



Automotive Cyber Security Engineer

QP Code: ASC/Q8312

Version: 1.0

NSQF Level: 5.5

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ASC/Q8312: Automotive Cyber Security Engineer

Brief Job Description

Individuals at this job are responsible for the designing of security processes, detection of threats and security incidents to devices, automation systems, robots & machineries in the IIOT networks.

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/N9818: Manage work and resources \(Research and Development\)](#)
2. [DGT/VSQ/N0103: Employability Skills \(90 Hours\)](#)
3. [ASC/N8321: Manage integration of IIoT sensors, edge devices and machines with robots and industrial automated systems](#)
4. [ASC/N8341: Designing and Selection of Technology layer to manage Security Threats across the Communication networks between Manufacturing Entities.](#)
5. [ASC/N8342: Detect & Respond to security Incidents & restore the communication Affected Manufacturing Entities.](#)

Qualification Pack (QP) Parameters

| | |
|--------------------------------------|--------------------------------|
| Sector | Automotive |
| Sub-Sector | Research & Development |
| Occupation | Automotive Product Development |
| Country | India |
| NSQF Level | 5.5 |
| Credits | 21 |
| Aligned to NCO/ISCO/ISIC Code | NCO-2015/2523.9900 |

| | |
|---|--|
| Minimum Educational Qualification & Experience | <p>Completed 3 year diploma after 10th (Mechanical/Automobile/ Electrical / Electronics) with 3 Years of experience in relevant field OR B.E./B.Tech (Pursuing 4th year) OR Certificate-NSQF (Electric Vehicle Product Design Engineer/ Automotive Prototype Manufacturing Lead Technician Level 5) with 2 Years of experience in relevant field</p> |
| Minimum Level of Education for Training in School | |
| Pre-Requisite License or Training | NA |
| Minimum Job Entry Age | 22 Years |
| Last Reviewed On | 28th February 2023 |
| Next Review Date | 28th February 2026 |
| NSQC Approval Date | 28th February 2023 |
| Version | 1.0 |

ASC/N9818: Manage work and resources (Research and Development)

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 |
|---|--------------|-----------------|---------------|------------|
| <i>Maintain safe and secure working environment</i> | 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 |
| <i>Maintain Health and Hygiene</i> | 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 |
| <i>Effective waste management practices</i> | 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 |
| <i>Material/energy conservation practices</i> | 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/N9818 |
| NOS Name | Manage work and resources (Research and Development) |
| Sector | Automotive |
| Sub-Sector | Road Transportation |
| Occupation | Generic |
| NSQF Level | 5 |
| Credits | 2 |
| Version | 1.0 |
| Next Review Date | NA |

DGT/VSQ/N0103: Employability Skills (90 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 |
|--|--------------|-----------------|---------------|------------|
| <i>Introduction to Employability Skills</i> | 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 | - | - | - | - |
| <i>Constitutional values - Citizenship</i> | 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 | - | - | - | - |
| <i>Becoming a Professional in the 21st Century</i> | 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 | - | - | - | - |
| <i>Basic English Skills</i> | 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 | - | - | - | - |
| <i>Career Development & Goal Setting</i> | 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 | - | - | - | - |
| <i>Communication Skills</i> | 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 | - | - | - | - |
| <i>Diversity & Inclusion</i> | 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 | - | - | - | - |
| <i>Financial and Legal Literacy</i> | 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 | - | - | - | - |
| <i>Essential Digital Skills</i> | 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 | - | - | - | - |
| <i>Entrepreneurship</i> | 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 | - | - | - | - |
| <i>Customer Service</i> | 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 | - | - | - | - |
| <i>Getting ready for apprenticeship & Jobs</i> | 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/N0103 |
| NOS Name | Employability Skills (90 Hours) |
| Sector | Cross Sectoral |
| Sub-Sector | Professional Skills |
| Occupation | Employability |
| NSQF Level | 5 |
| Credits | 3 |
| Version | 1.0 |
| Last Reviewed Date | 31/01/2024 |
| Next Review Date | 31/01/2027 |
| NSQC Clearance Date | 31/01/2024 |

ASC/N8321: Manage integration of IIoT sensors, edge devices and machines with robots and industrial automated systems

Description

This NOS unit is about managing tasks related to integration of IIoT sensors, IO-Links, Machines, robots and automation systems using industrial networking protocols, IIOT devices used in manufacturing processes to meet the specification set by the organization.

