Qualification Pack

# Predictive Maintenance Data Acquisition Engineer

QP Code: CSC/Q

Version: 1.0

NSQF Level: 6

Capital Goods and Strategic Skill Council || 39,1st Floor, Samyak Tower, Pusa Rd, Block 9A, WEA, Karol Bagh, New Delhi, Delhi, 110005Email: coo@cgsc.in

# Contents

# CSC/Q: Predictive Maintenance Data Acquisition Engineer

## Brief Job Description

A Predictive Maintenance Data Acquisition Engineer is responsible for designing, implementing, and maintaining data acquisition systems for predictive maintenance purposes. These systems collect real-time data from various sources, such as sensors, machines, and equipment, to monitor their performance and predict potential failures. The engineer's role involves working closely with cross-functional teams, including operations, maintenance, and IT, to ensure data accuracy, reliability, and security.

## 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/N: Design & Implement the Data Acquisition Systems in the Production of equipment, machinery, and other industrial goods.
2. CSC/N: Analyze & Maintaining the Data Acquisition Systems using Data Acquisition Techniques.
3. CSC/N: Interpret the Data Acquisition Systems & Integrate Predictive Maintenance Strategies.

## Qualification Pack (QP) Parameters

| | |
|---|---|
| **Sector** | Capital Goods |
| **Sub-Sector** | 1. Robotics and Automation<br>2. Smart Manufacturing<br>3. Maintenance |
| **Occupation** | Maintenance |
| **Country** | India |
| **NSQF Level** | 6 |
| **Aligned to NCO/ISCO/ISIC Code** | |
| **Minimum Educational Qualification & Experience** | 3 years Diploma (Mechanical/Automobile/ Electrical / Electronics) after class 10th from recognized regulatory body with 3 years of relevant experience.<br>OR<br>B.E./B.Tech in the relevant field with 1 Year of relevant experience.<br>OR<br>M.E./M.Tech in the relevant field<br>OR<br>Certificate-NSQF Level 5.5 with 1.5 Years of relevant experience. |

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| | |
| **Minimum Level of Education for Training in School** | |
| **Pre-Requisite License or Training** | NA |
| **Minimum Job Entry Age** | 21 Years |
| **Last Reviewed On** | |
| **Next Review Date** | |
| **Deactivation Date** | |
| **NSQC Approval Date** | |
| **Version** | 1.0 |

# CSC/N: Design & Implement the Data Acquisition Systems in the Production of equipment, machinery, and other industrial goods.

## Brief Job Description

This NOS unit is about Design & Implement the Data Acquisition Systems in the Production of equipment, machinery, and other industrial goods.

## Scope

The scope covers the following:

- Select the Components to design Data Acquisition System as per requirement.
- Integrate the Components using Data Acquisition Techniques
- Test & Validate the Data Acquisition System.

## Elements and Performance Criteria

*Select the Components to design Data Acquisition System a s per requirement.*

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

**PC1.**evaluate requirements of the Data Acquisition System.

PC2. identify the devices and Components to be connected in the Data Acquisition System.

PC3. Select appropriate technology, devices, and deployment model to best meet the overall needs of the Data Acquisition System.

*Integrate the Components using Data Acquisition Techniques*

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

PC4. apply appropriate wired/wireless connectivity protocols for Software & Hardware in the Production Process.

PC5. evaluate impacts of Data Acquisition System on the environment and on human health.

PC6. ensure network supports bulk configuration functionalities across multiple solution. components

PC7. design fallback mechanisms in case of system disruptions and outages establish the communication between automation system, intelligent devices, and robots by doing parameter setting like baud rate, distance, station ID and station type

PC8. turn on the power of Data Acquisition system in the network and look for healthy communication between them.

*Test & Validate the Data Acquisition System*

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

PC9. Prepare test data that simulates real-world scenarios and covers the entire range of operating conditions of the System.

PC10. Run the test cases defined in the test plan and collect data from the sensors and equipment being monitored.

PC11. Verify that the system meets the acceptance criteria defined in the test plan, such as reliability, accuracy, response time, and scalability.

