Automotive Smart Manufacturing Specialist

QP Code: ASC/Q8308

Version: 1.0

NSQF Level: 7

Automotive Skills Development Council || 153, Gr Floor, Okhla Industrial Area, Phase – III, Leela Building, New Delhi – 110020

Contents

ASC/Q8308: Automotive Smart Manufacturing Specialist

Brief Job Description

The individual at this job is responsible for designing and developing the end to end distributed EDGE computing solutions and services. He/She should lead the development activities and guide the team on technical front in Edge computing solutions, Review of code and design activities, Propose Right Architecture based on comparative studies, development of IIOT devices and networking systems and installation and commissioning of IIoT hardware on machine and automation systems.

Personal Attributes

The person should be result oriented with good technical and analytical skills, should have Excellent Interpersonal Skills, communication and presentation skills and a good team player. They should have ability to manage projects, prioritizing of work and mentoring the budding engineers.

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. ASC/N8323: Prepare financial model and plan project requirements

4. ASC/N8324: Manage development of IIOT devices and networking systems

5. ASC/N8325: Manage installation and commissioning of IIoT hardware on machine and automation systems

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Automotive Product Development
Country	India
NSQF Level	7
Aligned to NCO/ISCO/ISIC Code	NCO-2015/NIL
Minimum Educational Qualification & Experience	M.E./M.Tech in the relevant field with 2 Years of relevant experience OR B.E./B.Tech (in relevant field) with 5 Years of relevant experience,

	OR 3 years Diploma (Mechanical/Automobile/ Electrical / Electronics) after class 12th from recognized regulatory body with 6 years of relevant experience OR Certificate-NSQF (Automotive Smart Manufacturing Engineer Level 6) with 3 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	28th July,2022
Next Review Date	28th July,2025
NSQC Approval Date	28th July,2022
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
PC12. report advanced hygiene and sanitation issues to appropriate authority	1	1	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
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	7
Credits	TBD
Version	1.0
Last Reviewed Date	28th July,2022
Next Review Date	28th July,2025
NSQC Clearance Date	28th July,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

Qualification Pack

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
PC13. encourage team members to rectify errors as per feedback and minimize mistakes in future	5	3	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
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	7
Credits	TBD
Version	1.0
Last Reviewed Date	28th July,2022
Next Review Date	28th July,2025
NSQC Clearance Date	28th July,2022

ASC/N8323: Prepare financial model and plan project requirements

Description

This NOS unit is about preparing the financial model of IIoT based smart manufacturing process and selecting the hardware for edge computing, communication, networking and EDGE devices, machines, automation systems, transducers, and IO-link trans-receivers which are compatible with the legacy system.

Scope

The scope covers the following :

- Assess project requirements
- Prepare project outline and financial model
- Select hardware for IIOT network system

Elements and Performance Criteria

Assess project requirements

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

PC1. evaluate the requirements of the IIoT network, sensors, hardware for EDGE computation and devices, machines to work with automation system in manufacturing

PC2. interpret the project's module design by obtaining information from drawings and layouts

PC3. select appropriate technology and related devices, deployment model to best meet the overall needs of the IoT network for smart manufacturing process

PC4. ensure that required sensors, specific hardwires, components and type of materials are selected by following organisational specified criteria and as per design requirements

PC5. finalise the core and auxiliary support process as per specifications & drawings

Prepare project outline and financial model

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

PC6. prepare a layout of project execution where it should defend the choice of technology and its cost

PC7. prepare outline of the development process and its requirements for both material and resources

PC8. prepare various models of execution of the project for less friction between technology and resources

PC9. prepare the cost list to execute the project with selected hardware, materials, and resources

PC10. prepare the timeline and resource requirements for the selected models of execution

Select hardware for IIOT network system

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

PC11. conduct survey to identify the need of modification in existing systems and requirements of new machines and automation systems as per the project execution model

PC12. identify the points of the existing systems to be modified for integration of IIoT sensor or IO-Links

