

Qualification Pack



Advance Mechatronics Simulation Engineer

QP Code: CSC/Q0423

Version: 1.0

NSQF Level: 5.5

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Qualification Pack

Contents

CSC/Q0423: Advance Mechatronics Simulation Engineer	3
<i>Brief Job Description</i>	3
Applicable National Occupational Standards (NOS).....	3
<i>Compulsory NOS</i>	3
<i>Qualification Pack (QP) Parameters</i>	3
CSC/N0479: Supervise programming Simulation of Mechatronics System using CAD inputs (CAD Modelling of particular process).....	5
CSC/N0480: Supervise testing, and Integration of all the sensor, actuators, control system and mechanical components of the mechatronic system.	11
CSC/N1339: Collaboratively coordinate with the team	17
CSC/N0505: Follow health, safety and environment guidelines at workplace	24
DGT/VSQ/N0102: Employability Skills (60 Hours)	32
Assessment Guidelines and Weightage.....	39
<i>Assessment Guidelines</i>	39
<i>Assessment Weightage</i>	40
Acronyms.....	41
Glossary	42

Qualification Pack

CSC/Q0423: Advance Mechatronics Simulation Engineer

Brief Job Description

Advanced Mechatronics Simulation Engineer is responsible for integration of mechanical, electrical, and computer systems to create advanced automation solutions.

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. [CSC/N0479: Supervise programming Simulation of Mechatronics System using CAD inputs \(CAD Modelling of particular process\)](#)
2. [CSC/N0480: Supervise testing, and Integration of all the sensor, actuators, control system and mechanical components of the mechatronic system.](#)
3. [CSC/N1339: Collaboratively coordinate with the team](#)
4. [CSC/N0505: Follow health, safety and environment guidelines at workplace](#)
5. [DGT/VSQ/N0102: Employability Skills \(60 Hours\)](#)

Qualification Pack (QP) Parameters

Sector	Capital Goods
Sub-Sector	Plant Machinery and Equipment, Robotics and Automation
Occupation	Design
Country	India
NSQF Level	5.5
Credits	20
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2144.9900

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Minimum Educational Qualification & Experience	<p>Pursuing Completed 4 year UG (in case of 4-year UG with honours/ honours with research) (Mechanical/Electronics/Automobile/electrical) OR Pursuing 3rd year of UG (Mechanical/automobile/electrical/electronics) with 1.5 years of experience relevant OR Completed 2nd year diploma after 12th with 1.5 years of experience relevant OR Completed 3-year diploma (after 10th) with 3 Years of experience relevant OR Previous relevant Qualification of NSQF Level (5) with 1.5 years of experience relevant OR Previous relevant Qualification of NSQF Level (4) with 3 Years of experience relevant</p>
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	01/10/2030
NSQC Approval Date	01/10/2025
Version	1.0
Reference code on NQR	QG-5.5-CG-02047-2024-V1-CGSC
NQR Version	1

Qualification Pack

CSC/N0479: Supervise programming Simulation of Mechatronics System using CAD inputs (CAD Modelling of particular process)

Description

This NOS unit is about Supervise programming Simulation of Mechatronics System using CAD inputs (CAD Modelling of process).

Scope

The scope covers the following :

- Conduct development of Detailed Models mechatronic system components.
- Implement simulations & analyze results to predict the performance and behavior of mechatronic systems
- Perform integration, validation & optimization activities for models.

Elements and Performance Criteria

Conduct development of Detailed Models mechatronic system components

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

- PC1. Proficiently use modeling and simulation software (e.g., MATLAB/Simulink, ANSYS, SolidWorks) to create accurate and detailed models of mechanical, electrical, hydraulic, and control components.
- PC2. Develop understanding of the principles and interactions of mechanical, electrical, hydraulic, and control systems within mechatronic applications.
- PC3. Identify and perform validation of the developed models against experimental data and real-world scenarios to ensure their accuracy and reliability. Update models based on validation results.

Implement simulations & analyze results to predict the performance and behavior of mechatronic systems.

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

- PC4. Configure and run simulations using advanced software tools (e.g., MATLAB/Simulink, ANSYS, COMSOL Multiphysics) to model the behavior of mechatronic systems under various operating conditions.
- PC5. Analyze simulation results to understand the performance, efficiency, and potential failure modes of mechatronic systems.
- PC6. Prepare detailed reports and visualizations to document the simulation process, results, and conclusions. Effectively communicate findings to stakeholders, including engineers, project managers, and clients, providing clear recommendations for design improvements.

Perform integration, validation & optimization activities for models.

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

- PC7. Integrate individual component models into comprehensive, system-level simulations to assess overall system performance and interaction.
- PC8. Validate the integrated models by comparing simulation results with experimental data and real-world performance.

