

Qualification Pack



Robotics and Automation PLC-SCADA engineer

QP Code: CSC/Q0413

Version: 1.0

NSQF Level: 5.5

Capital Goods & Strategic Skill Council || 1st Floor, L-29, Outer Circle, Connaught Place
New Delhi - 110001 || email:technicaladvisors@cgsc.in

Qualification Pack

Contents

CSC/Q0413: Robotics and Automation PLC-SCADA 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/N0465: Implement and Maintain control systems using PLC and SCADA systems	5
CSC/N0466: Develop System logic, programming automation sequence, and troubleshoot issues.....	9
CSC/N0467: Perform PLC Programming and Configuration	15
CSC/N0468: Carry SCADA System Design and Maintenance.....	19
CSC/N0469: Perform integration of Robotics and Automation Systems	24
CSC/N0470: Conduct Training and Documentation	29
CSC/N1339: Collaboratively coordinate with the team	35
CSC/N0505: Follow health, safety and environment guidelines at workplace	42
DGT/VSQ/N0102: Employability Skills (60 Hours)	50
Assessment Guidelines and Weightage.....	57
<i>Assessment Guidelines</i>	57
<i>Assessment Weightage</i>	58
Acronyms.....	60
Glossary	61

Qualification Pack

CSC/Q0413: Robotics and Automation PLC-SCADA engineer

Brief Job Description

The individual will play a crucial role in designing, implementing, and maintaining Programmable Logic Controller (PLC) and Supervisory Control and Data Acquisition (SCADA) systems for our cutting-edge robotics and automation projects. Strong understanding of automation protocols, network communication protocols, and software to operate and manage control systems efficiently.

Personal Attributes

A Robotics and Automation PLC-SCADA engineer requires strong technical proficiency in programming, PLC systems, and SCADA software, alongside problem-solving skills and attention to detail. Adaptability, collaboration, safety consciousness, project management abilities, continuous improvement mindset, leadership skills, and ethical conduct are also essential for success in this role.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [CSC/N0465: Implement and Maintain control systems using PLC and SCADA systems](#)
2. [CSC/N0466: Develop System logic, programming automation sequence, and troubleshoot issues.](#)
3. [CSC/N0467: Perform PLC Programming and Configuration](#)
4. [CSC/N0468: Carry SCADA System Design and Maintenance](#)
5. [CSC/N0469: Perform integration of Robotics and Automation Systems](#)
6. [CSC/N0470: Conduct Training and Documentation](#)
7. [CSC/N1339: Collaboratively coordinate with the team](#)
8. [CSC/N0505: Follow health, safety and environment guidelines at workplace](#)
9. [DGT/VSQ/N0102: Employability Skills \(60 Hours\)](#)

Qualification Pack (QP) Parameters

Sector	Capital Goods
Sub-Sector	Machine Tools

Qualification Pack

Occupation	Design, Design
Country	India
NSQF Level	5.5
Credits	19
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7412.0101
Minimum Educational Qualification & Experience	UG in relevant field (UG Degree in relevant field + 2 years of relevant experience or 3 Years UG Degree in Science and Technology (B.Sc / BCA) / 4 years BE,B.Tech (Electrical, Electronics, Mechanical, Mechatronics, Instrumentation and Control)* or 10th grade pass +3 years Diploma in relevant field + 5 year of relevant experience or Previous NSQC level 5 + 1.5 years of relevant experience *Subject to being offered as 6 months internship/ project)
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	24 Years
Last Reviewed On	NA
Next Review Date	31/01/2027
NSQC Approval Date	31/01/2024
Version	1.0
Reference code on NQR	QG-5.5-CG-02049-2024-V1-CGSC
NQR Version	1

Qualification Pack

CSC/N0465: Implement and Maintain control systems using PLC and SCADA systems

Description

Implementing and maintaining control systems using PLC and SCADA involves designing, programming, and integrating these systems for industrial automation. Responsibilities include developing PLC programs, creating SCADA interfaces, testing systems, and providing ongoing maintenance and support. This role requires a strong understanding of industrial processes, PLC programming languages (such as ladder logic), and SCADA software.

Scope

The scope covers the following :

- The scope of implementing and maintaining control systems using PLC and SCADA includes designing, programming, and integrating these systems for industrial automation. This involves developing PLC programs, creating SCADA interfaces, testing systems, and providing ongoing maintenance and support.