PC13. identify and select the transducers and IO-Links as per the requirements for modification in

the existing systems

PC14. identify the requirements of new components or machines or replacements to upgrade for full filling the legacy compatibility

PC15. identify the suitable network modules, communication protocols and devices, additional systems and passive materials for developing the industrial standard network for wired and wireless communication between IIoT hardware, machines, automated systems

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 fall-back mechanisms

KU4. who to involve while designing and developing networks for the solution

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

KU6. connectivity protocols for device-cloud communications (this may include protocols such as 5g, wi-fi, gsm, gprs, and satellite)

KU7. 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. network management dashboards and applications (such as hp open view)

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

KU10. updated internal and external network regulations

KU11. 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. analyse 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
Assess project requirements	**14**	**14**		**8**
PC1. evaluate the requirements of the IIoT network, sensors, hardware for EDGE computation and devices, machines to work with automation system in manufacturing	3	3		2
PC2. interpret the project's module design by obtaining information from drawings and layouts	3	2		1
PC3. select appropriate technology and related devices, deployment model to best meet the overall needs of the IoT network for smart manufacturing process	2	3		2
PC4. ensure that required sensors, specific hardwires, components and type of materials are selected by following organisational specified criteria and as per design requirements	3	3		1
PC5. finalise the core and auxiliary support process as per specifications & drawings	3	3		2
Prepare project outline and financial model	**12**	**12**		**6**
PC6. prepare a layout of project execution where it should defend the choice of technology and its cost	3	2		2
PC7. prepare outline of the development process and its requirements for both material and resources	3	2		1
PC8. prepare various models of execution of the project for less friction between technology and resources	2	3		1
PC9. prepare the cost list to execute the project with selected hardware, materials, and resources	2	2		1
PC10. prepare the timeline and resource requirements for the selected models of execution	2	3		1
Select hardware for IIOT network system	**14**	**14**		**6**
PC11. conduct survey to identify the need of modification in existing systems and requirements of new machines and automation systems as per the project	3	3		1

execution model				
PC12. identify the points of the existing systems to be modified for integration of IIoT sensor or IO-Links	3	2		2
PC13. identify and select the transducers and IO-Links as per the requirements for modification in the existing systems	2	3		1
PC14. identify the requirements of new components or machines or replacements to upgrade for full filling the legacy compatibility	3	3		1
PC15. identify the suitable network modules, communication protocols and devices, additional systems and passive materials for developing the industrial standard network for wired and wireless communication between IIoT hardware, machines, automated systems	3	3		1
NOS Total	**40**	**40**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8323
NOS Name	Prepare financial model and plan project requirements
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Automotive Product Development
NSQF Level	7
Credits	TBD
Version	1.0
Last Reviewed Date	28th July,2022
Next Review Date	28th July,2025
NSQC Clearance Date	28th July,2022

ASC/N8324: Manage development of IIOT devices and networking systems

Description

This NOS unit is about managing tasks related to defining the strategies for EDGE computing, development of clusters, EDGE model management and monitoring, automation systems integration conditions for communication through industrial networking protocols, designing of IIOT devices used in manufacturing processes etc. to meet the specification set by the organization.

Scope

The scope covers the following :

- Define the strategies for EDGE computing
- Development of EDGE models management and monitoring
- Supervise the development of IIoT sensors, IO-Links, IoT gateway, EDGE devices
- Develop IIoT network and communication as per selected industry standard protocols

Elements and Performance Criteria

Define the strategies for EDGE computing

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

PC1. identify the number of EDGE nodes required with respect to the number of edge devices, sensors, data traffic, packet data size and locations of IIoT elements at Zone zero or machine or process floors.

