Qualification Pack

Automotive IIOT Application Engineer

QP Code: ASC/Q6412

Version: 3.0

NSQF Level: 4.5

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Qualification Pack

ASC/Q6412: Automotive IIOT Application Engineer

Brief Job Description

Individual at this job is responsible for integrating machines,robots and automation systems, establish healthy communication using network protocols, remote monitoring and fetch vital machine data using IIOT edge devices within an organization for all its processes, the new development, production and application phases.

Personal Attributes

The person should be organized, team-oriented and have the ability to 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/N9810: Manage work and resources (Manufacturing)
2. DGT/VSQ/N0102: Employability Skills (60 Hours)
3. SSC/N8227: Design network architecture for end-to-end IoT solutions
4. ASC/N6429: Integration of Machines, Robots and Automation system using industrial networking protocols, IIOT Sensors and I/O Link
5. ASC/N6430: Perform Remote Monitoring, Controlling and fetch Vital machine data using IIOT Edge Devices
6. ASC/N6431: Maintenance and Troubleshoot IIOT network and Devices

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Production Engineering
Country	India

Qualification Pack

NSQF Level	4.5
Credits	15
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2144.0801
Minimum Educational Qualification & Experience	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 OR Certificate-NSQF (Automotive IIOT Application Technician Level 3.5) with 3 Years of experience of Experience with minimum education as 8th class pass
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	22 Years
Last Reviewed On	NA
Next Review Date	03/05/2026
NSQC Approval Date	03/05/2023
Version	3.0
Reference code on NQR	QG-4.5-AU-00541-2023-V1.1-ASDC
NQR Version	1.1

ASC/N9810: Manage work and resources (Manufacturing)

Description

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

Scope

The scope covers the following :

- Maintain safe and secure working environment
- Maintain Health and Hygiene
- 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. implement safe working practices for dealing with hazards to ensure safety of self and others

PC3. conduct regular checks of the machines with support of the maintenance team to identify potential hazards

PC4. ensure that all the tools/equipment/fasteners/spare parts are arranged as per specifications/utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions

PC5. organise safety drills or training sessions to create awareness amongst others on the identified risks and safety practices

PC6. fill daily check sheet to report improvements done and risks identified

PC7. ensure that relevant safety boards/signs are placed on the shop floor for the safety of self and others

PC8. report any identified breaches in health, safety and security policies and procedures to the designated person

Maintain Health and Hygiene

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

PC9. ensure workplace, equipment, restrooms etc. are sanitized regularly

PC10. ensure team is aware about hygiene and sanitation regulations and following them on the shop floor

PC11. ensure availability of running water, hand wash and alcohol-based sanitizers at the workplace

PC12. report advanced hygiene and sanitation issues to appropriate authority

PC13. follow stress and anxiety management techniques and support employees to cope with stress, anxiety etc

PC14. wear and dispose PPEs regularly and appropriately

Effective waste management practices

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

PC15. ensure recyclable, non-recyclable and hazardous wastes are segregated as per SOP

PC16. ensure proper mechanism is followed while collecting and disposing of non-recyclable, recyclable and reusable waste

Material/energy conservation practices

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

PC17. ensure malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment are resolved effectively

PC18. prepare and analyze material and energy audit reports to decipher excessive consumption of material and water

PC19. identify possibilities of using renewable energy and environment friendly fuels

PC20. identify processes where material and energy/electricity utilization can be optimized

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. various types of fire extinguisher

KU7. various types of safety signs and their meaning

KU8. appropriate first aid treatment relevant to different condition e.g. bleeding, minor burns, eye injuries etc.

KU9. relevant standards, procedures and policies related to 5S followed in the company

KU10. the various materials used and their storage norms

KU11. importance of efficient utilisation of material and water

KU12. basics of electricity and prevalent energy efficient devices

KU13. common practices of conserving electricity

KU14. common sources and ways to minimize pollution

KU15. categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics

KU16. waste management techniques

KU17. 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. work with supervisors/team members to carry out work related tasks
GS4. complete tasks efficiently and accurately within stipulated time
GS5. inform/report to concerned person in case of any problem
GS6. make timely decisions for efficient utilization of resources
GS7. write reports such as accident report, in at least English/regional language