Qualification Pack

- PC9. Perform optimization techniques to enhance system performance, including improving efficiency, reducing costs, and increasing reliability.
- PC10. Implement validated and optimized models into the design and development process, ensuring they are effectively utilized to enhance the final product.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. organization procedures for health, safety and security, individual role and responsibilities in this context
- KU2. the organization's emergency procedures for different emergency situations and the importance of following the same
- KU3. Mechatronics Fundamentals: Understanding of core concepts of mechatronics, including the integration of mechanical, electrical, hydraulic, and control systems. Key theories and principles underpinning the behavior and interaction of mechatronic components.
- KU4. Advanced Modeling Techniques: Proficiency in techniques for developing accurate and detailed models of mechatronic components using software tools like MATLAB/Simulink, ANSYS, SolidWorks, and COMSOL Multiphysics.
- KU5. Simulation Tools and Software: Efficient use of Proficient use of advanced simulation software to conduct performance and behavior analyses of mechatronic systems. Understanding of simulation parameters, boundary conditions, and input variables necessary for accurate model simulations.
- KU6. Data Analysis and Interpretation: Understanding the Techniques for analyzing simulation results to extract meaningful insights and performance metrics. Methods for identifying trends, potential failure modes, and areas for optimization from simulation data.
- KU7. Validation and Verification Processes: Procedures for validating simulation models against experimental and real-world data to ensure accuracy and reliability. Knowledge of techniques for identifying and correcting discrepancies between simulated and actual performance.
- KU8. System Integration: Knowledge of integrating component models into larger system-level simulations to assess overall system performance. Understanding of interdependencies and interactions among various mechatronic components within a system
- KU9. Cross-Disciplinary Collaboration: Proficiency in collaborating with cross-functional teams, including hardware, software, and design engineers, to ensure cohesive system development. Understanding the importance of interdisciplinary knowledge in the development and simulation of mechatronic systems.

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



Qualification Pack

- GS6. make timely decisions for efficient utilization of resources
- GS7. write reports such as accident report, in at least English/regional language

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Conduct development of Detailed Models mechatronic system components</i>	20	20	-	12
PC1. Proficiently use modeling and simulation software (e.g., MATLAB/Simulink, ANSYS, SolidWorks) to create accurate and detailed models of mechanical, electrical, hydraulic, and control components.	10	5	-	3
PC2. Develop understanding of the principles and interactions of mechanical, electrical, hydraulic, and control systems within mechatronic applications.	5	5	-	3
PC3. Identify and perform validation of the developed models against experimental data and real-world scenarios to ensure their accuracy and reliability. Update models based on validation results.	5	10	-	6
<i>Implement simulations & analyze results to predict the performance and behavior of mechatronic systems.</i>	9	6	-	4
PC4. Configure and run simulations using advanced software tools (e.g., MATLAB/Simulink, ANSYS, COMSOL Multiphysics) to model the behavior of mechatronic systems under various operating conditions.	3	3	-	2
PC5. Analyze simulation results to understand the performance, efficiency, and potential failure modes of mechatronic systems.	4	1	-	1
PC6. Prepare detailed reports and visualizations to document the simulation process, results, and conclusions. Effectively communicate findings to stakeholders, including engineers, project managers, and clients, providing clear recommendations for design improvements.	2	2	-	1
<i>Perform integration, validation & optimization activities for models.</i>	8	8	-	4
PC7. Integrate individual component models into comprehensive, system-level simulations to assess overall system performance and interaction.	3	3	-	1

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC8. Validate the integrated models by comparing simulation results with experimental data and real-world performance.	3	4	-	2
PC9. Perform optimization techniques to enhance system performance, including improving efficiency, reducing costs, and increasing reliability.	2	1	-	1
PC10. Implement validated and optimized models into the design and development process, ensuring they are effectively utilized to enhance the final product.	-	-	-	-
NOS Total	37	34	-	20

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0479
NOS Name	Supervise programming Simulation of Mechatronics System using CAD inputs (CAD Modelling of particular process)
Sector	Capital Goods
Sub-Sector	
Occupation	Design
NSQF Level	5.5
Credits	5
Version	1.0
Last Reviewed Date	01/10/2025
Next Review Date	01/10/2030
NSQC Clearance Date	01/10/2025

Qualification Pack

CSC/N0480: Supervise testing, and Integration of all the sensor, actuators, control system and mechanical components of the mechatronic system.

Description

This unit is about to Supervise testing, and Integration of all the sensor, actuators, control system and mechanical components of the mechatronic system.

