumé)	-	-	-	-
<b>PC30.</b> search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
<b>PC31.</b> apply to identified job openings using offline /online methods as per requirement	-	-	-	-
<b>PC32.</b> answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
<b>PC33.</b> identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
<b>NOS Total</b>	<b>20</b>	<b>30</b>	-	-

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	DGT/VSQ/N0102
<b>NOS Name</b>	Employability Skills (60 Hours)
<b>Sector</b>	Cross Sectoral
<b>Sub-Sector</b>	Professional Skills
<b>Occupation</b>	Employability
<b>NSQF Level</b>	4
<b>Credits</b>	2
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	31/01/2024
<b>Next Review Date</b>	31/01/2027
<b>NSQC Clearance Date</b>	31/01/2024

## Qualification Pack

# ASC/N6432: Support in integration of machines, robots and automation system, IIOT Sensors using industrial networking protocols and I/O Link

## Description

This NOS unit is about supporting and performing task related to integration of machines, robots, automation systems, IIOT Sensors using I/O link master and industrial networking protocols used in manufacturing processes to meet the specification set by an organization.

## Scope

The scope covers the following :

- Install the elements in different layers of industrial network architecture and protocols
- Integrate and establish communication using I/O link master
- Ensure IIOT Network Security
- Perform post-installation activities

## Elements and Performance Criteria

### *Install the elements in different layers of industrial network architecture and protocols*

To be competent, the user/individual on the job must be able to:

- PC1.** identify the devices and systems to be connected in the IIOT network
- PC2.** analyse the installed machines, automation elements, system, and robots into different layers of network architecture like field devices, control devices, network etc.
- PC3.** interpret the network consists of network devices, automation systems and robots
- PC4.** support the engineer in installation of the suitable network protocols like MODBUS, CC-LINK, Profinet, Profibus, OPC UA, MQTT etc. as per the control system requirements
- PC5.** connect the intelligent devices and system using suitable network topology like STAR, LINE, RING as per network design document and Engineer instructions
- PC6.** evaluate the impacts of IIOT network on the environment and humans

### *Integrate and establish communication using I/O link master and network protocols*

To be competent, the user/individual on the job must be able to:

- PC7.** install and connect the automation elements like PLC, VFD, HMI, Pneumatics, Hydraulics Elements, Industrial sensors, IIOT Sensors, control devices to I/O link master via I/O link Devices as per SOP and Engineer instructions
- PC8.** support in installation of the cable between devices as per the signaling parameters like bend radius, signal ground, terminal resistor, cable length etc.
- PC9.** establish the communication between automation system, intelligent devices, and robots by doing parameter setting like baud rate, distance, station ID and station type
- PC10.** support in setting the network parameters of automation system on the device manufacturers software as per SOP and organizational guidelines
- PC11.** turn on the power of automation devices, system in the network and look for healthy communication between them

### *Ensure IIOT network security*

## Qualification Pack

To be competent, the user/individual on the job must be able to:

- PC12.** ensure physical security of the network contains I/O Link, I/O Link Master, IIOT Sensors, machines, robots and automation system
- PC13.** protect the network from unauthorized access or malicious internet by following organizational guidelines
- PC14.** ensure that only authorized devices should be able to connect to the network

### *Perform post-installation activities*

To be competent, the user/individual on the job must be able to:

- PC15.** support in conducting the trials of system as per the e-plan and align it with the existing or new manufacturing process
- PC16.** handover the system to production team & support the engineer to provide them training on its use and operation as per organizational guidelines and procedures
- PC17.** prepare documents and records as a reference for future development as per Engineer instructions

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** product portfolio of organization
- KU2.** company manufacturing processes
- KU3.** Standard Operation Procedures (SOP) recommended by manufacturer for using equipment / machinery in use
- KU4.** different layers of network architecture
- KU5.** types of network protocols, topology and its significance
- KU6.** design of industrial network between devices based on protocols, topology and device parameters
- KU7.** signaling parameters required to do cable installation between devices
- KU8.** allocation of device parameters like station ID, baud rate etc. to the devices connected to the network
- KU9.** device manufacturer software for network parameter settings and device communication
- KU10.** working and integration of different elements using I/O link master to the controller
- KU11.** data types like machine, process and control data from robot and automation system in the network
- KU12.** maintenance and troubleshooting procedures like hardware, self-loop back, link test etc.
- KU13.** functioning of various network devices like routers, network switch, repeaters
- KU14.** network design concepts and Parameters to be considered
- KU15.** Automation Elements like Electro Pneumatics, Hydraulics, VFD, HMI, Servo Drives

## Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** communicate effectively at the workplace

## Qualification Pack

- GS2.** attentively listen and comprehend the information given by the process managers
- GS3.** write observations and any work-related information in English/regional language
- GS4.** recognise a workplace problem and take suitable action
- GS5.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS6.** complete the assigned tasks in a timely and efficient manner
- GS7.** coordinate with shop floor workers and team for installing the new systems efficiently

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Install the elements in different layers of industrial network architecture and protocols</i>	<b>9</b>	<b>16</b>	-	<b>7</b>
<b>PC1.</b> identify the devices and systems to be connected in the IIOT network	1	3	-	1
<b>PC2.</b> analyse the installed machines, automation elements, system, and robots into different layers of network architecture like field devices, control devices, network etc.	2	3	-	1
<b>PC3.</b> interpret the network consists of network devices, automation systems and robots	2	3	-	2
<b>PC4.</b> support the engineer in installation of the suitable network protocols like MODBUS, CC-LINK, Profinet, Profibus, OPC UA, MQTT etc. as per the control system requirements	2	3	-	1
<b>PC5.</b> connect the intelligent devices and system using suitable network topology like STAR, LINE, RING as per network design document and Engineer instructions	1	2	-	1
<b>PC6.</b> evaluate the impacts of IIOT network on the environment and humans	1	2	-	1
<i>Integrate and establish communication using I/O link master and network protocols</i>	<b>10</b>	<b>18</b>	-	<b>5</b>
<b>PC7.</b> install and connect the automation elements like PLC, VFD, HMI, Pneumatics, Hydraulics Elements, Industrial sensors, IIOT Sensors, control devices to I/O link master via I/O link Devices as per SOP and Engineer instructions	2	5	-	1
<b>PC8.</b> support in installation of the cable between devices as per the signaling parameters like bend radius, signal ground, terminal resistor, cable length etc.	2	3	-	1
<b>PC9.</b> establish the communication between automation system, intelligent devices, and robots by doing parameter setting like baud rate, distance, station ID and station type	2	4	-	1

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC10.</b> support in setting the network parameters of automation system on the device manufacturers software as per SOP and organizational guidelines	2	3	-	1
<b>PC11.</b> turn on the power of automation devices, system in the network and look for healthy communication between them	2	3	-	1
<i>Ensure IIOT network security</i>	<b>6</b>	<b>10</b>	-	<b>5</b>
<b>PC12.</b> ensure physical security of the network contains I/O Link, I/O Link Master, IIOT Sensors, machines, robots and automation system	2	4	-	2
<b>PC13.</b> protect the network from unauthorized access or malicious internet by following organizational guidelines	2	3	-	2
<b>PC14.</b> ensure that only authorized devices should be able to connect to the network	2	3	-	1
<i>Perform post-installation activities</i>	<b>5</b>	<b>6</b>	-	<b>3</b>
<b>PC15.</b> support in conducting the trials of system as per the e-plan and align it with the existing or new manufacturing process	2	2	-	1
<b>PC16.</b> handover the system to production team & support the engineer to provide them training on its use and operation as per organizational guidelines and procedures	1	2	-	1
<b>PC17.</b> prepare documents and records as a reference for future development as per Engineer instructions	2	2	-	1
<b>NOS Total</b>	<b>30</b>	<b>50</b>	-	<b>20</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N6432
<b>NOS Name</b>	Support in integration of machines, robots and automation system, IIOT Sensors using industrial networking protocols and I/O Link
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Production Engineering
<b>NSQF Level</b>	3.5
<b>Credits</b>	4
<b>Version</b>	2.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	31/03/2025
<b>NSQC Clearance Date</b>	31/03/2022



## Qualification Pack

# ASC/N6433: Perform remote monitoring, controlling and fetching of vital machine data of the devices connected in the IIOT network

## Description

This unit is about performing remote monitoring, controlling and fetching of vital machine data of the devices connected in the IIOT network.