Elements and Performance Criteria

Implement and Maintain control systems using PLC and SCADA systems

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

- PC1. Successfully implement PLC and SCADA systems within specified project timelines.
- PC2. Ensure efficient integration with existing automation infrastructure.
- PC3. Adhere to industry standards and best practices in the design and implementation of PLC and SCADA systems.
- PC4. Ensure compliance with relevant safety regulations.
- PC5. Optimize PLC and SCADA configurations to achieve maximum system efficiency.
- PC6. Implement strategies to minimize cycle times and improve overall productivity.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. Proficiency in programming PLCs using languages such as ladder logic, function block diagrams, or structured text.
- KU2. Ability to develop SCADA interfaces for monitoring and controlling industrial processes.
- KU3. Understanding of industrial processes and automation principles to design effective control systems.
- KU4. Knowledge of control system design principles, including hardware selection, communication protocols, and system architecture.
- KU5. Ability to integrate PLCs and SCADA systems with other hardware and software components.

Qualification Pack

- KU6. Skill in testing control systems to ensure they meet specifications and commissioning them for operation.
- KU7. Ability to diagnose and resolve issues in control systems and perform regular maintenance tasks.
- KU8. Knowledge of relevant safety standards and regulations for industrial control systems.
- KU9. Skill in creating and maintaining documentation for control systems, including system architecture and operating procedures.
- KU10. Ability to work effectively in a team and communicate technical information clearly to stakeholders.

Generic Skills (GS)

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

- GS1. Ability to identify and solve complex problems in control systems efficiently.
- GS2. Being meticulous in programming, testing, and troubleshooting to ensure system accuracy and reliability.
- GS3. Capacity to analyze data and system performance to optimize control strategies and improve efficiency.
- GS4. Flexibility to adjust to changing project requirements and technologies in the field of industrial automation.
- GS5. Collaborating effectively with engineers, technicians, and other stakeholders to achieve project goals.
- GS6. Clearly conveying technical information verbally and in writing to team members and clients.
- GS7. Prioritizing tasks and managing time effectively to meet project deadlines.

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Implement and Maintain control systems using PLC and SCADA systems</i>	15	45	-	-
PC1. Successfully implement PLC and SCADA systems within specified project timelines.	-	-	-	-
PC2. Ensure efficient integration with existing automation infrastructure.	-	-	-	-
PC3. Adhere to industry standards and best practices in the design and implementation of PLC and SCADA systems.	-	-	-	-
PC4. Ensure compliance with relevant safety regulations.	-	-	-	-
PC5. Optimize PLC and SCADA configurations to achieve maximum system efficiency.	-	-	-	-
PC6. Implement strategies to minimize cycle times and improve overall productivity.	-	-	-	-
NOS Total	15	45	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0465
NOS Name	Implement and Maintain control systems using PLC and SCADA systems
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, Light Engineering Goods, Defence Equipment, Fire-Fighting & Safety Equipment
Occupation	Design
NSQF Level	5.5
Credits	2
Version	1.0
Last Reviewed Date	31/01/2024
Next Review Date	31/01/2027
NSQC Clearance Date	31/01/2024

Qualification Pack

CSC/N0466: Develop System logic, programming automation sequence, and troubleshoot issues.

Description

Developing system logic involves designing the control strategy, while programming automation sequences entails writing PLC code. Troubleshooting issues requires diagnosing and resolving problems in the control system. This role demands a deep understanding of PLC programming languages and SCADA systems.

Scope

The scope covers the following :

- The scope of developing system logic, programming automation sequences, and troubleshooting issues includes designing control strategies, writing PLC code, and resolving system problems. This role involves ensuring the efficient and reliable operation of control systems. It requires expertise in PLC programming languages, SCADA systems, and problem-solving techniques.

Elements and Performance Criteria

Develop System logic, programming automation sequence, and troubleshoot issues.

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

- PC1. Develop clear and efficient system logic for PLC and SCADA operations.
- PC2. Implement programming sequences that enhance the performance and reliability of the automation system.
- PC3. Design logic and programming sequences that are adaptable to changes in production requirements.
- PC4. Ensure flexibility in the automation system to accommodate future modifications and expansions.
- PC5. Maintain comprehensive documentation of system logic, ensuring clarity and ease of understanding for other team members.
- PC6. Provide detailed annotations and comments within the code for improved readability.

Troubleshooting and Issue Resolution

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

- PC7. Demonstrate the ability to quickly identify and diagnose issues within the PLC and SCADA systems.
- PC8. Utilize diagnostic tools and methodologies effectively.
- PC9. Develop and implement efficient solutions to address identified issues.
- PC10. Minimize downtime by resolving problems promptly and effectively.
- PC11. Conduct thorough root cause analysis for recurring issues.
- PC12. Propose and implement preventative measures to eliminate the root causes of problems.