Scope

The scope covers the following :

- Conduct testing of sensors, actuators, control systems, and mechanical components to meet performance specifications and functions.
- Integrate tested components into a cohesive mechatronic system.
- Perform system-level validation activities for continuous improvement

Elements and Performance Criteria

Conduct testing of sensors, actuators, control systems, and mechanical components to meet performance specifications and functions

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

- PC1. Develop detailed test plans and procedures that outline the specific tests to be conducted, including performance criteria, testing conditions, and measurement methods
- PC2. Conduct tests systematically according to the established test plans, ensuring accurate and consistent execution. Collect and record test data meticulously, ensuring that all relevant parameters and outcomes are documented for further analysis.
- PC3. Analyze the collected test data to determine whether the components meet the required performance specifications and function correctly. Identify any deviations from expected performance, diagnose underlying issues, and recommend corrective actions or improvements to enhance component reliability and effectiveness.

Integrate tested components into a cohesive mechatronic system.

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

- PC4. Develop integration plans that outline the step-by-step process for combining sensors, actuators, control systems, and mechanical components into a unified system.
- PC5. Perform the integration of tested components according to the established plans, ensuring proper physical and functional connections. Address and resolve compatibility issues that may arise during integration.
- PC6. Conduct comprehensive system-level tests to verify that the integrated mechatronic system operates correctly and meets the overall design and performance specifications.

Perform system-level validation activities for continuous improvement

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

- PC7. Develop validation plans that include test objectives, methodologies, and success criteria for evaluating the entire mechatronic system.

Qualification Pack

- PC8. Collect and meticulously analyze data from system-level validation tests to assess the overall performance, reliability, and efficiency of the integrated mechatronic system.
- PC9. Identify & use validation results to pinpoint areas where the system can be enhanced, whether through design modifications, component upgrades, or software adjustments. Recommend specific changes or optimizations based on data-driven insights to improve system functionality and performance.
- PC10. Integrate recommended improvements into the system design and conduct iterative validation to ensure that changes achieve the desired outcomes.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. organization procedures for health, safety and security, individual role and responsibilities in this context
- KU2. the organization's emergency procedures for different emergency situations and the importance of following the same
- KU3. Principles of Mechatronic Systems: In-depth understanding of Core concepts of mechatronics, including the integration and interaction of mechanical, electrical, electronic, and control systems. Functional roles and characteristics of sensors, actuators, control systems, and mechanical components in a mechatronic system.
- KU4. Testing Methods and Tools: Familiarity with Techniques and methodologies for testing the performance and functionality of individual components, such as sensors, actuators, and control systems. Use of testing equipment and software tools (e.g., oscilloscopes, multimeters, signal generators, data acquisition systems) to perform accurate and reliable tests.
- KU5. Integration Techniques: Knowledge of Best practices for integrating various components into a unified mechatronic system, including mechanical assembly, electrical wiring, and software interfacing. Knowledge of communication protocols (e.g., CAN, I2C, SPI, UART) and data exchange methods for ensuring seamless interaction between components.
- KU6. System-Level Design and Architecture: Understanding of overall design and architecture of mechatronic systems, including system schematics, block diagrams, and flowcharts.
- KU7. Validation and Verification Processes: Understanding of Procedures for validating the integrated system against design specifications and real-world performance requirements. Techniques for verifying system functionality, reliability, and safety through comprehensive testing and analysis.
- KU8. Safety Standards and Regulations: Awareness of relevant safety standards, industry regulations, and compliance requirements for mechatronic systems. Understanding of risk assessment and mitigation strategies to ensure safe operation of the integrated system.

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

Qualification Pack

- 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

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Conduct testing of sensors, actuators, control systems, and mechanical components to meet performance specifications and functions</i>	20	20	-	9
PC1. Develop detailed test plans and procedures that outline the specific tests to be conducted, including performance criteria, testing conditions, and measurement methods	10	5	-	3
PC2. Conduct tests systematically according to the established test plans, ensuring accurate and consistent execution. Collect and record test data meticulously, ensuring that all relevant parameters and outcomes are documented for further analysis.	5	5	-	3
PC3. Analyze the collected test data to determine whether the components meet the required performance specifications and function correctly. Identify any deviations from expected performance, diagnose underlying issues, and recommend corrective actions or improvements to enhance component reliability and effectiveness.	5	10	-	3
<i>Integrate tested components into a cohesive mechatronic system.</i>	10	10	-	3
PC4. Develop integration plans that outline the step-by-step process for combining sensors, actuators, control systems, and mechanical components into a unified system.	3	3	-	2
PC5. Perform the integration of tested components according to the established plans, ensuring proper physical and functional connections. Address and resolve compatibility issues that may arise during integration.	5	5	-	1
PC6. Conduct comprehensive system-level tests to verify that the integrated mechatronic system operates correctly and meets the overall design and performance specifications.	2	2	-	-
<i>Perform system-level validation activities for continuous improvement</i>	8	8	-	6