## Scope

The scope covers the following :

- Perform IIOT network assessment
- Perform Remote Monitoring and Controlling of Machines
- Fetch Vital Machine Data

## Elements and Performance Criteria

### *Perform IIOT network assessment*

To be competent, the user/individual on the job must be able to:

- PC1.** conduct on-site surveys of the IIOT network to assess the system operation
- PC2.** monitor and record the on-field device status as per SOP
- PC3.** detect all sources of network interference available in the range of IIOT network
- PC4.** eliminate the impact of network interference by following organizational guidelines

### *Perform remote monitoring and controlling of machines*

To be competent, the user/individual on the job must be able to:

- PC5.** monitor the real time open alarm, machine status and system logs of the IIOT network
- PC6.** manage production, quality & preventive maintenance plans remotely
- PC7.** monitor life of subsystems of IIOT network with user defined limits
- PC8.** analyse the present condition of the machines, robots and automation system (cycling, idle, setup, breakdown) by following Engineer instructions

### *Fetch Vital Machine Data*

To be competent, the user/individual on the job must be able to:

- PC9.** fetch machine power consumption report and machine spare part life utilization report by following SOP/WI
- PC10.** identify and analyse the reason of machine idleness, machine setup and machine breakdown activity in the IIOT network
- PC11.** analyse the real time feed override, consumable request, system alarm as per SOP

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

## Qualification Pack

- KU1.** organizational policies, procedures, and guidelines that relate to designing and maintaining networks
- KU2.** organizational policies and procedures for sharing data, documenting network designs and fallback mechanisms
- KU3.** who to involve while monitoring and troubleshooting the network
- KU4.** the range of standard templates and tools available and how to use them
- KU5.** connectivity protocols for device-device communications
- KU6.** wired/wireless connectivity protocols for device-device or device-gateway communications
- KU7.** the network management dashboards and applications
- KU8.** network topologies, wired and wireless technologies, fiber optics, etc.
- KU9.** updated internal and external network regulations
- KU10.** how to perform network assessments

## Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** follow instructions, guidelines, procedures, rules, and service level agreements
- GS2.** listen effectively and communicate information accurately
- GS3.** follow rule-based decision-making processes
- GS4.** make decisions on suitable courses
- GS5.** plan and organize the work to achieve targets and meet deadlines
- GS6.** refer anomalies to the supervisor
- GS7.** ask for clarification and advice from appropriate people
- GS8.** analyze the business impact and disseminate relevant information to others
- GS9.** apply balanced judgments to different situations
- GS10.** check the work is complete and free from errors
- GS11.** work independently and collaboratively

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform IIOT network assessment</i>	<b>10</b>	<b>17</b>	-	<b>6</b>
<b>PC1.</b> conduct on-site surveys of the IIOT network to assess the system operation	2	5	-	1
<b>PC2.</b> monitor and record the on-field device status as per SOP	2	5	-	2
<b>PC3.</b> detect all sources of network interference available in the range of IIOT network	3	3	-	1
<b>PC4.</b> eliminate the impact of network interference by following organizational guidelines	3	4	-	2
<i>Perform remote monitoring and controlling of machines</i>	<b>10</b>	<b>18</b>	-	<b>8</b>
<b>PC5.</b> monitor the real time open alarm, machine status and system logs of the IIOT network	3	5	-	2
<b>PC6.</b> manage production, quality & preventive maintenance plans remotely	2	4	-	2
<b>PC7.</b> monitor life of subsystems of IIOT network with user defined limits	3	4	-	2
<b>PC8.</b> analyse the present condition of the machines, robots and automation system (cycling, idle, setup, breakdown) by following Engineer instructions	2	5	-	2
<i>Fetch Vital Machine Data</i>	<b>10</b>	<b>15</b>	-	<b>6</b>
<b>PC9.</b> fetch machine power consumption report and machine spare part life utilization report by following SOP/WI	4	5	-	2
<b>PC10.</b> identify and analyse the reason of machine idleness, machine setup and machine breakdown activity in the IIOT network	3	5	-	2
<b>PC11.</b> analyse the real time feed override, consumable request, system alarm as per SOP	3	5	-	2
<b>NOS Total</b>	<b>30</b>	<b>50</b>	-	<b>20</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N6433
<b>NOS Name</b>	Perform remote monitoring, controlling and fetching of vital machine data of the devices connected in the IIOT network
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Production Engineering
<b>NSQF Level</b>	3.5
<b>Credits</b>	3.5
<b>Version</b>	2.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	31/03/2025
<b>NSQC Clearance Date</b>	31/03/2022