Scope

The scope covers the following :

- Installation of IIOT elements as per the industrial network architecture and protocols
- Integration and establishment of communication using I/O link master and network protocols
- Perform post-installation activities

Elements and Performance Criteria

Installation of IIOT elements as per the industrial network architecture and protocols

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

- PC1.** design/interpret the network consists of devices, automation system and robots
- PC2.** support the IIOT technicians during selection and installation of the suitable network protocols like MODBUS, CC-LINK, PROFINET, PROFIBUS, OPC UA, MQTT etc. based on the communication networking system required
- PC3.** analyse the installed sensors, IO-Link trans-receivers, machines, automation elements, system and robots into different layers of network architecture like field devices, control devices, network
- PC4.** verify the network that consists of devices, automation system and robots as per SOP
- PC5.** ensure that IIOT technicians are connecting the appropriate intelligent devices and system using suitable network topology (STAR, LINE, RING) as per network design document

Integration and establishment of communication using I/O link master and network protocols

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

- PC6.** support the IIOT technicians during connecting the automation elements like sensors, machines, and field control devices to I/O link master as per SOP
- PC7.** ensure that cable installed between devices is in align with the signaling parameters like bend radius, signal ground, terminal resistor, cable length etc.
- PC8.** establish and check the communication between automation system, intelligent devices, and robots by doing parameter setting like baud rate, distance, station ID and station type
- PC9.** support during setting of the network parameters of automation system on the device manufacturers software as per SOP and organizational guidelines
- PC10.** start the automation devices, system in the network and look for healthy communication between them
- PC11.** ensure physical security of the network contains IIOT edge devices, IIOT sensors, machines, robots and automation system

PC12. ensure that network has appropriate protection from the unauthorized access or malicious internet activities

PC13. ensure only authorized devices should be able to connect to the network

Perform post-installation activities

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

PC14. conduct the trials of system as per the plan to align it with existing or new manufacturing process

PC15. handover the system to production team & train them on it as per organizational guidelines and procedures

PC16. prepare and maintain documents and records such as experience under development, TGW /TGR faced during process trials etc. As a reference for future development

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. product portfolio of organization

KU2. company manufacturing processes

KU3. Standard Operation Procedures (SOP) recommended by manufacturer for using equipment / machinery in use

KU4. different layers of network architecture

KU5. types of network protocols, topology and its significance

KU6. Design of industrial network between devices based on protocols, topology and device parameters

KU7. signaling parameters required to do cable installation between devices

KU8. allocation of device parameters like station id, baud rate etc. To the devices connected to the network

KU9. device manufacturer software for network parameter settings and device communication

KU10. working and integration of different elements using i/o link master to the controller

KU11. data types like machine, process and control data from robot and automation system in the network

KU12. maintenance and troubleshooting procedures like hardware, self-loop back, link test etc.

KU13. functioning of various network devices like routers, network switch, repeaters

Generic Skills (GS)

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

GS1. 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 |
|--|--------------|-----------------|---------------|------------|
| <i>Installation of IIOT elements as per the industrial network architecture and protocols</i> | 12 | 12 | - | 6 |
| PC1. design/interpret the network consists of devices, automation system and robots | 3 | 2 | - | 1 |
| PC2. support the IIOT technicians during selection and installation of the suitable network protocols like MODBUS, CC-LINK, PROFINET, PROFIBUS, OPC UA, MQTT etc. based on the communication networking system required | 3 | 3 | - | 2 |
| PC3. analyse the installed sensors, IO-Link trans-receivers, machines, automation elements, system and robots into different layers of network architecture like field devices, control devices, network | 2 | 3 | - | 1 |
| PC4. verify the network that consists of devices, automation system and robots as per SOP | 2 | 2 | - | 1 |
| PC5. ensure that IIOT technicians are connecting the appropriate intelligent devices and system using suitable network topology (STAR, LINE, RING) as per network design document | 2 | 2 | - | 1 |
| <i>Integration and establishment of communication using I/O link master and network protocols</i> | 18 | 18 | - | 8 |
| PC6. support the IIOT technicians during connecting the automation elements like sensors, machines, and field control devices to I/O link master as per SOP | 3 | 3 | - | 1 |
| PC7. ensure that cable installed between devices is in align with the signaling parameters like bend radius, signal ground, terminal resistor, cable length etc. | 3 | 3 | - | 1 |
| PC8. establish and check the communication between automation system, intelligent devices, and robots by doing parameter setting like baud rate, distance, station ID and station type | 2 | 2 | - | 1 |