Carry out maintenance and upgrades

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

Qualification Pack

- PC13. Establish a routine maintenance schedule for PLC and SCADA systems.
- PC14. Conduct regular checks to ensure the health and performance of the automation control systems.
- PC15. Identify opportunities for system upgrades and enhancements to improve functionality.
- PC16. Implement upgrades with minimal disruption to ongoing operations.
- PC17. Maintain version control for PLC and SCADA programs.
- PC18. Document changes made during upgrades for future reference and troubleshooting.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. Proficiency in programming PLCs using languages such as ladder logic, function block diagrams, or structured text.
- KU2. Ability to develop SCADA interfaces for monitoring and controlling industrial processes.
- KU3. Understanding of industrial processes and automation principles to design effective control systems.
- KU4. Knowledge of control system design principles, including hardware selection, communication protocols, and system architecture.
- KU5. Ability to integrate PLCs and SCADA systems with other hardware and software components.
- KU6. Skill in testing control systems to ensure they meet specifications and commissioning them for operation.
- KU7. Ability to diagnose and resolve issues in control systems and perform regular maintenance tasks.
- KU8. Knowledge of relevant safety standards and regulations for industrial control systems.
- KU9. Skill in creating and maintaining documentation for control systems, including system architecture and operating procedures.
- KU10. Ability to work effectively in a team and communicate technical information clearly to stakeholders.

Generic Skills (GS)

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

- GS1. Ability to identify and solve complex problems in control systems efficiently.
- GS2. Being meticulous in programming, testing, and troubleshooting to ensure system accuracy and reliability.
- GS3. Capacity to analyze data and system performance to optimize control strategies and improve efficiency.
- GS4. Flexibility to adjust to changing project requirements and technologies in the field of industrial automation.
- GS5. Collaborating effectively with engineers, technicians, and other stakeholders to achieve project goals.
- GS6. Clearly conveying technical information verbally and in writing to team members and clients.



Qualification Pack

GS7. Prioritizing tasks and managing time effectively to meet project deadlines.

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Develop System logic, programming automation sequence, and troubleshoot issues.</i>	10	25	-	-
PC1. Develop clear and efficient system logic for PLC and SCADA operations.	-	-	-	-
PC2. Implement programming sequences that enhance the performance and reliability of the automation system.	-	-	-	-
PC3. Design logic and programming sequences that are adaptable to changes in production requirements.	-	-	-	-
PC4. Ensure flexibility in the automation system to accommodate future modifications and expansions.	-	-	-	-
PC5. Maintain comprehensive documentation of system logic, ensuring clarity and ease of understanding for other team members.	-	-	-	-
PC6. Provide detailed annotations and comments within the code for improved readability.	-	-	-	-
<i>Troubleshooting and Issue Resolution</i>	10	25	-	-
PC7. Demonstrate the ability to quickly identify and diagnose issues within the PLC and SCADA systems.	-	-	-	-
PC8. Utilize diagnostic tools and methodologies effectively.	-	-	-	-
PC9. Develop and implement efficient solutions to address identified issues.	-	-	-	-
PC10. Minimize downtime by resolving problems promptly and effectively.	-	-	-	-
PC11. Conduct thorough root cause analysis for recurring issues.	-	-	-	-
PC12. Propose and implement preventative measures to eliminate the root causes of problems.	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Carry out maintenance and upgrades</i>	10	20	-	-
PC13. Establish a routine maintenance schedule for PLC and SCADA systems.	-	-	-	-
PC14. Conduct regular checks to ensure the health and performance of the automation control systems.	-	-	-	-
PC15. Identify opportunities for system upgrades and enhancements to improve functionality.	-	-	-	-
PC16. Implement upgrades with minimal disruption to ongoing operations.	-	-	-	-
PC17. Maintain version control for PLC and SCADA programs.	-	-	-	-
PC18. Document changes made during upgrades for future reference and troubleshooting.	-	-	-	-
NOS Total	30	70	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0466
NOS Name	Develop System logic, programming automation sequence, and troubleshoot issues.
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, Light Engineering Goods, Defence Equipment, Fire-Fighting & Safety Equipment
Occupation	Design
NSQF Level	5.5
Credits	2
Version	1.0
Last Reviewed Date	31/01/2024
Next Review Date	31/01/2027
NSQC Clearance Date	31/01/2024

Qualification Pack

CSC/N0467: Perform PLC Programming and Configuration

Description

Performing PLC programming and configuration involves designing logic, writing programs, and configuring hardware. Responsibilities include testing, debugging, and documenting PLC programs. This role requires a deep understanding of PLC programming languages and industrial automation, as well as strong problem-solving skills.

Scope

The scope covers the following :

- The scope of performing PLC programming and configuration includes designing logic, writing programs, and configuring hardware for automated systems. Responsibilities also include testing, debugging, and documenting PLC programs. This role requires expertise in PLC programming languages, industrial automation, and hardware configuration.