## Qualification Pack

# ASC/N6434: Carry out maintenance and troubleshooting of I/O link master and IIOT network devices

## Description

This unit is about performing maintenance and troubleshooting of I/O link master and IIOT network devices.

## Scope

The scope covers the following :

- Perform maintenance of IIOT sensors and I/O link master
- Carry out troubleshooting activities

## Elements and Performance Criteria

### *Perform Maintenance of IIOT Edge Devices*

To be competent, the user/individual on the job must be able to:

- PC1.** analyse the machine alarms - start time, end time, duration, reason with graphical view and report
- PC2.** raise alert for machine maintenance related activities via SMS/Email as per SOP and organizational guidelines
- PC3.** analyse the MTTR & MTBF report, breakdown, OEE, machine power consumption and machine spare part life utilization report

### *Carry out troubleshooting activities*

To be competent, the user/individual on the job must be able to:

- PC4.** perform detailed troubleshooting and analysis of IIOT networks and end devices
- PC5.** identify network blind spots
- PC6.** diagnose and resolve network configuration and connectivity issues by following SOP/WI
- PC7.** perform line test on devices connected on the IIOT network
- PC8.** perform hardware test on communication modules, I/O link, and I/O link master

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** organizational policies, procedures, and guidelines that relate to designing and maintaining networks
- KU2.** organizational policies and procedures for sharing data, documenting network designs and fallback mechanisms
- KU3.** who to involve during maintenance and troubleshooting of the network
- KU4.** range of standard templates and tools available and how to use them
- KU5.** connectivity protocols for device-device communications

## Qualification Pack

- KU6.** wired/wireless connectivity protocols for device-device or device-gateway communications
- KU7.** network management dashboards and applications
- KU8.** network topologies, wired and wireless technologies, fiber optics, etc.
- KU9.** updated internal and external network regulations
- KU10.** how to perform network assessments
- KU11.** how to diagnose and resolve network issues
- KU12.** how to identify network blind spots

## Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** follow instructions, guidelines, procedures, rules, and service level agreements
- GS2.** listen effectively and communicate information accurately
- GS3.** follow rule-based decision-making processes
- GS4.** make decisions on suitable courses
- GS5.** plan and organize the work to achieve targets and meet deadlines
- GS6.** refer anomalies to the supervisor
- GS7.** ask for clarification and advice from appropriate people
- GS8.** analyze the business impact and disseminate relevant information to others
- GS9.** apply balanced judgments to different situations
- GS10.** check the work is complete and free from errors
- GS11.** work independently and collaboratively

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform Maintenance of IIOT Edge Devices</i>	<b>13</b>	<b>21</b>	-	<b>11</b>
<b>PC1.</b> analyse the machine alarms - start time, end time, duration, reason with graphical view and report	4	6	-	4
<b>PC2.</b> raise alert for machine maintenance related activities via SMS/Email as per SOP and organizational guidelines	5	7	-	4
<b>PC3.</b> analyse the MTTR & MTBF report, breakdown, OEE, machine power consumption and machine spare part life utilization report	4	8	-	3
<i>Carry out troubleshooting activities</i>	<b>17</b>	<b>29</b>	-	<b>9</b>
<b>PC4.</b> perform detailed troubleshooting and analysis of IIOT networks and end devices	4	6	-	2
<b>PC5.</b> identify network blind spots	3	5	-	2
<b>PC6.</b> diagnose and resolve network configuration and connectivity issues by following SOP/WI	3	6	-	2
<b>PC7.</b> perform line test on devices connected on the IIOT network	4	6	-	1
<b>PC8.</b> perform hardware test on communication modules, I/O link, and I/O link master	3	6	-	2
<b>NOS Total</b>	<b>30</b>	<b>50</b>	-	<b>20</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N6434
<b>NOS Name</b>	Carry out maintenance and troubleshooting of I/O link master and IIOT network devices
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Production Engineering
<b>NSQF Level</b>	3.5
<b>Credits</b>	3
<b>Version</b>	2.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	31/03/2025
<b>NSQC Clearance Date</b>	31/03/2022