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC7. Develop validation plans that include test objectives, methodologies, and success criteria for evaluating the entire mechatronic system.	3	3	-	2
PC8. Collect and meticulously analyze data from system-level validation tests to assess the overall performance, reliability, and efficiency of the integrated mechatronic system.	2	2	-	2
PC9. Identify & use validation results to pinpoint areas where the system can be enhanced, whether through design modifications, component upgrades, or software adjustments. Recommend specific changes or optimizations based on data-driven insights to improve system functionality and performance.	3	3	-	2
PC10. Integrate recommended improvements into the system design and conduct iterative validation to ensure that changes achieve the desired outcomes.	-	-	-	-
NOS Total	38	38	-	18

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0480
NOS Name	Supervise testing, and Integration of all the sensor, actuators, control system and mechanical components of the mechatronic system.
Sector	Capital Goods
Sub-Sector	
Occupation	Design
NSQF Level	5.5
Credits	5
Version	1.0
Last Reviewed Date	01/10/2025
Next Review Date	01/10/2030
NSQC Clearance Date	01/10/2025

Qualification Pack

CSC/N1339: Collaboratively coordinate with the team

Description

This OS unit is about building relationships and working with people and groups inside and outside the organization, using skills and habits, to achieve the team goals and objectives

Scope

The scope covers the following :

- This unit/task covers the following:
- Creating team environment
- Communicating - giving and receiving
- Working cooperatively
- Participating in team decision making
- Demonstrating Sense of Responsibility
- Showing respect for opinions, customs, and preferences

Elements and Performance Criteria

Communicate effectively at the workplace

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

- PC1. exchange information and instruction with colleagues, and seek clarifications and feedback
- PC2. assist colleagues where required
- PC3. follow business communication etiquette in all interactions and communicative formats (online, digital, and in-person)
- PC4. document and share all relevant information with stakeholders in agreed formats and as per agreed timelines

Work effectively

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

- PC5. identify and obtain clarity regarding organisational, team and own goals and targets
- PC6. prioritise and plan work in order to achieve goals and targets
- PC7. monitor own and team performance as per agreed plan
- PC8. complete duties accurately, systematically and within required timeframes
- PC9. express emotions appropriately at the workplace and manage own response to heightened emotions
- PC10. maintain orderliness and cleanliness in the work area Maintain and enhance professional competence
- PC11. identify own strengths and weaknesses in relation to goals and targets
- PC12. adapt self, service, or product to meet success criteria
- PC13. seek and select opportunities for continuous professional development
- PC14. formulate a professional development plan to enhance capabilities

Qualification Pack

- PC15. build or contribute to the organizational knowledge base of cases, clients, issues, solutions, and innovations
- PC16. examine developments and trends in field of work and their potential impact on work
- PC17. take feedback from peers, supervisors and clients to improve own performance and practices

Work in a disciplined and ethical manner

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

- PC18. perform tasks as per workplace standards, organizational policies and legislative requirements
- PC19. display appropriate professional appearance at the workplace and adhere to the organizational dress code
- PC20. demonstrate responsible and disciplined behavior at the workplace such as punctuality; completing tasks as per given time and standards; demonstrating professional behavior at all times, adopting environment- friendly practices, etc.
- PC21. identify the cause of conflict and options for resolution with peers or escalate grievances and problems to appropriate authority as per procedure for conflict resolution
- PC22. protect the rights of the client and organization when delivering services
- PC23. ensure services are delivered equally to all clients regardless of personal and cultural beliefs
- PC24. operate within an agreed ethical code of practice and report unethical conduct to the appropriate authorities
- PC25. follow organizational guidelines and legal requirements on disclosure and confidentiality

Uphold social diversity at the workplace

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

- PC26. recognize and evaluate biased practices against underrepresented groups like women and persons with disabilities, in workplace systems and processes
- PC27. identify and report discrimination and harassment based on gender, disability, or cultural difference at the workplace
- PC28. use inclusive or neutral language and gestures in all interactions
- PC29. respect the personal and professional space of others
- PC30. access grievance redressal mechanisms as per legislations

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. the organisation's policies and procedures for working with colleagues, roles and responsibilities
- KU2. the importance of effective communication and establishing good working relationships with colleagues
- KU3. different methods of communication and the circumstances in which it is appropriate to use these
- KU4. the importance of creating an environment of trust and mutual respect
- KU5. the implications of own work on the work and schedule of others
- KU6. different types of information that colleagues might need and the importance of providing this information when it is required

Qualification Pack

KU7. the importance of helping colleagues with problems, to meet quality and time standards as a team

Generic Skills (GS)

