सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

Qualification Pack

Automotive IIOT Application Engineer

QP Code: ASC/Q6412

Version: 1.0

NSQF Level: 5

Automotive Skills Development Council || 153, GF, Okhla Industrial Area, Phase 3
New Delhi 110020

Contents

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. ASC/N9812: Interact effectively with team, customers and others
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

NSQF Level	5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2144.0801
Minimum Educational Qualification & Experience	B.E/ B. Tech (Automobile/ Mechanical/Electrical/Electronics) OR 3 years Diploma (Automobile/ Mechanical/Electrical/Electronics) from a recognized body (after class 12th) with 1 year of relevant experience OR Certificate-NSQF Level 4 (Automotive IIOT Application Technician) with 2 Years of relevant experience
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	22 Years
Last Reviewed On	27/01/2022
Next Review Date	27/01/2025
NSQC Approval Date	27/01/2022
Version	1.0
Reference code on NQR	2022/AUT/ASDC/05105
NQR Version	1.0

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	TBD
Version	1.0
Last Reviewed Date	27/01/2022
Next Review Date	27/01/2025
NSQC Clearance Date	27/01/2022

ASC/N9812: Interact effectively with team, customers and others

Description

This unit is about communicating with team members, superior and others.

Scope

The scope covers the following :

- Communicate effectively with team members
- Interact with superiors
- Respect gender and ability differences

Elements and Performance Criteria

Communicate effectively with team members

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

PC1. implement ways to share information with team members in line with organisational requirements

PC2. ensure that work requirements are clearly communicated to the team members through all means including face-to-face, telephonic and written

PC3. manage and co-ordinate with team members to integrate work as per requirements

PC4. work in a way that show respect for all team members and customers

PC5. carry out commitments made to team members and let them know in good time if there is any discrepancy with reasons

PC6. resolve conflicts within the team members at work to achieve smooth workflow

PC7. guide the team members to follow the organisation's policies and procedures

PC8. ensure team goals are given preference over individual goals

PC9. respect personal space of colleagues and customers

Interact with superiors

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

PC10. report progress on job allocated and team performance to the superiors

PC11. escalate problems to superiors that cannot be handled

PC12. train the team members to report completed work and receive feedback on work done

PC13. encourage team members to rectify errors as per feedback and minimize mistakes in future

Respect gender and ability differences

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

PC14. ensure team shows sensitivity towards all genders and PwD

PC15. adjust communication styles to reflect gender sensitivity and sensitivity towards person with disability

PC16. help PwD team members to overcome the challenges, if asked

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the importance of effective communication and establishing good working relationships with team members and superiors
KU2. different methods of communication as per the circumstances
KU3. gender based concepts, issues and legislation
KU4. organisation standards and guidelines to be followed for PwD
KU5. rights and duties at workplace with respect to PwD
KU6. organisation policies and procedures pertaining to written and verbal communication

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. make timely decisions for efficient utilization of resources
GS6. read instructions/guidelines/procedures
GS7. write in English/any one language

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Communicate effectively with team members	20	14	-	8
PC1. implement ways to share information with team members in line with organisational requirements	2	2	-	-
PC2. ensure that work requirements are clearly communicated to the team members through all means including face-to-face, telephonic and written	2	2	-	2
PC3. manage and co-ordinate with team members to integrate work as per requirements	2	1	-	2
PC4. work in a way that show respect for all team members and customers	3	1	-	2
PC5. carry out commitments made to team members and let them know in good time if there is any discrepancy with reasons	2	2	-	-
PC6. resolve conflicts within the team members at work to achieve smooth workflow	3	2	-	-
PC7. guide the team members to follow the organisation's policies and procedures	2	1	-	-
PC8. ensure team goals are given preference over individual goals	2	1	-	-
PC9. respect personal space of colleagues and customers	2	2	-	2
Interact with superiors	18	10	-	7
PC10. report progress on job allocated and team performance to the superiors	4	3	-	2
PC11. escalate problems to superiors that cannot be handled	4	2	-	1
PC12. train the team members to report completed work and receive feedback on work done	5	2	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. encourage team members to rectify errors as per feedback and minimize mistakes in future	5	3	-	2
Respect gender and ability differences	12	6	-	5
PC14. ensure team shows sensitivity towards all genders and PwD	4	2	-	2
PC15. adjust communication styles to reflect gender sensitivity and sensitivity towards person with disability	4	2	-	2
PC16. help PwD team members to overcome the challenges, if asked	4	2	-	1
NOS Total	**50**	**30**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9812
NOS Name	Interact effectively with team, customers and others
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	27/01/2022
Next Review Date	27/01/2025
NSQC Clearance Date	27/01/2022

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	3	-	2
PC2. identify the devices and systems to be connected by the IoT network	3	3	-	2
PC3. identify appropriate technology, devices, and deployment model to best meet the overall needs of the IoT network	3	3	-	2
Define various parameters of network design	18	30	-	6
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	2	-	2
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	2	-	2
PC6. evaluate impacts of IoT network on the environment and on human health	5	2	-	-
PC7. build interoperable networks where end-to-end communication is possible across diverse components	1	3	-	1
PC8. ensure network supports bulk configuration functionalities across multiple solution components	1	3	-	1
PC9. design fallback mechanisms in case of network disruptions and outages	3	2	-	2
PC10. address network redundancy considerations	2	1	-	-
Evaluate regulations	2	1	-	2
PC11. evaluate regulatory aspects of building network such as permitted frequency bands	2	1	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Design network dashboards	1		-	2
PC12. design and develop networking dashboards used for network monitoring	1	3	-	2
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	SSC/N8227
NOS Name	Design network architecture for end-to-end IoT solutions
Sector	Automotive
Sub-Sector	Future Skills
Occupation	Internet of Things
NSQF Level	5
Credits	TBD
Version	2.0
Last Reviewed Date	27/01/2022
Next Review Date	27/01/2025
NSQC Clearance Date	27/01/2022

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	5
Credits	TBD
Version	1.0
Last Reviewed Date	27/01/2022
Next Review Date	27/01/2025
NSQC Clearance Date	27/01/2022

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	5
Credits	TBD
Version	1.0
Last Reviewed Date	27/01/2022
Next Review Date	27/01/2025
NSQC Clearance Date	27/01/2022

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	5
Credits	TBD
Version	1.0
Last Reviewed Date	27/01/2022
Next Review Date	27/01/2025
NSQC Clearance Date	27/01/2022

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.

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
ASC/N9812.Interact effectively with team, customers and others	50	30	-	20	100	10
SSC/N8227.Design network architecture for end-to-end IoT solutions	30	50	-	20	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	**250**	**250**	**-**	**100**	**600**	**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

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.