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Maintain safe and secure working environment	**20**	**13**	**-**	**8**
PC1. identify hazardous activities and the possible causes of risks or accidents in the workplace	4	2	-	2
PC2. implement safe working practices for dealing with hazards to ensure safety of self and others	3	1	-	2
PC3. conduct regular checks of the machines with support of the maintenance team to identify potential hazards	2	2	-	1
PC4. ensure that all the tools/equipment/fasteners/spare parts are arranged as per specifications/utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions	3	2	-	1
PC5. organise safety drills or training sessions to create awareness amongst others on the identified risks and safety practices	2	-	-	-
PC6. fill daily check sheet to report improvements done and risks identified	2	2	-	-
PC7. ensure that relevant safety boards/signs are placed on the shop floor for the safety of self and others	2	2	-	1
PC8. report any identified breaches in health, safety and security policies and procedures to the designated person	2	2	-	1
Maintain Health and Hygiene	**13**	**7**	**-**	**5**
PC9. ensure workplace, equipment, restrooms etc. are sanitized regularly	3	2	-	1
PC10. ensure team is aware about hygiene and sanitation regulations and following them on the shop floor	2	1	-	-
PC11. ensure availability of running water, hand wash and alcohol-based sanitizers at the workplace	2	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. report advanced hygiene and sanitation issues to appropriate authority	1	1	-	1
PC13. follow stress and anxiety management techniques and support employees to cope with stress, anxiety etc	2	1	-	1
PC14. wear and dispose PPEs regularly and appropriately	3	-	-	1
Effective waste management practices	**6**	**4**	**-**	**1**
PC15. ensure recyclable, non-recyclable and hazardous wastes are segregated as per SOP	3	2	-	-
PC16. ensure proper mechanism is followed while collecting and disposing of non-recyclable, recyclable and reusable waste	3	2	-	1
Material/energy conservation practices	**11**	**6**	**-**	**6**
PC17. ensure malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment are resolved effectively	2	2	-	1
PC18. prepare and analyze material and energy audit reports to decipher excessive consumption of material and water	3	2	-	1
PC19. identify possibilities of using renewable energy and environment friendly fuels	3	1	-	2
PC20. identify processes where material and energy/electricity utilization can be optimized	3	1	-	2
NOS Total	**50**	**30**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9810
NOS Name	Manage work and resources (Manufacturing)
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	2
Version	2.0
Last Reviewed Date	03/05/2023
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

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:

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.

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

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

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	**1**	**1**	**-**	**-**
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
Constitutional values – Citizenship	**1**	**1**	**-**	**-**
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	**2**	**4**	**-**	**-**
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	**2**	**3**	**-**	**-**
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	**1**	**2**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
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	**2**	**2**	**-**	**-**
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	**1**	**2**	**-**	**-**
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	**2**	**3**	**-**	**-**
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	**3**	**4**	**-**	**-**
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	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Entrepreneurship	**2**	**3**	**-**	**-**
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	**1**	**2**	**-**	**-**
PC26. identify different types of customers	-	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**2**	**3**	**-**	**-**
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	-	-	-	-
NOS Total	**20**	**30**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0102
NOS Name	Employability Skills (60 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	18/02/2025
Next Review Date	18/02/2028
NSQC Clearance Date	18/02/2025

SSC/N8227: Design network architecture for end-to-end IoT solutions

Description

This unit is about designing networks and network dashboards while taking various considerations, regulations, and interoperability requirements into account.

Scope

The scope covers the following :

- Capture the problem statement
- Define various parameters of network design
- Evaluate regulations
- Design network dashboards

Elements and Performance Criteria

Capture the problem statement

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

PC1. evaluate requirements of the IoT network

PC2. identify the devices and systems to be connected by the IoT network

PC3. identify appropriate technology, devices, and deployment model to best meet the overall needs of the IoT network

Define various parameters of network design

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

PC4. design wireless/wired network nodes while taking into consideration the varieties of IoT Clients, Edge devices, Cloud Service/IoT Broker, and other networking devices

PC5. apply appropriate wired/wireless connectivity protocols for device-cloud communications (this many include protocols such as 5G, Wi-Fi, GSM, GPRS and Satellite)

PC6. evaluate impacts of IoT network on the environment and on human health

PC7. build interoperable networks where end-to-end communication is possible across diverse components

PC8. ensure network supports bulk configuration functionalities across multiple solution components

PC9. design fallback mechanisms in case of network disruptions and outages

PC10. address network redundancy considerations

Evaluate regulations

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

PC11. evaluate regulatory aspects of building network such as permitted frequency bands

Design network dashboards

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

PC12. design and develop networking dashboards used for network monitoring

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
KU3. organizational policies and procedures for documenting network designs and fallback mechanisms
KU4. who to involve while designing and developing networks for the solution
KU5. the range of standard templates and tools available and how to use them
KU6. the connectivity protocols for device-cloud communications (this may include protocols such as 5G, Wi-Fi, GSM, GPRS, and Satellite)
KU7. the wired/wireless connectivity protocols for device-device or device-gateway communications (this may include protocols such as NFC, NB-IoT, Bluetooth/BLE, ZigBee, Mesh, and Lora)
KU8. the network management dashboards and applications (such as HP Open View)
KU9. the network topologies, wired and wireless technologies, fiber optics, etc.
KU10. the updated internal and external network regulations
KU11. the impacts of network on the environment and human health