PC2. define the suitable data packet size for lower bandwidth and low latency

PC3. monitor that the nodes are optimized appropriately with respect to the number of sensors and their communication frequency, packet data size and traffic for faster communication

PC4. monitor that strict communication requirements to be followed during development of firmware for EDGE devices

Manage and monitor development of EDGE models

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

PC5. select the development environment and programming language for coding

PC6. monitor the backend process for relation mapping and retrieving data from DBMS

PC7. design and monitor effective and efficient solutions, must first gain a thorough grasp of the website's performance demands and goals

PC8. monitor the process of Application Programming Interfaces (APIs) development and administration

PC9. write and test development solutions for code-related problems

Supervise the development of IIoT sensors, IO-Links, IoT gateway, EDGE devices

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

PC10. identify the different communication protocols for wire and wireless connectivity for gateways, IIoT sensors and IO-Links

PC11. manage priority tasks for the EDGE devices and optimize it in firmware level

PC12. ensure that defined security standards and encryptions are followed in the EDGE boards and DATA links

PC13. define the electrical wiring conditions and limitations of sensors and IO-Links with EDGE

devices.

PC14. identify and define the RF shielding and Electromagnetic shielding for the EDGE devices and the connected sensors and links

PC15. monitor and analyse the test results in between the development of the hardware, firmware and Dashboards closely to understand its feasibility and optimization

PC16. identify and arrange the requirements of additional backup power supplies, local data storing, acyclic configurations, and failsafe condition

Manage the development of IIoT network and communication
To be competent, the user/individual on the job must be able to:

PC17. ensure that appropriate hardware and soft tools are selected for development of industry standard communication

PC18. manage the activities of development of the communication with the required protocols, security and encryptions.

PC19. manage the activities of testing the communication system with the IIoT hardware to identify the congestion possibilities, optimize bandwidth requirements and power requirements with backup for seamless and stable network connectivity

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. company manufacturing processes

KU2. Standard Operation Procedures (SOP) recommended by manufacturer for using equipment / machinery in use

KU3. different layers of network architecture

KU4. types of network protocols, topology and its significance

KU5. design of industrial network between devices based on protocols, topology and device parameters

KU6. signaling parameters required to do cable installation between devices

KU7. allocation of device parameters like station id, baud rate etc. To the devices connected to the network

KU8. device manufacturer software for network parameter settings and device communication

KU9. working and integration of different elements using i/o link master to the controller

KU10. data types like machine, process and control data from robot and automation system in the network

KU11. maintenance and troubleshooting procedures like hardware, self-loop back, link test etc.

KU12. functioning of various network devices like routers, network switch, repeaters

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. analyse 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
Define the strategies for EDGE computing	**8**	**8**		**4**
PC1. identify the number of EDGE nodes required with respect to the number of edge devices, sensors, data traffic, packet data size and locations of IIoT elements at Zone zero or machine or process floors.	2	2		1
PC2. define the suitable data packet size for lower bandwidth and low latency	2	2		1
PC3. monitor that the nodes are optimized appropriately with respect to the number of sensors and their communication frequency, packet data size and traffic for faster communication	2	2		1
PC4. monitor that strict communication requirements to be followed during development of firmware for EDGE devices	2	2		1
Manage and monitor development of EDGE models	**10**	**10**		**6**
PC5. select the development environment and programming language for coding	2	2		2
PC6. monitor the backend process for relation mapping and retrieving data from DBMS	2	2		1
PC7. design and monitor effective and efficient solutions, must first gain a thorough grasp of the website's performance demands and goals	2	2		1
PC8. monitor the process of Application Programming Interfaces (APIs) development and administration	2	2		1
PC9. write and test development solutions for code-related problems	2	2		1
Supervise the development of IIoT sensors, IO-Links, IoT gateway, EDGE devices	**14**	**14**		**7**
PC10. identify the different communication protocols for wire and wireless connectivity for gateways, IIoT sensors and IO-Links	2	2		1
PC11. manage priority tasks for the EDGE devices and optimize it in firmware level	2	2		1