## Assessment Guidelines and Assessment Weightage

### Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down the proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on the knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for the theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.
6. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.



## Qualification Pack

**Minimum Aggregate Passing % at QP Level : 70**

(Please note: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

## Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N9803.Organize work and resources (Manufacturing)	50	30	-	20	100	15
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	10
ASC/N6432.Support in integration of machines, robots and automation system, IIOT Sensors using industrial networking protocols and I/O Link	30	50	-	20	100	25
ASC/N6433.Perform remote monitoring, controlling and fetching of vital machine data of the devices connected in the IIOT network	30	50	-	20	100	25
ASC/N6434.Carry out maintenance and troubleshooting of I/O link master and IIOT network devices	30	50	-	20	100	25
<b>Total</b>	<b>160</b>	<b>210</b>	<b>-</b>	<b>80</b>	<b>450</b>	<b>100</b>

## Qualification Pack

### Acronyms

<b>NOS</b>	National Occupational Standard(s)
<b>NSQF</b>	National Skills Qualifications Framework
<b>QP</b>	Qualifications Pack
<b>TVET</b>	Technical and Vocational Education and Training
<b>PPE</b>	Personal Protective Equipment
<b>PwD</b>	Person with Disability
<b>SOP</b>	Standard Operating Practices
<b>PwD</b>	Persons with Disability
<b>I/O</b>	Input/Output
<b>IIOT</b>	Industrial Internet of Things
<b>OPC UA</b>	OPC Unified Architecture
<b>MQTT</b>	MQ Telemetry Transport
<b>PLC</b>	Programmable Logic Controller
<b>VFD</b>	Variable Frequency Drive
<b>HMI</b>	Human-Machine Interface
<b>MTTR</b>	Mean Time to Recovery or Mean Time to Restore
<b>MTBF</b>	Mean Time Between Failures
<b>PPE</b>	Personal Protective Equipment
<b>PwD</b>	Person with Disability
<b>SOP</b>	Standard Operating Practices
<b>I/O</b>	Input/Output
<b>IIOT</b>	Industrial Internet of Things
<b>OPC UA</b>	OPC Unified Architecture
<b>MQTT</b>	MQ Telemetry Transport
<b>PLC</b>	Programmable Logic Controller

## Qualification Pack

<b>VFD</b>	Variable Frequency Drive
<b>HMI</b>	Human-Machine Interface
<b>MTTR</b>	Mean Time to Recovery or Mean Time to Restore
<b>MTBF</b>	Mean Time Between Failures

## Qualification Pack

### Glossary

<b>Sector</b>	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
<b>Sub-sector</b>	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
<b>Occupation</b>	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
<b>Job role</b>	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
<b>Occupational Standards (OS)</b>	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
<b>Performance Criteria (PC)</b>	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
<b>National Occupational Standards (NOS)</b>	NOS are occupational standards which apply uniquely in the Indian context.
<b>Qualifications Pack (QP)</b>	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
<b>Unit Code</b>	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
<b>Unit Title</b>	Unit title gives a clear overall statement about what the incumbent should be able to do.
<b>Description</b>	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
<b>Scope</b>	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

## Qualification Pack

<b>Knowledge and Understanding (KU)</b>	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
<b>Organisational Context</b>	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
<b>Technical Knowledge</b>	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
<b>Core Skills/ Generic Skills (GS)</b>	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
<b>Electives</b>	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
<b>Options</b>	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.