Elements and Performance Criteria

Perform PLC Programming and Configuration

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

- PC1. Demonstrates advanced knowledge of PLC programming languages such as ladder logic, structured text, or function block diagrams.
- PC2. Effectively configures PLC and SCADA systems to meet project requirements.
- PC3. Quickly identifies and resolves issues in PLC programs and configurations.
- PC4. Maintains thorough and accurate documentation for all PLC programs and configurations.
- PC5. Adheres to industry standards and best practices in PLC programming and configuration.
- PC6. Collaborates effectively with cross-functional teams, including electrical engineers, project managers, and automation technicians.
- PC7. Completes PLC programming and configuration tasks within specified project timelines.
- PC8. Actively seeks opportunities for professional development and stays abreast of the latest advancements in PLC and SCADA technologies.
- PC9. Implements and follows quality assurance processes in PLC programming and configuration.
- PC10. Ensures customer satisfaction by delivering PLC and SCADA solutions that meet or exceed client expectations.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. Proficiency in programming PLCs using languages such as ladder logic, function block diagrams, or structured text.
- KU2. Ability to develop SCADA interfaces for monitoring and controlling industrial processes.

Qualification Pack

- KU3. Understanding of industrial processes and automation principles to design effective control systems.
- KU4. Knowledge of control system design principles, including hardware selection, communication protocols, and system architecture.
- KU5. Ability to integrate PLCs and SCADA systems with other hardware and software components.
- KU6. Skill in testing control systems to ensure they meet specifications and commissioning them for operation.
- KU7. Ability to diagnose and resolve issues in control systems and perform regular maintenance tasks.
- KU8. Knowledge of relevant safety standards and regulations for industrial control systems.
- KU9. Skill in creating and maintaining documentation for control systems, including system architecture and operating procedures.
- KU10. Ability to work effectively in a team and communicate technical information clearly to stakeholders.

Generic Skills (GS)

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

- GS1. Ability to identify and solve complex problems in control systems efficiently.
- GS2. Being meticulous in programming, testing, and troubleshooting to ensure system accuracy and reliability.
- GS3. Capacity to analyze data and system performance to optimize control strategies and improve efficiency.
- GS4. Flexibility to adjust to changing project requirements and technologies in the field of industrial automation.
- GS5. Collaborating effectively with engineers, technicians, and other stakeholders to achieve project goals.
- GS6. Clearly conveying technical information verbally and in writing to team members and clients.
- GS7. Prioritizing tasks and managing time effectively to meet project deadlines.

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform PLC Programming and Configuration</i>	30	70	-	-
PC1. Demonstrates advanced knowledge of PLC programming languages such as ladder logic, structured text, or function block diagrams.	-	-	-	-
PC2. Effectively configures PLC and SCADA systems to meet project requirements.	-	-	-	-
PC3. Quickly identifies and resolves issues in PLC programs and configurations.	-	-	-	-
PC4. Maintains thorough and accurate documentation for all PLC programs and configurations.	-	-	-	-
PC5. Adheres to industry standards and best practices in PLC programming and configuration.	-	-	-	-
PC6. Collaborates effectively with cross-functional teams, including electrical engineers, project managers, and automation technicians.	-	-	-	-
PC7. Completes PLC programming and configuration tasks within specified project timelines.	-	-	-	-
PC8. Actively seeks opportunities for professional development and stays abreast of the latest advancements in PLC and SCADA technologies.	-	-	-	-
PC9. Implements and follows quality assurance processes in PLC programming and configuration.	-	-	-	-
PC10. Ensures customer satisfaction by delivering PLC and SCADA solutions that meet or exceed client expectations.	-	-	-	-
NOS Total	30	70	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0467
NOS Name	Perform PLC Programming and Configuration
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, Light Engineering Goods, Defence Equipment, Fire-Fighting & Safety Equipment
Occupation	Design
NSQF Level	5.5
Credits	3
Version	1.0
Last Reviewed Date	31/01/2024
Next Review Date	31/01/2027
NSQC Clearance Date	31/01/2024

Qualification Pack

CSC/N0468: Carry SCADA System Design and Maintenance

Description

Carrying out SCADA system design and maintenance involves designing the SCADA system architecture, creating graphical interfaces, and configuring communication protocols. Responsibilities also include testing, troubleshooting, and updating SCADA systems to ensure optimal performance. This role requires expertise in SCADA software, industrial automation, and system maintenance practices.

Scope

The scope covers the following :

- The scope of carrying out SCADA system design and maintenance includes designing the SCADA system architecture, developing HMI interfaces, and configuring communication protocols. Responsibilities also include testing, troubleshooting, and updating SCADA systems to ensure optimal performance and reliability. This role requires expertise in SCADA software, industrial automation, and system maintenance practices.