PC12. ensure that defined security standards and encryptions are followed in the EDGE boards and DATA links	2	2		1
PC13. define the electrical wiring conditions and limitations of sensors and IO-Links with EDGE devices.	2	2		1
PC14. identify and define the RF shielding and Electromagnetic shielding for the EDGE devices and the connected sensors and links	2	2		1
PC15. monitor and analyse the test results in between the development of the hardware, firmware and Dashboards closely to understand its feasibility and optimization	2	2		1
PC16. identify and arrange the requirements of additional backup power supplies, local data storing, acyclic configurations, and failsafe condition	2	2		1
Manage the development of IIoT network and communication	**8**	**8**		**3**
PC17. ensure that appropriate hardware and soft tools are selected for development of industry standard communication	3	2		1
PC18. manage the activities of development of the communication with the required protocols, security and encryptions.	3	3		1
PC19. manage the activities of testing the communication system with the IIoT hardware to identify the congestion possibilities, optimize bandwidth requirements and power requirements with backup for seamless and stable network connectivity	2	3		1
NOS Total	**40**	**40**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8324
NOS Name	Manage development of IIOT devices and networking systems
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Automotive Product Development
NSQF Level	7
Credits	TBD
Version	1.0
Last Reviewed Date	28th July,2022
Next Review Date	28th July,2025
NSQC Clearance Date	28th July,2022

ASC/N8325: Manage installation and commissioning of IIoT hardware on machine and automation systems

Description

This NOS unit is about managing tasks related to installation, commissioning and testing of IIoT hardware on machine and automation systems.

Scope

The scope covers the following :

- Testing and deployment of communication network, EDGE computers and servers
- Verification of installation of IIoT hardware on machine and automation systems
- Configure the EDGE device to connect with the network
- Testing of data transmission and data processing tools
- Commissioning the end to end system

Elements and Performance Criteria

Testing and deployment of communication network, EDGE computers and servers

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

PC1. test the developed network for connectivity and stability and future extension

PC2. monitor the activities related to installation of the systems on the pre-planned locations to distribute the network for max connectivity and reach

PC3. test the functioning of backup systems, power connectivity and security access to the EDGE devices from both online and offline mode

PC4. test the algorithms with example datasets and EDGE computers with the program and firmware for hard and soft real time process

PC5. monitor that installation of the systems and units in enclosed and secured marshalling boxes is done properly

PC6. verify the physical security and environment for the hardware for hassle-free operations

Verification of installation of IIoT hardware on machine and automation systems

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

PC7. verify the installation of sensors, switches, links, with the machines robots and automation systems

PC8. verify the connections of IIoT transducers, switches, IO-Links, tags from the machines, robots and automated and non-automated systems with the EDGE devices are appropriate

PC9. verify the data accusation from the IIoT systems in local level to check the reliability and repeatability

Configure the EDGE device to connect with the network

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

PC10. configure the EDGE computers and devices as per the IIoT network configuration

PC11. verify the connections to the network and its stability

Testing of data transmission and data processing tools

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

PC12. monitor the testing of data efficient transmission from the Zone Zero machines and systems to the EDGE servers

PC13. generate the cold data to test the connectivity, latency, packet size, and bandwidth

PC14. monitor the testing of data processing tools with cold data and different sample sets to test its alarm and warnings, process output, processing time, command and control latency

PC15. generate the report on latency and bandwidth as per organisational procedures

Commissioning the end to end system

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

PC16. commission the network connectivity, network stability, data processing algorithms, EDGE computing system performance, power consumptions for various devices, backup power systems, connection and placements of the IIoT systems with sensors and Io-Links, latency of data transmission, and overall stability of the systems

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 fall-back mechanisms

KU4. who to involve while monitoring and troubleshooting the network

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

KU6. connectivity protocols for device-cloud communications (this may include protocols such as 5g, wi-fi, gsm, gprs, and satellite

KU7. wired/wireless connectivity protocols for device-device or device-gateway communications (Ku8. The network management dashboards and applications

KU8. network topologies, wired and wireless technologies, fiber optics, etc.

