



## Qualification Pack



# Structural Steel NDT Tester

Electives: Ultrasonic Testing (UT)/ Magnetic Particle Test (MPT)/ Dye Penetration Test (DPT)

QP Code: CON/Q3503

Version: 4.0

NSQF Level: 3.5

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### CON/Q3503: Structural Steel NDT Tester

#### Brief Job Description

A structural steel NDT tester is responsible for performing non-destructive tests (NDT) on structural steel components and welded sections by conducting dye penetration test, magnetic particle test, and ultrasonic test.

#### Personal Attributes

This individual should be physically and mentally strong to oversee the quality control work at a construction site. The person should have appropriate organizational, interpersonal and communication skills.

#### Applicable National Occupational Standards (NOS)

##### Compulsory NOS:

1. [CON/N0417: Prepare for the testing of structural steel components](#)
2. [CON/N9001: Work according to personal health, safety and environment protocols at construction site](#)
3. [DGT/VSQ/N0101: Employability Skills \(30 Hours\)](#)

##### Electives (mandatory to select at least one):

###### Elective 1: Ultrasonic Testing (UT)

This occupational standards unit is about performing ultrasonic testing on structural steel components and welded sections.

1. [CON/N0411: Perform ultrasonic testing on structural steel components and welded sections](#)

###### Elective 2: Magnetic Particle Test (MPT)

This occupational standards unit is about performing magnetic particle test on structural steel welded joints.

1. [CON/N0412: Perform magnetic particle test on structural steel welded joints](#)

###### Elective 3: Dye Penetration Test (DPT)

This occupational standards unit is about performing liquid/ dye penetration test on structural steel welded joints.



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### 1. [CON/N0413: Perform liquid /dye penetration test on structural steel welded joints](#)

#### Qualification Pack (QP) Parameters

<b>Sector</b>	Construction
<b>Sub-Sector</b>	Real Estate and Infrastructure construction
<b>Occupation</b>	Quality Assurance & Quality Control
<b>Country</b>	India
<b>NSQF Level</b>	3.5
<b>Credits</b>	16
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/3111.0100
<b>Minimum Educational Qualification &amp; Experience</b>	11th Class OR Completed 1st year of 3-year diploma (after 10th) and pursuing regular diploma OR 10th grade pass (pursuing continuous schooling) OR 8th grade pass with 3 Years of experience relevant experience OR Previous relevant Qualification of NSQF Level (2.5) with 3 Years of experience relevant experience OR Previous relevant Qualification of NSQF Level (3)
<b>Minimum Level of Education for Training in School</b>	10th Class
<b>Pre-Requisite License or Training</b>	Recommended training in basic computer literacy
<b>Minimum Job Entry Age</b>	18 Years
<b>Last Reviewed On</b>	NA
<b>Next Review Date</b>	29/02/2024
<b>NSQC Approval Date</b>	31/08/2023
<b>Version</b>	4.0



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<b>Reference code on NQR</b>	QG-3.5-CO-00815-2023-V2-CSDCI
<b>NQR Version</b>	1



## Qualification Pack

# CON/N0417: Prepare for the testing of structural steel components

## Description

This occupational standards unit is about preparing for the testing of structural steel components

## Scope

The scope covers the following :

- Determine the testing requirements
- Select and prepare the sample
- Calibrate the testing equipment

## Elements and Performance Criteria

### *Determine the testing requirements*

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

- PC1.** interpret the quality plan, Welding Procedure Specification (WPS), fabrication shop drawings etc., to understand the technical specifications, locations of testing and method to be adopted
- PC2.** identify the location of joint or section for conducting the test as per the specification
- PC3.** estimate the quantity of materials and time required for the completion of test

### *Select and prepare the sample*

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

- PC4.** select representative samples of structural steel components for testing based on applicable policies and specifications
- PC5.** prepare the steel samples according to the specific testing requirements, e.g. cutting, machining, or shaping the samples to the desired dimensions
- PC6.** carry out pre-test cleaning of the structural steel components using the appropriate solvents, brushes, scrubs etc., to remove any paint, dust, oil, grease or scale
- PC7.** maintain appropriate documentation for each sample, including its origin, specifications, and any relevant material certifications
- PC8.** label each sample appropriately for identification

### *Calibrate the testing equipment*

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

- PC9.** check the availability of the testing equipment, such as tensile testing machines, impact testers, and hardness testers
- PC10.** check for the calibration of the testing equipment and calibrate them, as required
- PC11.** ensure the testing environment meets the testing standards, such as the recommended temperature and humidity
- PC12.** select the appropriate Personal Protective Equipment (PPE), such as helmets, gloves, safety glasses, for testing of structural steel