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---------------------|------------------------|----------------------|-------------------|
| PC9. support during setting of the network parameters of automation system on the device manufacturers software as per SOP and organizational guidelines | 2 | 2 | - | 1 |
| PC10. start the automation devices, system in the network and look for healthy communication between them | 2 | 2 | - | 1 |
| PC11. ensure physical security of the network contains IIOT edge devices, IIOT sensors, machines, robots and automation system | 2 | 2 | - | 1 |
| PC12. ensure that network has appropriate protection from the unauthorized access or malicious internet activities | 2 | 2 | - | 1 |
| PC13. ensure only authorized devices should be able to connect to the network | 2 | 2 | - | 1 |
| <i>Perform post-installation activities</i> | 10 | 10 | - | 6 |
| PC14. conduct the trials of system as per the plan to align it with existing or new manufacturing process | 3 | 3 | - | 2 |
| PC15. handover the system to production team & train them on it as per organizational guidelines and procedures | 3 | 3 | - | 2 |
| PC16. prepare and maintain documents and records such as experience under development, TGW /TGR faced during process trials etc. As a reference for future development | 4 | 4 | - | 2 |
| NOS Total | 40 | 40 | - | 20 |

National Occupational Standards (NOS) Parameters

| | |
|-------------------------|--|
| NOS Code | ASC/N8321 |
| NOS Name | Manage integration of IIoT sensors, edge devices and machines with robots and industrial automated systems |
| Sector | Automotive |
| Sub-Sector | Research & Development |
| Occupation | Automotive Product Development |
| NSQF Level | 6 |
| Credits | 5 |
| Version | 1.0 |
| Next Review Date | NA |

ASC/N8341: Designing and Selection of Technology layer to manage Security Threats across the Communication networks between Manufacturing Entities.

Description

This NOS unit is about selection & designing of technology layer to manage security threats across the communication networks between IIoT sensors, IO-Links, machines, robots, and automation systems.

Scope

The scope covers the following :

- Designing of network security architecture
- Installation of application layer as per network security design
- Perform network monitoring & threat assessment

Elements and Performance Criteria

Designing of network security architecture

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

- PC1.** read and interpret e-plan or project document received from the manager
- PC2.** select appropriate industrial software (networking window) as per the project requirements
- PC3.** select appropriate core and auxiliary support process as per the project document
- PC4.** select appropriate security parameters for data present in edge computing devices, cloud platforms, open-source databases
- PC5.** define the manufacturing entities based on criticality and security threat levels in network security architecture
- PC6.** ensure that only authorized devices/systems should be able to connect to the network
- PC7.** design the network security system to ensure sufficient security levels are in place from device manufacturer, standard device installation & software requirement

Installation of application layer as per network security design

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

- PC8.** select and install the suitable network protocols like MODBUS, CC-LINK, PROFINET, PROFIBUS, OPC UA, MQTT etc. based on the communication networking system
- PC9.** set the security parameters of system on the networking window as per SOP and organizational guidelines
- PC10.** configure and troubleshoot network security hardware like switches, routers, firewalls, WLAN, and Virtual Private Networks
- PC11.** select the devices/system mapped into application layer based on their functions & sensitivity of data
- PC12.** ensure that solution architecture (application layer) of the software performs day-to-day security processes such as threat and vulnerability management

Perform network monitoring & threat assessment

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

- PC13.** evaluate criticality and security of threat levels of manufacturing entities
- PC14.** analyze data security performance metrics to highlight the threats in comparison with network security parameters
- PC15.** maintain and update the communication status of physical systems in the manufacturing process
- PC16.** implement regular threat assessment across devices to strengthen resistance against attack

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** product portfolio of organization
- KU2.** company manufacturing processes
- KU3.** Standard Operation Procedures (SOP) recommended by manufacturer for using equipment / machinery in use
- KU4.** different layers of cyber security system architecture
- KU5.** types of network protocols, topology and its significance
- KU6.** design of industrial network between devices based on protocols, topology and device parameters
- KU7.** device manufacturer software for network parameter settings and device communication
- KU8.** working and integration of different elements using i/o link master to the controller
- KU9.** data types like machine, process and control data from robot and automation system in the network
- KU10.** maintenance and troubleshooting procedures like hardware, self-loop back, link test etc
- KU11.** functioning of various network devices like routers, network switch, repeaters
- KU12.** managing the Malware software
- KU13.** how to install firewalls and data encryption protocols
- KU14.** knowledge of both internal and external security regulations and standards