Elements and Performance Criteria

SCADA System Design

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

- PC1. Develop comprehensive SCADA system architectures that align with project requirements and industry standards.
- PC2. Design SCADA systems with a focus on functionality, ensuring efficient monitoring, control, and data acquisition in Robotics and Automation environments.
- PC3. Incorporate seamless integration capabilities into the design, enabling effective communication with diverse PLCs and Automation devices.
- PC4. Implement redundancy measures to enhance system reliability, minimizing the risk of downtime due to hardware or software failures.
- PC5. Integrate robust security protocols to safeguard SCADA systems against unauthorized access, cyber threats, and data breaches.

SCADA System Maintenance

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

- PC6. develop and follows structured maintenance plans, including scheduled updates, patches, and system checks to ensure optimal performance.
- PC7. identify and resolves potential issues through regular system audits and preventive maintenance, minimizing unplanned downtime.
- PC8. manage timely implementation of software updates and upgrades, keeping the SCADA system current with the latest features and security patches.
- PC9. maintain accurate documentation of system configurations, changes, and maintenance activities for reference and future troubleshooting.
- PC10. implement continuous performance monitoring tools and practices to detect and address performance degradation before it impacts operations.

Qualification Pack

- PC11. conduct training sessions for relevant personnel on routine system maintenance tasks, ensuring a well-informed team capable of addressing basic issues.
- PC12. conduct thorough root cause analyses for system failures, implementing corrective actions to prevent recurrence.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. Proficiency in programming PLCs using languages such as ladder logic, function block diagrams, or structured text.
- KU2. Ability to develop SCADA interfaces for monitoring and controlling industrial processes.
- KU3. Understanding of industrial processes and automation principles to design effective control systems.
- KU4. Knowledge of control system design principles, including hardware selection, communication protocols, and system architecture.
- KU5. Ability to integrate PLCs and SCADA systems with other hardware and software components.
- KU6. Skill in testing control systems to ensure they meet specifications and commissioning them for operation.
- KU7. Ability to diagnose and resolve issues in control systems and perform regular maintenance tasks.
- KU8. Knowledge of relevant safety standards and regulations for industrial control systems.
- KU9. Skill in creating and maintaining documentation for control systems, including system architecture and operating procedures.
- KU10. Ability to work effectively in a team and communicate technical information clearly to stakeholders.

Generic Skills (GS)

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

- GS1. Ability to identify and solve complex problems in control systems efficiently.
- GS2. Being meticulous in programming, testing, and troubleshooting to ensure system accuracy and reliability.
- GS3. Capacity to analyze data and system performance to optimize control strategies and improve efficiency.
- GS4. Flexibility to adjust to changing project requirements and technologies in the field of industrial automation.
- GS5. Collaborating effectively with engineers, technicians, and other stakeholders to achieve project goals.
- GS6. Clearly conveying technical information verbally and in writing to team members and clients.
- GS7. Prioritizing tasks and managing time effectively to meet project deadlines.

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>SCADA System Design</i>	15	35	-	-
PC1. Develop comprehensive SCADA system architectures that align with project requirements and industry standards.	-	-	-	-
PC2. Design SCADA systems with a focus on functionality, ensuring efficient monitoring, control, and data acquisition in Robotics and Automation environments.	-	-	-	-
PC3. Incorporate seamless integration capabilities into the design, enabling effective communication with diverse PLCs and Automation devices.	-	-	-	-
PC4. Implement redundancy measures to enhance system reliability, minimizing the risk of downtime due to hardware or software failures.	-	-	-	-
PC5. Integrate robust security protocols to safeguard SCADA systems against unauthorized access, cyber threats, and data breaches.	-	-	-	-
<i>SCADA System Maintenance</i>	15	35	-	-
PC6. develop and follows structured maintenance plans, including scheduled updates, patches, and system checks to ensure optimal performance.	-	-	-	-
PC7. identify and resolves potential issues through regular system audits and preventive maintenance, minimizing unplanned downtime.	-	-	-	-
PC8. manage timely implementation of software updates and upgrades, keeping the SCADA system current with the latest features and security patches.	-	-	-	-
PC9. maintain accurate documentation of system configurations, changes, and maintenance activities for reference and future troubleshooting.	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. implement continuous performance monitoring tools and practices to detect and address performance degradation before it impacts operations.	-	-	-	-
PC11. conduct training sessions for relevant personnel on routine system maintenance tasks, ensuring a well-informed team capable of addressing basic issues.	-	-	-	-
PC12. conduct thorough root cause analyses for system failures, implementing corrective actions to prevent recurrence.	-	-	-	-
NOS Total	30	70	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0468
NOS Name	Carry SCADA System Design and Maintenance
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, Light Engineering Goods, Defence Equipment, Fire-Fighting & Safety Equipment
Occupation	Design
NSQF Level	5.5
Credits	2
Version	1.0
Last Reviewed Date	31/01/2024
Next Review Date	31/01/2027
NSQC Clearance Date	31/01/2024