## Knowledge and Understanding (KU)



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The individual on the job needs to know and understand:

- KU1.** the importance of testing structural steel components to ensure their quality, safety, and compliance with industry standards and regulations
- KU2.** the relevant industry standards and codes applicable to structural steel testing
- KU3.** the importance of prioritizing safety in structural steel testing and the use of relevant PPE
- KU4.** how to interpret the quality plan, WPS, and fabrication shop drawings
- KU5.** the selection and preparation of structural steel components for testing, including cutting, machining, cleaning, etc
- KU6.** the appropriate testing environment required for ultrasonic/ magnetic particle/ liquid or dye penetration testing
- KU7.** how to calibrate different testing equipment to conduct ultrasonic/ magnetic particle/ liquid or dye penetration testing
- KU8.** the applicable sample labelling, and documentation requirements

### Generic Skills (GS)

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

- GS1.** maintain the appropriate data and records
- GS2.** read the appropriate reports and literature concerning the field of work
- GS3.** communicate professionally with all the stakeholders
- GS4.** listen attentively to understand the information/ instructions being shared and take appropriate action
- GS5.** coordinate with the co-workers to achieve the work objectives
- GS6.** plan and execute tasks based on priority
- GS7.** identify possible disruptions to work and take appropriate mitigation measures
- GS8.** take prompt action to deal with workplace emergencies and accidents
- GS9.** evaluate all possible solutions to work-related problems and select the best one
- GS10.** follow the recommended practices for the timely completion of work and achievement of organizational objectives



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### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Determine the testing requirements</i>	<b>5</b>	<b>15</b>	-	<b>2</b>
<b>PC1.</b> interpret the quality plan, Welding Procedure Specification (WPS), fabrication shop drawings etc., to understand the technical specifications, locations of testing and method to be adopted	-	-	-	-
<b>PC2.</b> identify the location of joint or section for conducting the test as per the specification	-	-	-	-
<b>PC3.</b> estimate the quantity of materials and time required for the completion of test	-	-	-	-
<i>Select and prepare the sample</i>	<b>20</b>	<b>30</b>	-	<b>6</b>
<b>PC4.</b> select representative samples of structural steel components for testing based on applicable policies and specifications	-	-	-	-
<b>PC5.</b> prepare the steel samples according to the specific testing requirements, e.g. cutting, machining, or shaping the samples to the desired dimensions	-	-	-	-
<b>PC6.</b> carry out pre-test cleaning of the structural steel components using the appropriate solvents, brushes, scrubs etc., to remove any paint, dust, oil, grease or scale	-	-	-	-
<b>PC7.</b> maintain appropriate documentation for each sample, including its origin, specifications, and any relevant material certifications	-	-	-	-
<b>PC8.</b> label each sample appropriately for identification	-	-	-	-
<i>Calibrate the testing equipment</i>	<b>5</b>	<b>15</b>	-	<b>2</b>
<b>PC9.</b> check the availability of the testing equipment, such as tensile testing machines, impact testers, and hardness testers	-	-	-	-
<b>PC10.</b> check for the calibration of the testing equipment and calibrate them, as required	-	-	-	-





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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC11.</b> ensure the testing environment meets the testing standards, such as the recommended temperature and humidity	-	-	-	-
<b>PC12.</b> select the appropriate Personal Protective Equipment (PPE), such as helmets, gloves, safety glasses, for testing of structural steel	-	-	-	-
<b>NOS Total</b>	<b>30</b>	<b>60</b>	<b>-</b>	<b>10</b>



## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	CON/N0417
<b>NOS Name</b>	Prepare for the testing of structural steel components
<b>Sector</b>	Construction
<b>Sub-Sector</b>	Real Estate and Infrastructure construction
<b>Occupation</b>	Quality Assurance and Quality Control, Quality Assurance and Quality Control
<b>NSQF Level</b>	3.5
<b>Credits</b>	8
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	31/08/2023
<b>Next Review Date</b>	29/02/2024
<b>NSQC Clearance Date</b>	31/08/2023



## Qualification Pack

# CON/N9001: Work according to personal health, safety and environment protocols at construction site

## Description

This NOS covers the skill and knowledge required for an individual to work according to personal health, safety and environmental protocols at construction site

## Scope

The scope covers the following :

- Follow safety norms as defined by organization
- Adopt healthy & safe work practices
- Implement good housekeeping and environment protection process and activities
- Follow infection control guidelines as per applicability