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 |
|--|--------------|-----------------|---------------|------------|
| <i>Designing of network security architecture</i> | 16 | 16 | - | 7 |
| PC1. read and interpret e-plan or project document received from the manager | 2 | 2 | - | - |
| PC2. select appropriate industrial software (networking window) as per the project requirements | 3 | 2 | - | 1 |
| PC3. select appropriate core and auxiliary support process as per the project document | 2 | 2 | - | 2 |
| PC4. select appropriate security parameters for data present in edge computing devices, cloud platforms, open-source databases | 2 | 2 | - | 1 |
| PC5. define the manufacturing entities based on criticality and security threat levels in network security architecture | 2 | 2 | - | 1 |
| PC6. ensure that only authorized devices/systems should be able to connect to the network | 2 | 2 | - | 1 |
| PC7. design the network security system to ensure sufficient security levels are in place from device manufacturer, standard device installation & software requirement | 3 | 4 | - | 1 |
| <i>Installation of application layer as per network security design</i> | 13 | 14 | - | 7 |
| PC8. select and install the suitable network protocols like MODBUS, CC-LINK, PROFINET, PROFIBUS, OPC UA, MQTT etc. based on the communication networking system | 3 | 4 | - | 2 |
| PC9. set the security parameters of system on the networking window as per SOP and organizational guidelines | 2 | 2 | - | 1 |
| PC10. configure and troubleshoot network security hardware like switches, routers, firewalls, WLAN, and Virtual Private Networks | 3 | 4 | - | 2 |
| PC11. select the devices/system mapped into application layer based on their functions & sensitivity of data | 3 | 2 | - | 1 |

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|--------------|-----------------|---------------|------------|
| PC12. ensure that solution architecture (application layer) of the software performs day-to-day security processes such as threat and vulnerability management | 2 | 2 | - | 1 |
| <i>Perform network monitoring & threat assessment</i> | 11 | 10 | - | 6 |
| PC13. evaluate criticality and security of threat levels of manufacturing entities | 3 | 3 | - | 1 |
| PC14. analyze data security performance metrics to highlight the threats in comparison with network security parameters | 3 | 2 | - | 2 |
| PC15. maintain and update the communication status of physical systems in the manufacturing process | 2 | 2 | - | 1 |
| PC16. implement regular threat assessment across devices to strengthen resistance against attack | 3 | 3 | - | 2 |
| NOS Total | 40 | 40 | - | 20 |

National Occupational Standards (NOS) Parameters

| | |
|-------------------------|--|
| NOS Code | ASC/N8341 |
| NOS Name | Designing and Selection of Technology layer to manage Security Threats across the Communication networks between Manufacturing Entities. |
| Sector | Automotive |
| Sub-Sector | Research & Development |
| Occupation | Automotive Product Development |
| NSQF Level | 5.5 |
| Credits | 6 |
| Version | 1.0 |
| Next Review Date | NA |

ASC/N8342: Detect & Respond to security Incidents & restore the communication Affected Manufacturing Entities.

Description

This NOS unit is about detecting & responding to security incidents & restoring the communication in affected manufacturing entities.

Scope

The scope covers the following :

- Detect the security incidents
- Classify, prioritize & respond to the security incidents based on threat levels
- Restoration & recovery of communication on affected manufacturing entities

Elements and Performance Criteria

Detect the security incidents

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

- PC1.** monitor the communication status & behavior of edge & cloud computing devices present in the IIOT network by using monitoring applications
- PC2.** monitor the status of field and control device in the IIOT network
- PC3.** interpret the field & control device status with edge computing device data on the dashboard
- PC4.** check for third party network interference sources and take precautionary measures so that it should not affect the communications
- PC5.** ensure readiness of software protocol & threat assessment processes to reliably detect incidents

Classify, prioritize & respond to the security incidents based on threat levels

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

- PC6.** record, classify and prioritize information on security incidents using standard templates and tools
- PC7.** generate report from the affected manufacturing entities on threat level and submit it to manager
- PC8.** review the reports and consult with the manager for taking appropriate actions
- PC9.** respond to threat assessments on edge computing devices using automated security assessment tools after getting permission from manger
- PC10.** execute post-incident processes and procedures in line with security policies, procedures, and guidelines