Qualification Pack

CSC/N0469: Perform integration of Robotics and Automation Systems

Description

Performing integration of robotics and automation systems involves designing system architecture, selecting components, and programming sequences. Responsibilities include integrating robotics with automation systems, testing, and ensuring system efficiency. This role requires expertise in robotics, automation, PLC programming, and system integration principles.

Scope

The scope covers the following :

- The scope of performing integration of robotics and automation systems includes designing system architecture, selecting components, and programming sequences for efficient operation. Responsibilities also include integrating robotics with automation systems, testing the integrated system, and ensuring compliance with safety standards. This role requires expertise in robotics, automation, PLC programming, and system integration principles.

Elements and Performance Criteria

Perform integration of Robotics and Automation Systems

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

- PC1. integrate Robotics and Automation Systems with existing infrastructure, ensuring compatibility with diverse hardware and software components.
- PC2. implement effective communication protocols between PLCs, SCADA systems, and Robotics components to facilitate seamless data exchange.
- PC3. establish real-time monitoring capabilities, allowing for continuous tracking of Robotics and Automation System performance and status.
- PC4. integrate data from Robotics and Automation Systems into the SCADA system, providing a unified platform for comprehensive monitoring and control.
- PC5. design integration solutions with fault-tolerant mechanisms to ensure system stability and reliability in the event of component failures.
- PC6. incorporate safety protocols and features into the integration process, ensuring compliance with safety standards and minimizing risks during operation.
- PC7. demonstrate the ability to integrate diverse Robotics and Automation Systems, adapting to different manufacturers, models, and technologies.
- PC8. optimize integrated workflows to enhance efficiency, reduce cycle times, and improve overall productivity in the Robotics and Automation processes.
- PC9. conduct thorough testing and validation of the integrated systems to ensure functionality, performance, and adherence to specified requirements.
- PC10. maintain detailed documentation of integration processes, configurations, and settings for reference, troubleshooting, and future upgrades.
- PC11. provide training to end-users and support teams on the integrated systems, enabling them to operate, troubleshoot, and maintain the integrated Robotics and Automation Systems.

Qualification Pack

- PC12. seek opportunities for continuous improvement in integration processes, exploring new technologies and methodologies to enhance system capabilities.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. Proficiency in programming PLCs using languages such as ladder logic, function block diagrams, or structured text.
- KU2. Ability to develop SCADA interfaces for monitoring and controlling industrial processes.
- KU3. Understanding of industrial processes and automation principles to design effective control systems.
- KU4. Knowledge of control system design principles, including hardware selection, communication protocols, and system architecture.
- KU5. Ability to integrate PLCs and SCADA systems with other hardware and software components.
- KU6. Skill in testing control systems to ensure they meet specifications and commissioning them for operation.
- KU7. Ability to diagnose and resolve issues in control systems and perform regular maintenance tasks.
- KU8. Knowledge of relevant safety standards and regulations for industrial control systems.
- KU9. Skill in creating and maintaining documentation for control systems, including system architecture and operating procedures.
- KU10. Ability to work effectively in a team and communicate technical information clearly to stakeholders.

Generic Skills (GS)

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

- GS1. Ability to identify and solve complex problems in control systems efficiently.
- GS2. Being meticulous in programming, testing, and troubleshooting to ensure system accuracy and reliability.
- GS3. Capacity to analyze data and system performance to optimize control strategies and improve efficiency.
- GS4. Flexibility to adjust to changing project requirements and technologies in the field of industrial automation.
- GS5. Collaborating effectively with engineers, technicians, and other stakeholders to achieve project goals.
- GS6. Clearly conveying technical information verbally and in writing to team members and clients.
- GS7. Prioritizing tasks and managing time effectively to meet project deadlines.