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

**KU1.** organisation procedures for health, safety and security, individual role and responsibilities in this context

**KU2.** the organisation's emergency procedures for different emergency situations and the importance of following the same

**KU3.** Understanding of industrial automation principles: A data acquisition system designer should have a thorough understanding of industrial automation principles, including control theory, feedback loops, and process dynamics.

KU4. Familiarity with industrial communication protocols: The designer should be well-versed in industrial communication protocols such as Modbus, PROFIBUS, and CANopen, as well as fieldbus systems like Device Net and Foundation Fieldbus.

KU5. Proficiency in programming languages: The designer should be proficient in programming languages commonly used in data acquisition systems, such as C, C++, and ladder logic.

KU6. Knowledge of data acquisition hardware: The designer should have a deep understanding of data acquisition hardware components such as analog-digital converters (ADCs), digital-analog converters (DACs), counters/timers, and multiplexers.

KU7. Familiarity with data storage and retrieval: The designer should have a good understanding of data storage and retrieval methods, including databases, file systems, and data historians.

KU8. Understanding of data analysis and visualization: The designer should have a solid grasp of data analysis and visualization techniques such as statistical analysis and data mining.

KU9. Familiarity with cybersecurity principles: The designer should be aware of cybersecurity principles and best practices for securing data acquisition systems against cyber threats.

KU10. Knowledge of project management principles: The designer should have a solid understanding of project management principles such as project planning and execution methodologies like Agile and Scrum.

KU11. Familiarity with environmental considerations: The designer should be aware of environmental considerations such as temperature, humidity, and vibration, and how they impact data acquisition systems.

KU12. Knowledge of safety considerations: The designer should have a good understanding of safety considerations such as electrical safety, machine safety, and hazardous area classification.

## Generic Skills (GS)

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

**GS1.** read safety instructions/guidelines
**GS2.** modify work practices to improve them
**GS3.** work with supervisors/team members to carry out work related tasks
**GS4.** complete tasks efficiently and accurately within stipulated time
**GS5.** inform/report to concerned person in case of any problem
**GS6.** make timely decisions for efficient utilization of resources
**GS7.** write reports such as accident report, in at least English/regional language

## Assessment Criteria

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| *Select the Components to design Data Acquisition System a s per requirement.* | 10 | 10 | - | 6 |
| PC1. evaluate requirements of the Data Acquisition System. | 3 | 2 | - | 2 |
| PC2. identify the devices and Components to be connected in the Data Acquisition System. | 3 | 4 | - | 2 |
| PC3. identify appropriate technology, devices, and deployment model to best meet the overall needs of the Data Acquisition System. | 4 | 4 | - | 2 |
| *Integrate the Components using Data Acquisition Techniques* | 15 | 15 | - | 10 |
| PC4. apply appropriate wired/wireless connectivity protocols for Software & Hardware in the Production Process. | 3 | 3 | - | 2 |
| PC5. evaluate impacts of Data Acquisition System on the environment and on human health. | 3 | 3 | - | 2 |
| PC6. ensure network supports bulk configuration functionalities across multiple solution. | 3 | 3 | - | 2 |
| PC7. design fallback mechanisms in case of system disruptions and outages | 3 | 3 | - | 2 |

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| PC8. turn on the power of Data Acquisition system in the network and look for healthy communication between them. | 3 | 3 | - | 2 |
| *Test & Validate the Data Acquisition System* | 15 | 15 | - | 4 |
| PC9. Prepare test data that simulates real-world scenarios and covers the entire range of operating conditions of the System. | 5 | 4 | - | 2 |
| PC10. Run the test cases defined in the test plan and collect data from the sensors and equipment being monitored. | 5 | 6 | - | 1 |
| PC11. Verify that the system meets the acceptance criteria defined in the test plan, such as reliability, accuracy, response time, and scalability. | 5 | 5 | - | 1 |
| **NOS Total** | **40** | **40** | **-** | **20** |