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

- GS1. read and write instructions, guidelines, procedures, messages, emails, and other media in language of the workplace
- GS2. communicate in common and technical terms in language of the workplace
- GS3. listen effectively and orally communicate information
- GS4. be punctual, do work scheduling and reporting
- GS5. comply with workplace practices and ethics
- GS6. maintain cleanliness and healthy environment
- GS7. be customer friendly - understand real needs of the customer and suggest most appropriate solution
- GS8. be safety conscious and avoid risk
- GS9. be observant, vigilant, and security consciousness
- GS10. respond, handle problem, and escalate as necessary
- GS11. ask for clarification and advice from concerned persons
- GS12. make decisions on a suitable course of action or response keeping in view resource utilization while meeting commitments
- GS13. plan and organize work to achieve targets and deadlines

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Communicate effectively at the workplace</i>	7	20	-	-
PC1. exchange information and instruction with colleagues, and seek clarifications and feedback	-	-	-	-
PC2. assist colleagues where required	-	-	-	-
PC3. follow business communication etiquette in all interactions and communicative formats (online, digital, and in-person)	-	-	-	-
PC4. document and share all relevant information with stakeholders in agreed formats and as per agreed timelines	-	-	-	-
<i>Work effectively</i>	7	20	-	-
PC5. identify and obtain clarity regarding organisational, team and own goals and targets	-	-	-	-
PC6. prioritise and plan work in order to achieve goals and targets	-	-	-	-
PC7. monitor own and team performance as per agreed plan	-	-	-	-
PC8. complete duties accurately, systematically and within required timeframes	-	-	-	-
PC9. express emotions appropriately at the workplace and manage own response to heightened emotions	-	-	-	-
PC10. maintain orderliness and cleanliness in the work area Maintain and enhance professional competence	-	-	-	-
PC11. identify own strengths and weaknesses in relation to goals and targets	-	-	-	-
PC12. adapt self, service, or product to meet success criteria	-	-	-	-
PC13. seek and select opportunities for continuous professional development	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. formulate a professional development plan to enhance capabilities	-	-	-	-
PC15. build or contribute to the organizational knowledge base of cases, clients, issues, solutions, and innovations	-	-	-	-
PC16. examine developments and trends in field of work and their potential impact on work	-	-	-	-
PC17. take feedback from peers, supervisors and clients to improve own performance and practices	-	-	-	-
<i>Work in a disciplined and ethical manner</i>	8	20	-	-
PC18. perform tasks as per workplace standards, organizational policies and legislative requirements	-	-	-	-
PC19. display appropriate professional appearance at the workplace and adhere to the organizational dress code	-	-	-	-
PC20. demonstrate responsible and disciplined behavior at the workplace such as punctuality; completing tasks as per given time and standards; demonstrating professional behavior at all times, adopting environment- friendly practices, etc.	-	-	-	-
PC21. identify the cause of conflict and options for resolution with peers or escalate grievances and problems to appropriate authority as per procedure for conflict resolution	-	-	-	-
PC22. protect the rights of the client and organization when delivering services	-	-	-	-
PC23. ensure services are delivered equally to all clients regardless of personal and cultural beliefs	-	-	-	-
PC24. operate within an agreed ethical code of practice and report unethical conduct to the appropriate authorities	-	-	-	-
PC25. follow organizational guidelines and legal requirements on disclosure and confidentiality	-	-	-	-
<i>Uphold social diversity at the workplace</i>	8	10	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC26. recognize and evaluate biased practices against underrepresented groups like women and persons with disabilities, in workplace systems and processes	-	-	-	-
PC27. identify and report discrimination and harassment based on gender, disability, or cultural difference at the workplace	-	-	-	-
PC28. use inclusive or neutral language and gestures in all interactions	-	-	-	-
PC29. respect the personal and professional space of others	-	-	-	-
PC30. access grievance redressal mechanisms as per legislations	-	-	-	-
NOS Total	30	70	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N1339
NOS Name	Collaboratively coordinate with the team
Sector	Capital Goods
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	3
Version	1.0
Last Reviewed Date	01/10/2025
Next Review Date	01/10/2030
NSQC Clearance Date	01/10/2025

Qualification Pack

CSC/N0505: Follow health, safety and environment guidelines at workplace

Description

This OS unit is about following adequate safety procedures to make work environment healthy and safe

Scope

The scope covers the following :

- This unit/task covers the following:
- Adhere to standard safety procedures of the company
- Follow healthy practices and posture
- Practice waste management and recycling
- Conserve material and resources