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform integration of Robotics and Automation Systems</i>	30	70	-	-
PC1. integrate Robotics and Automation Systems with existing infrastructure, ensuring compatibility with diverse hardware and software components.	-	-	-	-
PC2. implement effective communication protocols between PLCs, SCADA systems, and Robotics components to facilitate seamless data exchange.	-	-	-	-
PC3. establish real-time monitoring capabilities, allowing for continuous tracking of Robotics and Automation System performance and status.	-	-	-	-
PC4. integrate data from Robotics and Automation Systems into the SCADA system, providing a unified platform for comprehensive monitoring and control.	-	-	-	-
PC5. design integration solutions with fault-tolerant mechanisms to ensure system stability and reliability in the event of component failures.	-	-	-	-
PC6. incorporate safety protocols and features into the integration process, ensuring compliance with safety standards and minimizing risks during operation.	-	-	-	-
PC7. demonstrate the ability to integrate diverse Robotics and Automation Systems, adapting to different manufacturers, models, and technologies.	-	-	-	-
PC8. optimize integrated workflows to enhance efficiency, reduce cycle times, and improve overall productivity in the Robotics and Automation processes.	-	-	-	-
PC9. conduct thorough testing and validation of the integrated systems to ensure functionality, performance, and adherence to specified requirements.	-	-	-	-
PC10. maintain detailed documentation of integration processes, configurations, and settings for reference, troubleshooting, and future upgrades.	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. provide training to end-users and support teams on the integrated systems, enabling them to operate, troubleshoot, and maintain the integrated Robotics and Automation Systems.	-	-	-	-
PC12. seek opportunities for continuous improvement in integration processes, exploring new technologies and methodologies to enhance system capabilities.	-	-	-	-
NOS Total	30	70	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0469
NOS Name	Perform integration of Robotics and Automation Systems
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, Light Engineering Goods, Defence Equipment, Fire-Fighting & Safety Equipment
Occupation	Design
NSQF Level	5.5
Credits	2
Version	1.0
Last Reviewed Date	31/01/2024
Next Review Date	31/01/2027
NSQC Clearance Date	31/01/2024

Qualification Pack

CSC/N0470: Conduct Training and Documentation

Description

Conducting training and documentation involves developing and delivering training materials, creating and managing documentation, and collecting feedback. Responsibilities include educating users on system operation, maintenance, and troubleshooting. This role requires strong communication skills and proficiency in creating written materials.

Scope

The scope covers the following :

- The scope of conducting training and documentation includes developing training materials, delivering training sessions, and creating and managing documentation. Responsibilities also include educating users on system operation, maintenance, and troubleshooting. This role requires strong communication skills and the ability to create clear and concise written materials.

Elements and Performance Criteria

Conduct Training

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

- PC1. develop comprehensive training programs for end-users, maintenance personnel, and other relevant stakeholders in Robotics and Automation Systems.
- PC2. ensure training materials are clear, concise, and effectively convey essential information about the operation and maintenance of SCADA systems, PLCs, and Robotics components.
- PC3. tailor training sessions to the specific needs and technical proficiency levels of diverse audiences, adapting content for both technical and non-technical staff.
- PC4. utilize interactive and hands-on training methods to engage participants actively, promoting better understanding and retention of information.
- PC5. conduct assessments and collect feedback to measure the effectiveness of training programs, making adjustments as needed for continuous improvement.
- PC6. ensure that training is delivered in a timely manner, aligning with project timelines, system implementations, and organizational requirements.
- PC7. facilitate knowledge transfer sessions to team members, fostering a collaborative and informed workforce capable of supporting and utilizing Robotics and Automation technologies.

Documentation

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

- PC8. create and maintain comprehensive documentation for SCADA systems, PLC configurations, and Robotics and Automation Systems, covering design, integration, and maintenance aspects.
- PC9. implement version control for documentation to ensure that all team members have access to the latest and most accurate information.
- PC10. develop clear and concise troubleshooting guides for common issues related to SCADA, PLC, and Robotics systems, enabling efficient issue resolution.

Qualification Pack

- PC11. ensure that documentation adheres to relevant industry standards and regulatory requirements, facilitating audits and compliance checks.
- PC12. ensure documentation is easily accessible to authorized personnel, promoting transparency and knowledge sharing within the organization.
- PC13. updates documentation to reflect changes in system configurations, software updates, and improvements, keeping the information current and relevant.
- PC14. create user-friendly manuals and guides that serve as valuable resources for end-users and support staff, promoting self-sufficiency in system operation and maintenance.
- PC15. collaborate with cross-functional teams to gather insights and feedback for continuous improvement of documentation quality and usability.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. Proficiency in programming PLCs using languages such as ladder logic, function block diagrams, or structured text.
- KU2. Ability to develop SCADA interfaces for monitoring and controlling industrial processes.
- KU3. Understanding of industrial processes and automation principles to design effective control systems.
- KU4. Knowledge of control system design principles, including hardware selection, communication protocols, and system architecture.
- KU5. Ability to integrate PLCs and SCADA systems with other hardware and software components.
- KU6. Skill in testing control systems to ensure they meet specifications and commissioning them for operation.
- KU7. Ability to diagnose and resolve issues in control systems and perform regular maintenance tasks.
- KU8. Knowledge of relevant safety standards and regulations for industrial control systems.
- KU9. Skill in creating and maintaining documentation for control systems, including system architecture and operating procedures.
- KU10. Ability to work effectively in a team and communicate technical information clearly to stakeholders.

