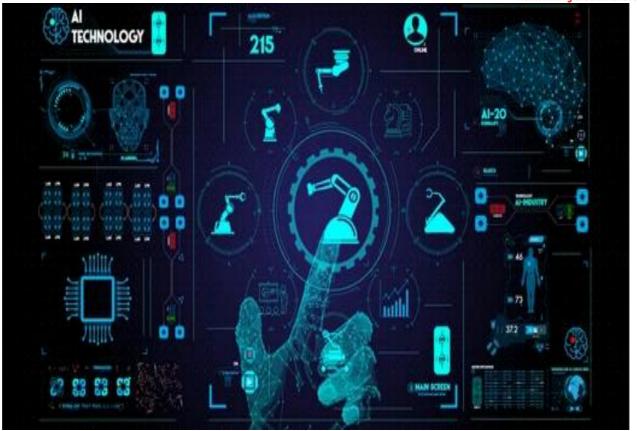# Automotive Smart Manufacturing Head

QP Code: ASC/Q6420

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/Q6420: Automotive Smart Manufacturing Head

Brief Job Description

The individual at this job is responsible for designing system for integration between machines, robots, and automation systems along with device compatibility using healthy network protocol. He/She should guide the team to perform the remote monitoring and fetch vital machine data using IIOT sensors & edge devices within an organization for all its processes, new development, production, and application phases.

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 the 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. DGT/VSQ/N0104 - Employability Skills (120 hours)
3. ASC/N6444: Prepare financial model and plan project requirements
4. ASC/N6445: Monitor systems & devices in the IIOT network
5. ASC/N6446: Manage system integration team to deploy IIoT hardware & analytics

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	B.E./B.Tech in the relevant field with 5 years of relevant experience, OR M.E./M. Tech in the relevant field with 3 year of relevant experience OR Certificate-NSQF (Automotive Smart Manufacturing Specialist Level 6.5) 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	29/03/2023
Next Review Date	29/03/2026
Deactivation Date	29/03/2026
NSQC Approval Date	29/03/2023
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	5
Credits	TBD
Version	1.0
Last Reviewed Date	NA
Next Review Date	NA
NSQC Clearance Date	

DGT/VSQ/N0104: Employability Skills (120 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. understand the significance of employability skills in meeting the current job market requirement and future of work

PC2. identify and explore learning and employability relevant portals

PC3. research about the different industries, job market trends, latest skills required and the available opportunities

Constitutional values – Citizenship

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

PC4. 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.

PC5. follow environmentally sustainable practices

Becoming a Professional in the 21st Century

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

PC6. recognize the significance of 21st Century Skills for employment

PC7. 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

PC8. adopt a continuous learning mindset for personal and professional development

Basic English Skills

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

PC9. use basic English for everyday conversation in different contexts, in person and over the telephone

PC10. read and understand routine information, notes, instructions, mails, letters etc. written in English

PC11. 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:

PC12. identify career goals based on the skills, interests, knowledge, and personal attributes

PC13. prepare a career development plan with short- and long-term goals

Communication Skills

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

PC14. follow verbal and non-verbal communication etiquette while communicating in professional and public settings

PC15. use active listening techniques for effective communication

PC16. communicate in writing using appropriate style and format based on formal or informal requirements

PC17. work collaboratively with others in a team

Diversity & Inclusion

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

PC18. communicate and behave appropriately with all genders and PwD

PC19. 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:

PC20. identify and select reliable institutions for various financial products and services such as bank account, debit and credit cards, loans, insurance etc.

PC21. carry out offline and online financial transactions, safely and securely, using various methods and check the entries in the passbook

PC22. identify common components of salary and compute income, expenses, taxes, investments etc.

PC23. 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:

PC24. operate digital devices and use their features and applications securely and safely

PC25. carry out basic internet operations by connecting to the internet safely and securely, using the mobile data or other available networks through Bluetooth, Wi-Fi, etc.

PC26. display responsible online behaviour while using various social media platforms

PC27. create a personal email account, send and process received messages as per requirement

PC28. carry out basic procedures in documents, spreadsheets and presentations using respective and appropriate applications

PC29. utilize virtual collaboration tools to work effectively

Entrepreneurship

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

PC30. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research

PC31. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion

PC32. 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:

PC33. identify different types of customers and ways to communicate with them

PC34. identify and respond to customer requests and needs in a professional manner

PC35. use appropriate tools to collect customer feedback

PC36. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

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

PC37. create a professional Curriculum vitae (Résumé)

PC38. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

PC39. apply to identified job openings using offline /online methods as per requirement

PC40. answer questions politely, with clarity and confidence, during recruitment and selection

PC41. 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. components of salary and 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

KU16. use applications such as word processors, spreadsheets etc.