Elements and Performance Criteria

Adhere to standard safety procedures of the organisation

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

- PC1. comply with general safety procedures and those for handling equipment, tools, chemicals, and hazardous material, as prescribed and followed in the organisation
- PC2. remove finger rings or any other metal objects likely to interfere with the work
- PC3. ensure that identification badge or any other object worn around the neck or on the clothing does not get caught in any rotating machine, or otherwise interfere with the work
- PC4. use appropriate safety devices such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, helmets etc. recommended for the work being performed
- PC5. inform, escalate, or raise alarm about any suspicions, unaccounted hazardous material, devices, or other objects found in the premises
- PC6. inform, escalate, or raise alarm about any breach of safety or security procedure in the organisation
- PC7. help achieve zero accidents goals at work
- PC8. avoid damage to sensitive electronic components due to negligence of ESD procedures
- PC9. participate regularly in fire drills or other safety related workshops organised by the organisation
- PC10. follow strictly all access control and perimeter safety procedures in designated factory areas such as robotic work stations, automated production lines, automated material movement and other potentially risky operations
- PC11. ensure that other people follow all access control and perimeter safety procedures in designated factory areas and help avoid accidents
- PC12. use emergency switches or other mechanisms of stopping a machine immediately in case any emergency situation has developed or about to happen
- PC13. ensure that electrical equipment are properly grounded
- PC14. follow Cyber Security guidelines and be vigilant at workplace

Qualification Pack

PC15. proceed to designated safe assembly area immediately on hearing fire alarm

Follow healthy practices and posture

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

PC16. wash hands and use sanitizers as recommended to prevent spread of diseases

PC17. follow common personal hygiene practices

PC18. maintain appropriate posture, especially in long hours of sitting or standing position and in handling heavy materials

PC19. participate in company organised health sessions such as exercises, games, yoga, physiotherapy, and other activities

PC20. handle heavy and hazardous materials with care, while maintaining appropriate posture, using suitable tools, and handling equipment such as trolleys, jacks, and ladders

PC21. learn and apply first aid devices available in the workplace

PC22. learn and apply safety and handling procedures for electrical shock and electrocution

PC23. learn and apply emergency medical help services

PC24. follow workplace decorum and avoid emotional outbursts or inappropriate language

PC25. prevent any harassment at workplace

Practice waste management and recycling

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

PC26. identify recyclable, non-recyclable, and hazardous waste generated in the workplace and comply with their disposal procedures

PC27. dispose non-recyclable waste and hazardous waste following recommended processes

PC28. deposit recyclable and reusable material at identified locations

PC29. support education and compliance of waste management processes

Conserve material and resources

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

PC30. identify ways to optimize usage of material and resources such as water, electricity, energy in various tasks, activities, and processes

PC31. check for spills and leakages of material in various tasks, activities, and processes and plug them

PC32. escalate the leakage issue to appropriate authority if needed

PC33. carry out routine cleaning of tools, machines, and equipment and maintain them in good working condition to optimize efficiency and wastage

PC34. check if the equipment is functioning normally before commencing work and rectify or report any malfunctioning to the responsible agency

PC35. check for any odour, sparks, fumes, emission, unusual vibration, noise, or any other objectionable presence in the environment and take immediate corrective action followed by report to responsible agency

PC36. ensure electrical equipment are properly connected for use and are switched off when not in use

PC37. support education and compliance of resource conservation processes

Knowledge and Understanding (KU)

Qualification Pack

The individual on the job needs to know and understand:

- KU1. company policies on workplace, environment, and personnel management
- KU2. company policy on occupational safety and health
- KU3. professional hazards related to nature of work and how to deal with them
- KU4. how to maintain the work area safe and secure
- KU5. how to handle hazardous materials, tools, and equipment
- KU6. emergency procedures for fire, electrocution, physical injury, wounds, etc.
- KU7. need for proper body posture and use of appropriate handling equipment
- KU8. understand electrical grounding practices
- KU9. common sources of pollution and ways to minimize it
- KU10. waste management - categorisation, colour coding, handling, and disposal procedure
- KU11. organisation policies and procedures for minimizing waste
- KU12. efficient use of electricity, material, and water in processes
- KU13. organization policies regarding network usage and security
- KU14. norms for professional behaviour at workplace and dealing with deviations

Generic Skills (GS)

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

- GS1. communicating in the language of the workplace
- GS2. reading and interpreting documents, drawings, symbols, and instructions
- GS3. operating computer and common office equipment and diagnosing common electrical and interconnection problems
- GS4. writing notes, reports, observations, emails
- GS5. using personnel protective devices
- GS6. maintaining clean and healthy work environment
- GS7. using and operating safety devices and equipment
- GS8. conducting work following workplace security processes and rules
- GS9. responding to emergency situations pertaining to workplace
- GS10. understanding people and collaborating to create a healthy workplace