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. apply problem-solving approaches to different situations
GS7. analyze the business impact and disseminate relevant information to others
GS8. apply balanced judgments to different situations
GS9. check the work is complete and free from errors

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Capture the problem statement	**9**	**21**	**-**	**-**
PC1. evaluate requirements of the IoT network	3	7	-	-
PC2. identify the devices and systems to be connected by the IoT network	3	7	-	-
PC3. identify appropriate technology, devices, and deployment model to best meet the overall needs of the IoT network	3	7	-	-
Define various parameters of network design	**18**	**42**	**-**	**-**
PC4. design wireless/wired network nodes while taking into consideration the varieties of IoT Clients, Edge devices, Cloud Service/IoT Broker, and other networking devices	3	7	-	-
PC5. apply appropriate wired/wireless connectivity protocols for device-cloud communications (this many include protocols such as 5G, Wi-Fi, GSM, GPRS and Satellite)	3	7	-	-
PC6. evaluate impacts of IoT network on the environment and on human health	5	10	-	-
PC7. build interoperable networks where end-to-end communication is possible across diverse components	1	4	-	-
PC8. ensure network supports bulk configuration functionalities across multiple solution components	1	4	-	-
PC9. design fallback mechanisms in case of network disruptions and outages	3	7	-	-
PC10. address network redundancy considerations	2	3	-	-
Evaluate regulations	**2**	**3**	**-**	**-**
PC11. evaluate regulatory aspects of building network such as permitted frequency bands	2	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Design network dashboards	**1**	**4**	**-**	**-**
PC12. design and develop networking dashboards used for network monitoring	1	4	-	-
NOS Total	**30**	**70**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	SSC/N8227
NOS Name	Design network architecture for end-to-end IoT solutions
Sector	IT-ITeS
Sub-Sector	Future Skills
Occupation	Internet of Things
NSQF Level	7
Credits	TBD
Version	2.0
Last Reviewed Date	03/05/2023
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

ASC/N6429: Integration of Machines, Robots and Automation system using industrial networking protocols, IIOT Sensors and I/O Link

Description

This NOS unit is about performing task related to integration of Machines,robots and automation systems using industrial networking protocols, IIOT devices used in manufacturing processes to meet the specification set by the 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 and network protocols
- 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. analyse the installed machines, automation elements, system and robots into different layers of network architecture like field devices, control devices, network

PC2. design/interpret the network consists of devices, automation system and robots

PC3. select and install the suitable network protocols like MODBUS, CC-LINK, Profinet, Profibus, OPC UA, MQTT etc. based on control system requirements

PC4. connect the intelligent devices and system using suitable network topology like STAR, LINE, RING as per network design document

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:

PC5. connect the automation elements like sensors, control devices to I/O link master as per SOP

PC6. install the cable between devices in align with signaling parameters like bend radius, signal ground, terminal resistor, cable length etc.

PC7. establish the communication between automation system, intelligent devices, and robots by doing parameter setting like baud rate, distance, station ID and station type

PC8. set the network parameters of automation system on the device manufacturers software as per SOP and organizational guidelines

PC9. turn on the power of automation devices, system in the network and look for healthy communication between them

Ensure IIOT network security

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

PC10. ensure physical security of the network Contains IIOT Edge Devices, IIOT Sensors, Machines, Robots and Automation System

PC11. protect the network from unauthorized access or malicious internet

PC12. ensure 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:

PC13. Conduct the trials of system as per the e-plan to align it with existing or new manufacturing process

PC14. Handover the system to production team & train them on it as per organizational guidelines and procedures

PC15. prepare documents and records such as experience under development, TGW /TGR faced during process trials etc. as a reference for future development

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

Generic Skills (GS)

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

GS1. communicate effectively at the workplace

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. recognize a workplace problem and take suitable action