## National Occupational Standards (NOS) Parameters

| | |
|---|---|
| **NOS Code** | CSC/N |
| **NOS Name** | Design & Implement the Data Acquisition Systems in the Production of equipment, machinery, and other industrial goods. |
| **Sector** | Capital Goods |
| **Sub-Sector** | 1. Robotics and Automation<br>2. Smart Manufacturing<br>3. Maintenance |
| **Occupation** | Maintenance |
| **NSQF Level** | 6 |
| **Credits** | 3 |
| **Version** | 1.0 |
| **Last Reviewed Date** | |
| **Next Review Date** | |
| **NSQC Clearance Date** | |

# CSC/N: Analyze & Maintaining the Data Acquisition Systems using Data Acquisition Techniques.

## Description

This unit is about Analyze & Maintaining the Data Acquisition Systems using Data Acquisition Techniques.

## Scope

The scope covers the following:

- Analyze the Data for Reliability As per Test Plan.
- Verify the Data Acquisition System for Accurate Prediction.
- Support in maintenance of Data Acquisition System.

## Elements and Performance Criteria

### *Analyze the Data for Reliability As per Test Plan*

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

**PC1.** Create a data analysis plan that outlines the objectives, scope, data sources, data preparation steps, analysis techniques, and reporting requirements.

**PC2.** Perform exploratory data analysis to gain insights into the data's distribution, correlations, and patterns. This may involve creating histograms, scatter plots, and correlation matrices.

**PC3.** Develop new features or variables from the raw data to improve the accuracy and reliability of predictive models.

### *Verify the Data Acquisition System for Accurate Prediction*

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

**PC4.** Run the test cases defined in the test plan, and collect data from the sensors and equipment being monitored.

**PC5.** Analyze the data collected during testing to verify that the system can accurately predict equipment failures.

**PC6.** Verify that the system meets the acceptance criteria defined in the test plan, such as reliability, accuracy, response time, and scalability.

**PC7.** Document the test results, including any issues or defects found during testing, and provide recommendations for improving the system's performance.

**PC8.** Review the test results with stakeholders and obtain their approval before deploying the system in production.

### *Support in maintenance of Data Acquisition System*

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

**PC9.** Create a maintenance plan that outlines the system's maintenance requirements, including regular maintenance tasks, preventive maintenance procedures, and corrective maintenance actions.

**PC10.** Establish standard maintenance procedures that cover tasks such as calibration of sensors, cleaning of equipment, replacement of faulty components, and software updates.

**PC11.** Implement data quality control measures, such as data cleansing procedures, data validation procedures, and data governance policies, to ensure that the data being fed into the system is accurate, reliable, and up to date.

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

**KU1.** organisation procedures for health, safety and security, individual role and responsibilities in this context

**KU2.** the organisation's emergency procedures for different emergency situations and the importance of following the same

**KU3.** Understanding of industrial automation principles: A data acquisition system designer should have a thorough understanding of industrial automation principles, including control theory, feedback loops, and process dynamics.

KU4. Familiarity with industrial communication protocols: The designer should be well-versed in industrial communication protocols such as Modbus, PROFIBUS, and CANopen, as well as fieldbus systems like Device Net and Foundation Fieldbus.

KU5. Proficiency in programming languages: The designer should be proficient in programming languages commonly used in data acquisition systems, such as C, C++, and ladder logic.

KU6. Knowledge of data acquisition hardware: The designer should have a deep understanding of data acquisition hardware components such as analog-digital converters (ADCs), digital-analog converters (DACs), counters/timers, and multiplexers.

KU7. Familiarity with data storage and retrieval: The designer should have a good understanding of data storage and retrieval methods, including databases, file systems, and data historians.

KU8. Understanding of data analysis and visualization: The designer should have a solid grasp of data analysis and visualization techniques such as statistical analysis and data mining.

KU9. Familiarity with cybersecurity principles: The designer should be aware of cybersecurity principles and best practices for securing data acquisition systems against cyber threats.

KU10. Knowledge of project management principles: The designer should have a solid understanding of project management principles such as project planning and execution methodologies like Agile and Scrum.

KU11. Familiarity with environmental considerations: The designer should be aware of environmental considerations such as temperature, humidity, and vibration, and how they impact data acquisition systems.