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Adhere to standard safety procedures of the organisation</i>	7	10	-	-
PC1. comply with general safety procedures and those for handling equipment, tools, chemicals, and hazardous material, as prescribed and followed in the organisation	-	-	-	-
PC2. remove finger rings or any other metal objects likely to interfere with the work	-	-	-	-
PC3. ensure that identification badge or any other object worn around the neck or on the clothing does not get caught in any rotating machine, or otherwise interfere with the work	-	-	-	-
PC4. use appropriate safety devices such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, helmets etc. recommended for the work being performed	-	-	-	-
PC5. inform, escalate, or raise alarm about any suspicions, unaccounted hazardous material, devices, or other objects found in the premises	-	-	-	-
PC6. inform, escalate, or raise alarm about any breach of safety or security procedure in the organisation	-	-	-	-
PC7. help achieve zero accidents goals at work	-	-	-	-
PC8. avoid damage to sensitive electronic components due to negligence of ESD procedures	-	-	-	-
PC9. participate regularly in fire drills or other safety related workshops organised by the organisation	-	-	-	-
PC10. follow strictly all access control and perimeter safety procedures in designated factory areas such as robotic work stations, automated production lines, automated material movement and other potentially risky operations	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. ensure that other people follow all access control and perimeter safety procedures in designated factory areas and help avoid accidents	-	-	-	-
PC12. use emergency switches or other mechanisms of stopping a machine immediately in case any emergency situation has developed or about to happen	-	-	-	-
PC13. ensure that electrical equipment are properly grounded	-	-	-	-
PC14. follow Cyber Security guidelines and be vigilant at workplace	-	-	-	-
PC15. proceed to designated safe assembly area immediately on hearing fire alarm	-	-	-	-
<i>Follow healthy practices and posture</i>	8	10	-	-
PC16. wash hands and use sanitizers as recommended to prevent spread of diseases	-	-	-	-
PC17. follow common personal hygiene practices	-	-	-	-
PC18. maintain appropriate posture, especially in long hours of sitting or standing position and in handling heavy materials	-	-	-	-
PC19. participate in company organised health sessions such as exercises, games, yoga, physiotherapy, and other activities	-	-	-	-
PC20. handle heavy and hazardous materials with care, while maintaining appropriate posture, using suitable tools, and handling equipment such as trolleys, jacks, and ladders	-	-	-	-
PC21. learn and apply first aid devices available in the workplace	-	-	-	-
PC22. learn and apply safety and handling procedures for electrical shock and electrocution	-	-	-	-
PC23. learn and apply emergency medical help services	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC24. follow workplace decorum and avoid emotional outbursts or inappropriate language	-	-	-	-
PC25. prevent any harassment at workplace	-	-	-	-
<i>Practice waste management and recycling</i>	-	-	-	-
PC26. identify recyclable, non-recyclable, and hazardous waste generated in the workplace and comply with their disposal procedures	-	-	-	-
PC27. dispose non-recyclable waste and hazardous waste following recommended processes	-	-	-	-
PC28. deposit recyclable and reusable material at identified locations	-	-	-	-
PC29. support education and compliance of waste management processes	-	-	-	-
<i>Conserve material and resources</i>	-	-	-	-
PC30. identify ways to optimize usage of material and resources such as water, electricity, energy in various tasks, activities, and processes	-	-	-	-
PC31. check for spills and leakages of material in various tasks, activities, and processes and plug them	-	-	-	-
PC32. escalate the leakage issue to appropriate authority if needed	-	-	-	-
PC33. carry out routine cleaning of tools, machines, and equipment and maintain them in good working condition to optimize efficiency and wastage	-	-	-	-
PC34. check if the equipment is functioning normally before commencing work and rectify or report any malfunctioning to the responsible agency	-	-	-	-
PC35. check for any odour, sparks, fumes, emission, unusual vibration, noise, or any other objectionable presence in the environment and take immediate corrective action followed by report to responsible agency	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC36. ensure electrical equipment are properly connected for use and are switched off when not in use	-	-	-	-
PC37. support education and compliance of resource conservation processes	-	-	-	-
NOS Total	15	20	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0505
NOS Name	Follow health, safety and environment guidelines at workplace
Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Defence Equipment, Fire-Fighting & Safety Equipment, Homeland Security
Occupation	Service
NSQF Level	5
Credits	1
Version	1.0
Last Reviewed Date	01/10/2025
Next Review Date	01/10/2030
NSQC Clearance Date	01/10/2025

Qualification Pack

DGT/VSQ/N0102: Employability Skills (60 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Setting
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

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

- PC1. identify employability skills required for jobs in various industries
- PC2. identify and explore learning and employability portals

Constitutional values - Citizenship

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

- PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.
- PC4. follow environmentally sustainable practices

Becoming a Professional in the 21st Century

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

- PC5. recognize the significance of 21st Century Skills for employment
- PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

Basic English Skills

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

Qualification Pack

- PC7. use basic English for everyday conversation in different contexts, in person and over the telephone
- PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English
- PC9. write short messages, notes, letters, e-mails etc. in English