GS5. analyze 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

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Install the elements in different layers of industrial network architecture and protocols	**11**	**10**	**-**	**6**
PC1. analyse the installed machines, automation elements, system and robots into different layers of network architecture like field devices, control devices, network	3	2	-	1
PC2. design/interpret the network consists of devices, automation system and robots	3	3	-	1
PC3. select and install the suitable network protocols like MODBUS, CC-LINK, Profinet, Profibus, OPC UA, MQTT etc. based on control system requirements	3	3	-	2
PC4. connect the intelligent devices and system using suitable network topology like STAR, LINE, RING as per network design document	2	2	-	2
Integrate and establish communication using I/O link master and network protocols	**12**	**9**	**-**	**5**
PC5. connect the automation elements like sensors, control devices to I/O link master as per SOP	2	2	-	1
PC6. install the cable between devices in align with signaling parameters like bend radius, signal ground, terminal resistor, cable length etc.	3	2	-	1
PC7. establish the communication between automation system, intelligent devices, and robots by doing parameter setting like baud rate, distance, station ID and station type	3	2	-	1
PC8. set the network parameters of automation system on the device manufacturers software as per SOP and organizational guidelines	2	2	-	1
PC9. turn on the power of automation devices, system in the network and look for healthy communication between them	2	1	-	1
Ensure IIOT network security	**12**	**16**	**-**	**5**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. ensure physical security of the network Contains IIOT Edge Devices, IIOT Sensors, Machines, Robots and Automation System	4	6	-	2
PC11. protect the network from unauthorized access or malicious internet	4	5	-	2
PC12. ensure only authorized devices should be able to connect to the network	4	5	-	1
Perform post-installation activities	**5**	**5**	**-**	**4**
PC13. Conduct the trials of system as per the e-plan to align it with existing or new manufacturing process	2	2	-	1
PC14. Handover the system to production team & train them on it as per organizational guidelines and procedures	1	2	-	1
PC15. prepare documents and records such as experience under development, TGW /TGR faced during process trials etc. as a reference for future development	2	1	-	2
NOS Total	**40**	**40**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6429
NOS Name	Integration of Machines, Robots and Automation system using industrial networking protocols, IIOT Sensors and I/O Link
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Production Engineering
NSQF Level	4.5
Credits	2.5
Version	2.0
Last Reviewed Date	03/05/2023
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

ASC/N6430: Perform Remote Monitoring, Controlling and fetch Vital machine data using IIOT Edge Devices

Description

This unit is about performing Remote monitoring, Controlling and fetch Vital Machine Data using IIOT Edge Devices

Scope

The scope covers the following :

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

Elements and Performance Criteria

Perform network assessment

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

PC1. perform on-site surveys on the IIoT network

PC2. perform on field device status

PC3. detect sources of network interference

PC4. eliminate the impact of network interference

PC5. collect network usage and traffic statistics

Perform Remote Monitoring and Controlling of Machines

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

PC6. monitor the real time open alarm and machine status

PC7. monitor system logs of the IIoT network

PC8. manage production, quality & preventive maintenance plans remotely

PC9. get notified about plan versus produced with valid reason of losses

PC10. monitor life of subsystems with user defined limits

PC11. analyze the Present condition of the machines, Robots and Automation System (cycling, idle, setup, breakdown)

Fetch Vital Machine Data

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

PC12. fetch machine power consumption report

PC13. fetch machine spare part life utilization report

PC14. capture the reason for machine idleness, machine setup activity, machine breakdown activity

PC15. analyze the real time feed override, consumable request, system alarm

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
KU3. organizational policies and procedures for documenting network designs and fallback mechanisms
KU4. who to involve while monitoring and troubleshooting the network
KU5. the range of standard templates and tools available and how to use them
KU6. the connectivity protocols for device-cloud communications (this may include protocols such as 5G, Wi-Fi, GSM, GPRS, and Satellite
KU7. the wired/wireless connectivity protocols for device-device or device-gateway communications (this may include protocols such as NFC, NB-IoT, Bluetooth/BLE, ZigBee, Mesh, and Lora)
KU8. the network management dashboards and applications (such as HP Open View)
KU9. the network topologies, wired and wireless technologies, fiber optics, etc.
KU10. the updated internal and external network regulations
KU11. how to perform network assessments
KU12. how to diagnose and resolve network issues
KU13. 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