KU12. Knowledge of safety considerations: The designer should have a good understanding of safety considerations such as electrical safety, machine safety, and hazardous area classification.

## Generic Skills (GS)

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

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

**GS2.** listen effectively and communicate information accurately

**GS3.** follow rule-based decision-making processes

**GS4.** make decisions on suitable courses

GS5. plan and organize the work to achieve targets and meet deadlines
GS6. apply problem-solving approaches to different situations
GS7. analyse the business impact and disseminate relevant information to others
GS8. apply balanced judgments to different situations
GS9. check the work is complete and free from errors

## Assessment Criteria

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| *Analyze the Data for Reliability As per Test Plan* | 10 | 10 | - | 6 |
| PC1. Create a data analysis plan that outlines the objectives, scope, data sources, data preparation steps, analysis techniques, and reporting requirements. | 3 | 2 | - | 2 |
| PC2. Perform exploratory data analysis to gain insights into the data's distribution, correlations, and patterns. This may involve creating histograms, scatter plots, and correlation matrices | 3 | 4 | - | 2 |
| PC3. Develop new features or variables from the raw data to improve the accuracy and reliability of predictive models. | 4 | 4 | - | 2 |
| *Verify the Data Acquisition System for Accurate Prediction* | 15 | 15 | - | 10 |
| PC4. Run the test cases defined in the test plan, and collect data from the sensors and equipment being monitored. | 3 | 3 | - | 2 |
| PC5. Analyze the data collected during testing to verify that the system can accurately predict equipment failures. | 3 | 3 | - | 2 |
| PC6. Verify that the system meets the acceptance criteria defined in the test plan, such as reliability, accuracy, response time, and scalability. | 3 | 3 | - | 2 |
| PC7. Document the test results, including any issues or defects found during testing, and provide recommendations for improving the system's performance. | 3 | 3 | - | 2 |

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| PC8. Review the test results with stakeholders and obtain their approval before deploying the system in production. | 3 | 3 | - | 2 |
| *Support in maintenance of Data Acquisition System* | 15 | 15 | - | 4 |
| PC9. Create a maintenance plan that outlines the system's maintenance requirements, including regular maintenance tasks, preventive maintenance procedures, and corrective maintenance actions. | 5 | 5 | - | 2 |
| PC10. Establish standard maintenance procedures that cover tasks such as calibration of sensors, cleaning of equipment, replacement of faulty components, and software updates. | 5 | 5 | - | 1 |
| PC11. Implement data quality control measures, such as data cleansing procedures, data validation procedures, and data governance policies, to ensure that the data being fed into the system is accurate, reliable, and up-to-date. | 5 | 5 | - | 1 |
| **NOS Total** | **40** | **40** | **-** | **20** |

## National Occupational Standards (NOS) Parameters

| | |
|---|---|
| **NOS Code** | CSC/N |
| **NOS Name** | Analyze & Maintaining the Data Acquisition Systems using Data Acquisition Techniques. |
| **Sector** | Capital Goods |
| **Sub-Sector** | 1. Robotics and Automation<br>2. Smart Manufacturing<br>3. Maintenance |
| **Occupation** | Maintenance |
| **NSQF Level** | 6 |
| **Credits** | 5 |
| **Version** | 1.0 |
| **Last Reviewed Date** | |
| **Next Review Date** | |
| **NSQC Clearance Date** | |

# CSC/N: Interpret the Data Acquisition Systems & Integrate Predictive Maintenance Strategies.

## Description

This unit is about Interpret the Data Acquisition Systems & Develop Predictive Maintenance Strategies to Forecast the Asset & Machinery Behavior.

## Scope

The scope covers the following:

- Validate the Predictive Model of Data Acquisition System.
- Develop the Predictive Maintenance Strategies to forecast future asset behavior.
- Monitor & Optimize the Predictive Maintenance Strategies.