Generic Skills (GS)

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

- GS1. Ability to identify and solve complex problems in control systems efficiently.
- GS2. Being meticulous in programming, testing, and troubleshooting to ensure system accuracy and reliability.
- GS3. Capacity to analyze data and system performance to optimize control strategies and improve efficiency.
- GS4. Flexibility to adjust to changing project requirements and technologies in the field of industrial automation.



Qualification Pack

- GS5. Collaborating effectively with engineers, technicians, and other stakeholders to achieve project goals.
- GS6. Clearly conveying technical information verbally and in writing to team members and clients.
- GS7. Prioritizing tasks and managing time effectively to meet project deadlines.

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Conduct Training</i>	30	70	-	-
PC1. develop comprehensive training programs for end-users, maintenance personnel, and other relevant stakeholders in Robotics and Automation Systems.	-	-	-	-
PC2. ensure training materials are clear, concise, and effectively convey essential information about the operation and maintenance of SCADA systems, PLCs, and Robotics components.	-	-	-	-
PC3. tailor training sessions to the specific needs and technical proficiency levels of diverse audiences, adapting content for both technical and non-technical staff.	-	-	-	-
PC4. utilize interactive and hands-on training methods to engage participants actively, promoting better understanding and retention of information.	-	-	-	-
PC5. conduct assessments and collect feedback to measure the effectiveness of training programs, making adjustments as needed for continuous improvement.	-	-	-	-
PC6. ensure that training is delivered in a timely manner, aligning with project timelines, system implementations, and organizational requirements.	-	-	-	-
PC7. facilitate knowledge transfer sessions to team members, fostering a collaborative and informed workforce capable of supporting and utilizing Robotics and Automation technologies.	-	-	-	-
<i>Documentation</i>	-	-	-	-
PC8. create and maintain comprehensive documentation for SCADA systems, PLC configurations, and Robotics and Automation Systems, covering design, integration, and maintenance aspects.	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC9. implement version control for documentation to ensure that all team members have access to the latest and most accurate information.	-	-	-	-
PC10. develop clear and concise troubleshooting guides for common issues related to SCADA, PLC, and Robotics systems, enabling efficient issue resolution.	-	-	-	-
PC11. ensure that documentation adheres to relevant industry standards and regulatory requirements, facilitating audits and compliance checks.	-	-	-	-
PC12. ensure documentation is easily accessible to authorized personnel, promoting transparency and knowledge sharing within the organization.	-	-	-	-
PC13. updates documentation to reflect changes in system configurations, software updates, and improvements, keeping the information current and relevant.	-	-	-	-
PC14. create user-friendly manuals and guides that serve as valuable resources for end-users and support staff, promoting self-sufficiency in system operation and maintenance.	-	-	-	-
PC15. collaborate with cross-functional teams to gather insights and feedback for continuous improvement of documentation quality and usability.	-	-	-	-
NOS Total	30	70	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0470
NOS Name	Conduct Training and Documentation
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, Light Engineering Goods, Defence Equipment, Fire-Fighting & Safety Equipment
Occupation	Design
NSQF Level	5.5
Credits	2
Version	1.0
Last Reviewed Date	31/01/2024
Next Review Date	31/01/2027
NSQC Clearance Date	31/01/2024

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

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down the proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on the knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for the theory part for each candidate at each examination/training centre (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training centre based on these criteria.
6. To pass the Qualification Pack assessment, every trainee should score a minimum of 70% of %

Qualification Pack

aggregate marks to successfully clear the assessment.

7. 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.)

Minimum Passing % at NOS Level: 70

(Please note: A Trainee must score the minimum percentage for each NOS separately as well as on the QP as a whole.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CSC/N0465.Implement and Maintain control systems using PLC and SCADA systems	15	45	-	-	60	5
CSC/N0466.Develop System logic, programming automation sequence, and troubleshoot issues.	30	70	-	-	100	14
CSC/N0467.Perform PLC Programming and Configuration	30	70	-	-	100	14
CSC/N0468.Carry SCADA System Design and Maintenance	30	70	-	-	100	14
CSC/N0469.Perform integration of Robotics and Automation Systems	30	70	-	-	100	14
CSC/N0470.Conduct Training and Documentation	30	70	-	-	100	14
CSC/N1339.Collaboratively coordinate with the team	30	70	-	-	100	14

Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CSC/N0505.Follow health, safety and environment guidelines at workplace	15	20	-	-	35	5
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	6
Total	230	515	-	-	745	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.