KU17. how to identify business opportunities

KU18. types and needs of customers

KU19. how to apply for a job and prepare for an interview

KU20. 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 in English and other languages

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

GS3. behave politely and appropriately with all to maintain effective work relationship

GS4. how to work in a virtual mode, using various technological platforms

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. understand the significance of employability skills in meeting the current job market requirement and future of work	-	-	-	-
PC2. identify and explore learning and employability relevant portals	-	-	-	-
PC3. research about the different industries, job market trends, latest skills required and the available opportunities	-	-	-	-
Constitutional values – Citizenship	1	1	-	-
PC4. 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.	-	-	-	-
PC5. follow environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	1	3	-	-
PC6. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC7. 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	-	-	-	-
PC8. adopt a continuous learning mindset for personal and professional development	-	-	-	-
Basic English Skills	3	4	-	-
PC9. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC11. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
Career Development & Goal Setting	1	2	-	-
PC12. identify career goals based on the skills, interests, knowledge, and personal attributes	-	-	-	-
PC13. prepare a career development plan with short- and long-term goals	-	-	-	-
Communication Skills	2	2	-	-
PC14. follow verbal and non-verbal communication etiquette while communicating in professional and public settings	-	-	-	-
PC15. use active listening techniques for effective communication	-	-	-	-
PC16. communicate in writing using appropriate style and format based on formal or informal requirements	-	-	-	-
PC17. work collaboratively with others in a team	-	-	-	-
Diversity & Inclusion	1	1	-	-
PC18. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC19. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
Financial and Legal Literacy	2	3	-	-
PC20. identify and select reliable institutions for various financial products and services such as bank account, debit and credit cards, loans, insurance etc.	-	-	-	-
PC21. carry out offline and online financial transactions, safely and securely, using various methods and check the entries in the passbook	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC23. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
Essential Digital Skills	**3**	**5**	**-**	**-**
PC24. operate digital devices and use their features and applications securely and safely	-	-	-	-
PC25. carry out basic internet operations by connecting to the internet safely and securely, using the mobile data or other available networks through Bluetooth, Wi-Fi, etc.	-	-	-	-
PC26. display responsible online behaviour while using various social media platforms	-	-	-	-
PC27. create a personal email account, send and process received messages as per requirement	-	-	-	-
PC28. carry out basic procedures in documents, spreadsheets and presentations using respective and appropriate applications	-	-	-	-
PC29. utilize virtual collaboration tools to work effectively	-	-	-	-
Entrepreneurship	**2**	**3**	**-**	**-**
PC30. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC31. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC32. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
Customer Service	**1**	**2**	**-**	**-**
PC33. identify different types of customers and ways to communicate with them	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC34. identify and respond to customer requests and needs in a professional manner	-	-	-	-
PC35. use appropriate tools to collect customer feedback	-	-	-	-
PC36. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**2**	**3**	-	-
PC37. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC38. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC39. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC40. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC41. 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/N0104
NOS Name	Employability Skills (120 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	5
Credits	3
Version	1.0
Last Reviewed Date	NA
Next Review Date	27/05/2024
NSQC Clearance Date	27/05/2021

ASC/N6444: 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 organizational specified criteria and as per design requirements

PC5. finalize 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/N6444
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	29/03/2023
Next Review Date	29/03/2026
NSQC Clearance Date	29/03/2023

ASC/N6445: Monitor Systems & devices in the IIOT Network

Description

This NOS unit is about monitoring the tasks related to development and selection of different systems & devices in IIoT network to meet the specification set as per design documents.

Scope

The scope covers the following:

- Develop network architecture as per design documents
- Monitor the systems and devices mapping in network
- Support team during system testing process

Elements and Performance Criteria

Develop network architecture as per design documents

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

PC1. obtain the design document and evaluate the network requirements like node allotment, station setting

PC2. identify and select the systems & devices as per network architecture level

PC3. identify the suitable communication model, topology to connect the machines & automation system

PC4. guide the team during assigning nodes to every device in the system

PC5. monitor that the nodes are optimized appropriately as per design document

PC6. ensure that the team is documenting the final network architecture plan appropriately

Monitor the systems and devices mapping in network

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

PC7. support the team during selection of the devices & checking their compatibility with the network and system

PC8. monitor the IIOT network parameters like node address, communication speed and their effect on the network

PC9. monitor that the team is mapping the node address of devices connected in the IIOT network appropriately and as per the design document and organizational standards

Support team during system testing process

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

PC10. guide the team in conducting hardware level testing across IIOT networks

PC11. verify that defined security standards and encryptions are followed in the EDGE boards and DATA links and as per the design document

PC12. support the team in conducting communication test across all devices in the IIOT Network

PC13. record the healthy status of all devices & report to organizational project review committee

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

KU13. e-plan as per customer requirement

KU14. team cohesion and collaborative working

KU15. IIOT sensors connection details

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 for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Develop network architecture as per design documents	**14**	**15**		**7**
PC1. obtain the design document and evaluate the network requirements like node allotment, station setting	2	2		1
PC2. identify and select the systems & devices as per network architecture level	3	3		2
PC3. identify the suitable communication model, topology to connect the machines & automation system	3	3		2
PC4. guide the team during assigning nodes to every device in the system	2	2		1
PC5. monitor that the nodes are optimized appropriately as per design document	3	3		1
PC6. ensure that the team is documenting the final network architecture plan appropriately	1	2		-
Monitor the systems and devices mapping in network	**13**	**13**		**8**
PC7. support the team during selection of the devices & checking their compatibility with the network and system	3	3		2
PC8. monitor the IIOT network parameters like node address, communication speed and their effect on the network	5	5		3
PC9. monitor that the team is mapping the node address of devices connected in the IIOT network appropriately and as per the design document and organizational standards	5	5		3
Support team during system testing process	**13**	**12**		**5**
PC10. guide the team in conducting hardware level testing across IIOT networks	5	5		2
PC11. verify that defined security standards and encryptions are followed in the EDGE boards and DATA links and as per the design document	3	2		1