## Elements and Performance Criteria

*Validate the Predictive Model of Data Acquisition System*

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

**PC1.** Define the Predictive Model Objective with reference to Model Strategy.

**PC2.** **Select the Test Set to** ensure it continues to meet the desired performance threshold.

**PC3.** Evaluate the Predictive Model Performance based on Reliability.

*Develop the Predictive Maintenance Strategies to forecast future asset behavior.*

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

**PC4.** define the asset and maintenance objectives based on Strategy.

**PC5.** Analyze the data using statistical methods and machine learning algorithms to identify patterns and trends that can be used to forecast future asset behavior.

**PC6.** coordinate with Supervisor to rectify any errors which are generated during the Execution of Maintenance Strategies.

*Monitor & Optimize the Predictive Maintenance Strategies.*

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

**PC7.** **Monitor,** collecting and analyzing data, updating the predictive models, and refining the maintenance activities.

**PC8.** evaluate regularly to ensure it is meeting the desired objectives and delivering the expected benefits.

**PC9.** maintain records of Predictive maintenance activities done on Production Process as per Data Acquisition Strategies.

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

**KU1.** organisation procedures for health, safety and security, individual role and responsibilities in this context

**KU2.** the organisation's emergency procedures for different emergency situations and the importance of following the same

**KU3.** Understanding of industrial automation principles: A data acquisition system designer should have a thorough understanding of industrial automation principles, including control theory, feedback loops, and process dynamics.

KU4. Familiarity with industrial communication protocols: The designer should be well-versed in industrial communication protocols such as Modbus, PROFIBUS, and CANopen, as well as fieldbus systems like DeviceNet and Foundation Fieldbus.

KU5. Proficiency in programming languages: The designer should be proficient in programming languages commonly used in data acquisition systems, such as C, C++, and ladder logic.

KU6. Knowledge of data acquisition hardware: The designer should have a deep understanding of data acquisition hardware components such as analog-digital converters (ADCs), digital-analog converters (DACs), counters/timers, and multiplexers.

KU7. Familiarity with data storage and retrieval: The designer should have a good understanding of data storage and retrieval methods, including databases, file systems, and data historians.

KU8. Understanding of data analysis and visualization: The designer should have a solid grasp of data analysis and visualization techniques such as statistical analysis and data mining.

KU9. Familiarity with cybersecurity principles: The designer should be aware of cybersecurity principles and best practices for securing data acquisition systems against cyber threats.

KU10. Knowledge of project management principles: The designer should have a solid understanding of project management principles such as project planning and execution methodologies like Agile and Scrum.

KU11. Familiarity with environmental considerations: The designer should be aware of environmental considerations such as temperature, humidity, and vibration, and how they impact data acquisition systems.

KU12. Knowledge of safety considerations: The designer should have a good understanding of safety considerations such as electrical safety, machine safety, and hazardous area classification.

## Generic Skills (GS)

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

**GS1.** follow instructions, guidelines, procedures, rules, and service level agreements
**GS2.** listen effectively and communicate information accurately
**GS3.** follow rule-based decision-making processes
**GS4.** make decisions on suitable courses
**GS5.** plan and organize the work to achieve targets and meet deadlines
**GS6.** apply problem-solving approaches to different situations
**GS7.** analyse the business impact and disseminate relevant information to others
**GS8.** apply balanced judgments to different situations
**GS9.** check the work is complete and free from errors

## Assessment Criteria

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| *Validate the Predictive Model of Data Acquisition System* | 10 | 10 | - | 7 |
| PC1. Define the Predictive Model Objective with reference to Model Strategy. | 3 | 3 | - | 2 |
| PC2. Select the Test Set to ensure it continues to meet the desired performance threshold. | 3 | 3 | - | 2 |
| PC3. Evaluate the Predictive Model Performance based on Reliability. | 4 | 4 | - | 3 |
| *Develop the Predictive Maintenance Strategies to forecast future asset behavior.* | 15 | 15 | - | 9 |
| PC4. define the asset and maintenance objectives based on Strategy. | 5 | 5 | - | 3 |
| PC5. Analyze the data using statistical methods and machine learning algorithms to identify patterns and trends that can be used to forecast future asset behavior. | 5 | 5 | - | 3 |
| PC6. coordinate with Supervisor to rectify any errors which are generated during the Execution of Maintenance Strategies. | 5 | 5 | - | 3 |