KU9. updated internal and external network regulations

KU10. how to perform network assessments

KU11. how to diagnose and resolve network issues

KU12. how to identify network blind spots

Generic Skills (GS)

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

GS1. follow instructions, guidelines, procedures, rules, and service level agreements

GS2. listen effectively and communicate information accurately

GS3. follow rule-based decision-making processes

GS4. make decisions on suitable courses

GS5. plan and organize the work to achieve targets and meet deadlines

GS6. apply problem-solving approaches to different situations

GS7. analyse 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
Testing and deployment of communication network, EDGE computers and servers	**14**	**14**		**8**
PC1. test the developed network for connectivity and stability and future extension	2	2		2
PC2. monitor the activities related to installation of the systems on the pre-planned locations to distribute the network for max connectivity and reach	3	2		1
PC3. test the functioning of backup systems, power connectivity and security access to the EDGE devices from both online and offline mode	3	3		2
PC4. test the algorithms with example datasets and EDGE computers with the program and firmware for hard and soft real time process	2	3		1
PC5. monitor that installation of the systems and units in enclosed and secured marshalling boxes is done properly	2	2		1
PC6. verify the physical security and environment for the hardware for hassle-free operations	2	2		1
Verification of installation of IIoT hardware on machine and automation systems	**10**	**10**		**4**
PC7. verify the installation of sensors, switches, links, with the machines robots and automation systems	3	3		1
PC8. verify the connections of IIoT transducers, switches, IO-Links, tags from the machines, robots and automated and non-automated systems with the EDGE devices are appropriate	4	4		2
PC9. verify the data accusation from the IIoT systems in local level to check the reliability and repeatability	3	3		1
Configure the EDGE device to connect with the network	6	6		2
PC10. configure the EDGE computers and devices as per the IIoT network configuration	3	3		1

PC11. verify the connections to the network and its stability	3	3		1
Testing of data transmission and data processing tools	**8**	**8**		**4**
PC12. monitor the testing of data efficient transmission from the Zone Zero machines and systems to the EDGE servers	2	2		1
PC13. generate the cold data to test the connectivity, latency, packet size, and bandwidth	2	2		1
PC14. monitor the testing of data processing tools with cold data and different sample sets to test its alarm and warnings, process output, processing time, command and control latency	2	2		1
PC15. generate the report on latency and bandwidth as per organisational procedures	2	2		1
Commissioning the end to end system	**2**	**2**		**2**
PC16. commission the network connectivity, network stability, data processing algorithms, EDGE computing system performance, power consumptions for various devices, backup power systems, connection and placements of the IIoT systems with sensors and Io-Links, latency of data transmission, and overall stability of the systems	2	2		2
NOS Total	**40**	**40**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8325
NOS Name	Manage installation and commissioning of IIoT hardware on machine and automation systems
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Automotive Product Development
NSQF Level	7
Credits	TBD
Version	1.0
Last Reviewed Date	28th July,2022
Next Review Date	28th July,2025
NSQC Clearance Date	28th July,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) (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.

2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.

3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).

4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training centre based on these criteria.

5. In case of successfully passing only certain number of NOSs, the trainee is eligible to take

subsequent assessment on the balance NOS's to pass the Qualification Pack.

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	0	20	100	15
ASC/N9812.Interact effectively with team, customers and others	50	30	-	20	100	10
ASC/N8323: Prepare financial model and plan project requirements	40	40	-	20	100	25
ASC/N8324: Manage development of IIOT devices and networking systems	40	40	0	20	100	25

ASC/N8325: Manage installation and commissioning of IIoT hardware on machine and automation systems	40	40	-	20	100	25
Total	220	180	-	100	500	100

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
AMC	Annual Maintenance Contract
PPE	Personal Protective Equipment
ERP	Enterprise Resource Planning
PM	Predictive Maintenance
QMS	Quality Management System
TOPS	Team Oriented Problem Solving
QMS	Quality Management System
CFT	Complement Fixation Test

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.