Restoration & recovery of communication on affected manufacturing entities

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

- PC11.** implement restoration & recovery plan given by manager
- PC12.** ensure timely restoration of devices and systems affected by security incident
- PC13.** evaluate the impact of security incidents in the manufacturing entities
- PC14.** assign information security incidents promptly to appropriate people for investigation/ action

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 (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.** how to perform network assessments
- KU12.** how to diagnose and resolve network issues
- KU13.** how to identify network blind spots
- KU14.** how to identify and resolve vulnerabilities in systems
- KU15.** how to store and retrieve information
- KU16.** how to restore and recover systems after a security incident

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 |
|--|--------------|-----------------|---------------|------------|
| <i>Detect the security incidents</i> | 14 | 14 | - | 7 |
| PC1. monitor the communication status & behavior of edge & cloud computing devices present in the IIOT network by using monitoring applications | 3 | 4 | - | 2 |
| PC2. monitor the status of field and control device in the IIOT network | 2 | 3 | - | 1 |
| PC3. interpret the field & control device status with edge computing device data on the dashboard | 3 | 2 | - | 2 |
| PC4. check for third party network interference sources and take precautionary measures so that it should not affect the communications | 3 | 3 | - | 1 |
| PC5. ensure readiness of software protocol & threat assessment processes to reliably detect incidents | 3 | 2 | - | 1 |
| <i>Classify, prioritize & respond to the security incidents based on threat levels</i> | 16 | 15 | - | 7 |
| PC6. record, classify and prioritize information on security incidents using standard templates and tools | 3 | 4 | - | 1 |
| PC7. generate report from the affected manufacturing entities on threat level and submit it to manager | 3 | 3 | - | 1 |
| PC8. review the reports and consult with the manager for taking appropriate actions | 3 | 3 | - | 1 |
| PC9. respond to threat assessments on edge computing devices using automated security assessment tools after getting permission from manager | 3 | 2 | - | 2 |
| PC10. execute post-incident processes and procedures in line with security policies, procedures, and guidelines | 4 | 3 | - | 2 |
| <i>Restoration & recovery of communication on affected manufacturing entities</i> | 10 | 11 | - | 6 |

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|--------------|-----------------|---------------|------------|
| PC11. implement restoration & recovery plan given by manager | 3 | 3 | - | 2 |
| PC12. ensure timely restoration of devices and systems affected by security incident | 2 | 2 | - | 1 |
| PC13. evaluate the impact of security incidents in the manufacturing entities | 2 | 3 | - | 2 |
| PC14. assign information security incidents promptly to appropriate people for investigation/ action | 3 | 3 | - | 1 |
| NOS Total | 40 | 40 | - | 20 |

National Occupational Standards (NOS) Parameters

| | |
|-------------------------|---|
| NOS Code | ASC/N8342 |
| NOS Name | Detect & Respond to security Incidents & restore the communication Affected Manufacturing Entities. |
| Sector | Automotive |
| Sub-Sector | Research & Development |
| Occupation | Automotive Product Development |
| NSQF Level | 5.5 |
| Credits | 5 |
| Version | 1.0 |
| Next Review Date | NA |

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down 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/N9818.Manage work and resources (Research and Development) | 50 | 30 | - | 20 | 100 | 15 |
| DGT/VSQ/N0103.Employability Skills (90 Hours) | 20 | 30 | - | - | 50 | 10 |
| ASC/N8321.Manage integration of IIoT sensors, edge devices and machines with robots and industrial automated systems | 40 | 40 | - | 20 | 100 | 25 |
| ASC/N8341.Designing and Selection of Technology layer to manage Security Threats across the Communication networks between Manufacturing Entities. | 40 | 40 | - | 20 | 100 | 25 |
| ASC/N8342.Detect & Respond to security Incidents & restore the communication Affected Manufacturing Entities. | 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 |

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. |

| | |
|--|---|
| <p>Organisational Context</p> | <p>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.</p> |
| <p>Technical Knowledge</p> | <p>Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.</p> |
| <p>Core Skills/ Generic Skills (GS)</p> | <p>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.</p> |
| <p>Electives</p> | <p>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.</p> |
| <p>Options</p> | <p>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.</p> |