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Perform network assessment	**14**	**15**	**-**	**6**
PC1. perform on-site surveys on the IIoT network	3	3	-	1
PC2. perform on field device status	3	4	-	2
PC3. detect sources of network interference	3	3	-	1
PC4. eliminate the impact of network interference	2	2	-	1
PC5. collect network usage and traffic statistics	3	3	-	1
Perform Remote Monitoring and Controlling of Machines	**14**	**15**	**-**	**8**
PC6. monitor the real time open alarm and machine status	2	2	-	1
PC7. monitor system logs of the IIoT network	2	3	-	1
PC8. manage production, quality & preventive maintenance plans remotely	3	2	-	1
PC9. get notified about plan versus produced with valid reason of losses	2	3	-	1
PC10. monitor life of subsystems with user defined limits	2	2	-	2
PC11. analyze the Present condition of the machines, Robots and Automation System (cycling, idle, setup, breakdown)	3	3	-	2
Fetch Vital Machine Data	**12**	**10**	**-**	**6**
PC12. fetch machine power consumption report	3	3	-	2
PC13. fetch machine spare part life utilization report	3	2	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. capture the reason for machine idleness, machine setup activity, machine breakdown activity	3	3	-	1
PC15. analyze the real time feed override, consumable request, system alarm	3	2	-	1
NOS Total	**40**	**40**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6430
NOS Name	Perform Remote Monitoring, Controlling and fetch Vital machine data using IIOT Edge Devices
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Production Engineering
NSQF Level	4.5
Credits	2.5
Version	2.0
Last Reviewed Date	03/05/2023
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

ASC/N6431: Maintenance and Troubleshoot IIOT network and Devices

Description

This unit is about performing Maintenance and troubleshooting of IIOT Devices and Network Assessments

Scope

The scope covers the following :

- Perform maintenance of IIOT Edge Devices
- 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. analyze 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

PC3. analyze 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. diagnose and resolve network configuration and connectivity issues

PC5. perform Line test on devices connected on the IIOT Network

PC6. perform Hardware Test on Communication Modules, I/O Link Master

PC7. identify network blind spots

PC8. perform detailed troubleshooting and analysis of IIoT networks and endpoints

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

KU3. organizational policies and procedures for documenting network designs and fallback mechanisms

KU4. who to involve while monitoring and troubleshooting the network

KU5. the range of standard templates and tools available and how to use them

KU6. the connectivity protocols for device-cloud communications (this may include protocols such as 5G, Wi-Fi, GSM, GPRS, and Satellite

KU7. the wired/wireless connectivity protocols for device-device or device-gateway communications (this may include protocols such as NFC, NB-IoT, Bluetooth/BLE, ZigBee, Mesh, and Lora)

KU8. the network management dashboards and applications

KU9. the network topologies, wired and wireless technologies, fiber optics, etc.

KU10. the updated internal and external network regulations

KU11. how to perform network assessments

KU12. how to diagnose and resolve network issues

KU13. 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

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Perform maintenance of IIOT Edge Devices	**18**	**20**	**-**	**11**
PC1. analyze the Machine Alarms- start time, end time, duration, reason with graphical view and report	5	6	-	4
PC2. raise alert for machine maintenance related activities via SMS/Email	7	7	-	4
PC3. analyze the MTTR & MTBF Report, Breakdown, OEE, Machine power consumption and machine spare part life utilization report	6	7	-	3
Carry out troubleshooting activities	**22**	**20**	**-**	**9**
PC4. diagnose and resolve network configuration and connectivity issues	5	4	-	2
PC5. perform Line test on devices connected on the IIOT Network	4	5	-	2
PC6. perform Hardware Test on Communication Modules, I/O Link Master	4	5	-	2
PC7. identify network blind spots	5	3	-	1
PC8. perform detailed troubleshooting and analysis of IIoT networks and endpoints	4	3	-	2
NOS Total	**40**	**40**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6431
NOS Name	Maintenance and Troubleshoot IIOT network and Devices
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Production Engineering
NSQF Level	4.5
Credits	3
Version	2.0
Last Reviewed Date	03/05/2023
Next Review Date	03/05/2026
NSQC Clearance Date	03/05/2023

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.

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/N9810.Manage work and resources (Manufacturing)	50	30	-	20	100	15
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	10
SSC/N8227.Design network architecture for end-to-end IoT solutions	30	70	-	-	100	20
ASC/N6429.Integration of Machines, Robots and Automation system using industrial networking protocols, IIOT Sensors and I/O Link	40	40	-	20	100	20
ASC/N6430.Perform Remote Monitoring, Controlling and fetch Vital machine data using IIOT Edge Devices	40	40	-	20	100	20
ASC/N6431.Maintenance and Troubleshoot IIOT network and Devices	40	40	-	20	100	15
Total	**220**	**250**	**-**	**80**	**550**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
I/O	Input/Output
IIOT	Industrial Internet of Things
MTTR	Mean Time to Recovery
MTBF	Mean Time Between Failures
I/O	Input/Output
IIOT	Industrial Internet of Things
MTTR	Mean Time to Recovery
MTBF	Mean Time Between Failures

Glossary

Sector	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.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	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.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	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.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	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.
Scope	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.

Knowledge and Understanding (KU)	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.
Organisational Context	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.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	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.
Electives	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.
Options	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.