PC12. support the team in conducting communication test across all devices in the IIOT Network	3	3		1
PC13. record the healthy status of all devices & report to organizational project review committee	2	2		1
NOS Total	**40**	**40**	**-**	**20**

NOS Code	ASC/N6445
NOS Name	Monitor Systems & devices in the IIOT Network
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Automotive Product Development
NSQF Level	7
Credits	TBD
Version	1.0
Last Reviewed Date	29/03/2023
Next Review Date	29/03/2026
NSQC Clearance Date	29/03/2023

ASC/N6446: Manage system Integration team to deploy IIoT hardware & Analytics

Description

This NOS unit is about managing System Integration team to deploy IIOT Hardware related to installation, commissioning, and testing of IIOT hardware on machine and automation systems.

Scope

The scope covers the following:

- Testing of communication network, EDGE devices, servers in the IIOT network
- Verification of system integrated in the IIOT hardware
- Manage deployment of hardware devices and analytics

Elements and Performance Criteria

Testing of communication network, EDGE devices, servers in the IIOT network

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

PC1. manage the team to develop network for connectivity of all the devices

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. support the team during testing of the functioning of backup systems, power connectivity and security access to the EDGE devices from both online and offline mode

PC4. manage the activities related to server allotment and database for cloud computing

PC5. guide the team to verify the physical security and environment for the hardware for hassle-free operations

Verification of system integrated in the IIOT hardware

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

PC6. verify the systems & devices integrated as per design documents

PC7. guide the team during verification of the connections of IIoT Sensors, I/O-Links to the machines, robots Automation systems with the appropriate Network Protocol Like OPC UA, Mod Bus

PC8. manage the activities related to device protocol upgraded to IIOT network protocol

Manage integration of hardware devices and analytics

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

PC9. configure the EDGE devices as per the IIOT network configuration

PC10. guide the team to establish healthy communication between machines/devices and check for device duplicate

PC11. integrate the manufacturing entities to cloud platform through allotted server

PC12. guide the team during use of analytical tools for managing the data

PC13. select the suitable algorithm on analyzed data & conduct the prediction

PC14. generate the report on data extraction as per organizational procedures

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

KU13. Analytical tools on Data analysis

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

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Testing of communication network, EDGE devices, servers in the IIOT network	**13**	**13**		**7**
PC1. manage the team to develop network for connectivity of all the devices	2	2		1
PC2. monitor the activities related to installation of the systems on the pre-planned locations to distribute the network for max connectivity and reach	2	2		2
PC3. support the team during testing of the functioning of backup systems, power connectivity and security access to the EDGE devices from both online and offline mode	4	4		2
PC4. manage the activities related to server allotment and database for cloud computing	2	2		1
PC5. guide the team to verify the physical security and environment for the hardware for hassle-free operations	3	3		1
Verification of system integrated in the IIOT hardware	**11**	**11**		**6**
PC6. verify the systems & devices integrated as per design documents	3	3		2
PC7. guide the team during verification of the connections of IIoT Sensors, I/O-Links to the machines, robots Automation systems with the appropriate Network Protocol Like OPC UA, Mod Bus	4	4		2
PC8. manage the activities related to device protocol upgraded to IIOT network protocol	4	4		2
Manage integration of hardware devices and analytics	**16**	**16**		**7**
PC9. configure the EDGE devices as per the IIOT network configuration	3	3		1
PC10. guide the team to establish healthy communication between machines/devices and check for device duplicate	3	3		1
PC11. integrate the manufacturing entities to cloud platform through allotted server	3	3		1

PC12.guide the team during use of analytical tools for managing the data	3	3		2
PC13.select the suitable algorithm on analyzed data & conduct the prediction	2	2		1
PC14.generate the report on data extraction as per organizational procedures	2	2		1
NOS Total	**40**	**40**	**-**	**20**

NOS Code	ASC/N6446
NOS Name	Manage system Integration team to deploy IIoT hardware & Analytics
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Automotive Product Development
NSQF Level	7
Credits	TBD
Version	1.0
Last Reviewed Date	29/03/2023
Next Review Date	29/03/2026
NSQC Clearance Date	29/03/2023

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) (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
DGT/VSQ/N0104 - Employability Skills (120 hours)	20	30	-	-	50	10
ASC/N6444: Prepare financial model and plan project requirements	40	40	-	20	100	25
ASC/N6445: Monitor systems & devices in the IIOT network	40	40	0	20	100	25

ASC/N6446: Manage system integration team to deploy IIoT hardware & analytics	40	40	-	20	100	25
Total	**190**	**180**	**-**	**80**	**450**	**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.