Career Development & Goal Setting

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

- PC10. understand the difference between job and career
- PC11. prepare a career development plan with short- and long-term goals, based on aptitude

Communication Skills

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

- PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings
- PC13. work collaboratively with others in a team

Diversity & Inclusion

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

- PC14. communicate and behave appropriately with all genders and PwD
- PC15. escalate any issues related to sexual harassment at workplace according to POSH Act

Financial and Legal Literacy

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

- PC16. select financial institutions, products and services as per requirement
- PC17. carry out offline and online financial transactions, safely and securely
- PC18. identify common components of salary and compute income, expenses, taxes, investments etc
- PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation

Essential Digital Skills

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

- PC20. operate digital devices and carry out basic internet operations securely and safely
- PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively
- PC22. use basic features of word processor, spreadsheets, and presentations

Entrepreneurship

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

- PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research
- PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion
- PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

Customer Service

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

- PC26. identify different types of customers
- PC27. identify and respond to customer requests and needs in a professional manner.

Qualification Pack

PC28. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

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

PC29. create a professional Curriculum vitae (Résumé)

PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

PC31. apply to identified job openings using offline /online methods as per requirement

PC32. answer questions politely, with clarity and confidence, during recruitment and selection

PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills and different learning and employability related portals

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

KU6. importance of career development and setting long- and short-term goals

KU7. about effective communication

KU8. POSH Act

KU9. Gender sensitivity and inclusivity

KU10. different types of financial institutes, products, and services

KU11. how to compute income and expenditure

KU12. importance of maintaining safety and security in offline and online financial transactions

KU13. different legal rights and laws

KU14. different types of digital devices and the procedure to operate them safely and securely

KU15. how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.

KU16. how to identify business opportunities

KU17. types and needs of customers

KU18. how to apply for a job and prepare for an interview

KU19. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

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

GS1. read and write different types of documents/instructions/correspondence

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

Qualification Pack

- GS3. behave politely and appropriately with all
- GS4. how to work in a virtual mode
- GS5. perform calculations efficiently
- GS6. solve problems effectively
- GS7. pay attention to details
- GS8. manage time efficiently
- GS9. maintain hygiene and sanitization to avoid infection

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	1	1	-	-
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
<i>Constitutional values - Citizenship</i>	1	1	-	-
PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC4. follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	2	4	-	-
PC5. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
<i>Basic English Skills</i>	2	3	-	-
PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
<i>Career Development & Goal Setting</i>	1	2	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. understand the difference between job and career	-	-	-	-
PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
<i>Communication Skills</i>	2	2	-	-
PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
PC13. work collaboratively with others in a team	-	-	-	-
<i>Diversity & Inclusion</i>	1	2	-	-
PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
<i>Financial and Legal Literacy</i>	2	3	-	-
PC16. select financial institutions, products and services as per requirement	-	-	-	-
PC17. carry out offline and online financial transactions, safely and securely	-	-	-	-
PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
<i>Essential Digital Skills</i>	3	4	-	-
PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Entrepreneurship</i>	2	3	-	-
PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
<i>Customer Service</i>	1	2	-	-
PC26. identify different types of customers	-	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship & Jobs</i>	2	3	-	-
PC29. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC31. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
NOS Total	20	30	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0102
NOS Name	Employability Skills (60 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	07/10/2025
Next Review Date	07/10/2028
NSQC Clearance Date	07/10/2025

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for the Qualification Pack will be created by CGSC.
2. Performance Criteria (PC) have been assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
3. The assessment for the theory part will/may be based on knowledge bank of questions approved CGSC.
4. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
5. Assessment Agencies will create Assessor Guides comprising of Theory and Practical Assessment Set and Guidelines for each examination/training centre (as per assessment criteria below). The same will be approved by CGSC for adequacy.
6. To successfully attain Certification on the Qualification Pack, the trainee must score a minimum of 70% in each Core NOS and minimum of 70% in all non-core NOS. In addition, a candidate needs to attain a minimum overall pass percentage of 70% for certification.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

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
CSC/N0479. Supervise programming Simulation of Mechatronics System using CAD inputs (CAD Modelling of particular process)	37	34	0	20	91	30
CSC/N0480. Supervise testing, and Integration of all the sensor, actuators, control system and mechanical components of the mechatronic system.	38	38	0	18	94	30
CSC/N1339. Collaboratively coordinate with the team	30	70	-	-	100	20
CSC/N0505. Follow health, safety and environment guidelines at workplace	15	20	-	-	35	15
DGT/VSQ/N0102. Employability Skills (60 Hours)	20	30	-	-	50	5
Total	140	192	-	38	370	100

Qualification Pack

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Qualification Pack

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.

Qualification Pack

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.