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| *Monitor & Optimize the Predictive Maintenance Strategies* | 15 | 15 | - | 4 |
| PC7. Monitor, collecting and analyzing data, updating the predictive models, and refining the maintenance activities. | 5 | 5 | - | 2 |
| PC8. evaluate regularly to ensure it is meeting the desired objectives and delivering the expected benefits. | 5 | 5 | - | 1 |
| PC9. maintain records of Predictive maintenance activities done on Production Process as per Data Acquisition Strategies. | 5 | 5 | - | 1 |
| NOS Total | 40 | 40 | - | 20 |

## National Occupational Standards (NOS) Parameters

| | |
|---|---|
| **NOS Code** | CSC/N |
| **NOS Name** | Interpret the Data Acquisition Systems & Develop Predictive Maintenance Strategies |
| **Sector** | Capital Goods |
| **Sub-Sector** | 1. Robotics and Automation<br>2. Smart Manufacturing<br>3. Maintenance |
| **Occupation** | Maintenance |
| **NSQF Level** | 6 |
| **Credits** | 7 |
| **Version** | 1.0 |
| **Last Reviewed Date** | |
| **Next Review Date** | |
| **NSQC Clearance Date** | |

# Assessment Guidelines and Assessment Weightage

## Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.

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

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

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

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

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

6. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

**Minimum Aggregate Passing % at QP Level : 70**

(**Please note**: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

## Assessment Weightage

Compulsory NOS

| National Occupational Standards | Theory Marks | Practical Marks | Project Marks | Viva Marks | Total Marks | Weightage |
|---|---|---|---|---|---|---|
| CSC/N: Design & Implement the Data Acquisition Systems in the Production of equipment, machinery, and other industrial goods. | 40 | 40 | 0 | 20 | 100 | 25 |
| CSC/N: Analyze & Maintaining the Data Acquisition Systems using Data Acquisition Techniques. | 40 | 40 | 0 | 20 | 100 | 25 |
| CSC/N: Interpret the Data Acquisition Systems & Develop Predictive Maintenance Strategies. | 40 | 40 | 0 | 20 | 100 | 20 |
| Collaboratively coordinate with the team. | 40 | 40 | 0 | 20 | 100 | 10 |
| Maintain Health, Safety and Environment at workplace. | 40 | 40 | 0 | 20 | 100 | 10 |
| DGT/VSQ/N0103-Employability Skills (90 hours) | 40 | 40 | 0 | 20 | 100 | 10 |
| **Total** | **240** | **240** | **-** | **120** | **600** | **100** |

## Acronyms

| | |
|---|---|
| **NOS** | National Occupational Standard(s) |
| **NSQF** | National Skills Qualifications Framework |
| **QP** | Qualifications Pack |
| **TVET** | Technical and Vocational Education and Training |
| **AMC** | Annual Maintenance Contract |
| **PPE** | Personal Protective Equipment |

## Glossary

| | |
|---|---|
| **Sector** | Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests. |
| **Sub-sector** | Sub-sector is derived from a further breakdown based on the characteristics and interests of its components. |
| **Occupation** | Occupation is a set of job roles, which perform similar/ related set of functions in an industry. |
| **Job role** | Job role defines a unique set of functions that together form a unique employment opportunity in an organisation. |
| **Occupational Standards (OS)** | OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts. |
| **Performance Criteria (PC)** | Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task. |
| **National Occupational Standards (NOS)** | NOS are occupational standards which apply uniquely in the Indian context. |
| **Qualifications Pack (QP)** | QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code. |
| **Unit Code** | Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N' |
| **Unit Title** | Unit title gives a clear overall statement about what the incumbent should be able to do. |
| **Description** | Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for. |
| **Scope** | Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required. |
| **Knowledge and Understanding (KU)** | Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard. |

| | |
|---|---|
| **Organisational Context** | Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility. |
| **Technical Knowledge** | Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities. |
| **Core Skills/ Generic Skills (GS)** | Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles. |
| **Electives** | Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives. |
| **Options** | Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options. |