## Elements and Performance Criteria

### *Follow safety norms as defined by the organization*

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

- PC1.** identify and report any hazards, risks or breaches in site safety to the appropriate authority
- PC2.** follow emergency and evacuation procedures in case of accidents, fires, natural calamities
- PC3.** follow recommended safe practices in handling construction materials, including chemical and hazardous material whenever applicable
- PC4.** follow all the protocols and safety techniques conveyed during safety awareness programs like Tool Box Talks, safety demonstrations and mock drills conducted at the site
- PC5.** select and operate different types of fire extinguishers corresponding to various types of fires as per EHS guideline
- PC6.** identify near miss, unsafe condition and unsafe act

### *Adopt healthy & safe work practices*

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

- PC7.** use appropriate Personal Protective Equipment (PPE) as per work requirements for : Head Protection, Ear protection, Fall Protection ,Foot Protection, Face and Eye Protection, Hand and Body Protection , and Respiratory Protection (if required)
- PC8.** handle all required tools, tackles, materials and equipment safely
- PC9.** follow safe disposal of waste, harmful and hazardous materials as per EHS guidelines
- PC10.** check and install all safety equipment as per standard guidelines
- PC11.** follow safety protocols and practices as laid down by site EHS department
- PC12.** obtain "height pass" clearance for working at heights

### *Implement good housekeeping practices*

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

- PC13.** collect, segregate and deposit construction waste into appropriate containers based on their toxicity or hazardous nature



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**PC14.** apply ergonomic principles wherever required

*Follow infection control guidelines as per applicability*

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

**PC15.** follow recommended personal hygiene, workplace hygiene and sanitization practices

**PC16.** clean and disinfect all materials, tools and supplies before and after use

**PC17.** report immediately to concerned authorities regarding signs and symptoms of illness of self and others

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** reporting procedures in cases of breaches or hazards for site safety, accidents, and emergency situations as per guidelines
- KU2.** types of safety hazards at construction sites
- KU3.** basic ergonomic principles as per applicability
- KU4.** the procedure for responding to accidents and other emergencies at site
- KU5.** use of appropriate personal protective equipment based on various working conditions
- KU6.** importance of handling tools, equipment, and materials as per applicable norms
- KU7.** effect of construction material on health and environments as per applicability
- KU8.** various environmental protection methods as per applicability
- KU9.** storage of waste including non-combustible scrap material and debris, combustible scrap material and debris, general construction waste and trash (non-toxic, non-hazardous), any other hazardous wastes and any other flammable wastes at the appropriate location
- KU10.** how to keep the workplace neat and tidy so as to be safe
- KU11.** how to use hazardous material in a safe and appropriate manner as per applicability
- KU12.** types of fire
- KU13.** procedure of operating different types of fire extinguishers
- KU14.** safety relevant to tools, tackles, and equipment as per applicability
- KU15.** housekeeping activities relevant to task
- KU16.** ways of transmission of infection
- KU17.** ways to manage infectious risks at the workplace
- KU18.** different methods of cleaning, disinfection, sterilization, and sanitization
- KU19.** symptoms of infection like fever, cough, redness, swelling, and inflammation

## Generic Skills (GS)

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

- GS1.** write in at least one language, preferably in the local language of the site
- GS2.** fill safety formats for near miss, unsafe conditions and safety suggestions
- GS3.** read in one or more language, preferably in the local language of the site



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- GS4.** speak in one or more language, preferably in one of the local language of the site
- GS5.** listen to instructions/communication shared by site EHS and superiors regarding site safety, and conducting the toolbox talk
- GS6.** identify potential safety risks and report to the appropriate authority
- GS7.** assess and analyze areas which may affect health, safety and environment protocol on the site



## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Follow safety norms as defined by the organization</i>	<b>6</b>	<b>14</b>	-	-
<b>PC1.</b> identify and report any hazards, risks or breaches in site safety to the appropriate authority	-	-	-	-
<b>PC2.</b> follow emergency and evacuation procedures in case of accidents, fires, natural calamities	-	-	-	-
<b>PC3.</b> follow recommended safe practices in handling construction materials, including chemical and hazardous material whenever applicable	-	-	-	-
<b>PC4.</b> follow all the protocols and safety techniques conveyed during safety awareness programs like Tool Box Talks, safety demonstrations and mock drills conducted at the site	-	-	-	-
<b>PC5.</b> select and operate different types of fire extinguishers corresponding to various types of fires as per EHS guideline	-	-	-	-
<b>PC6.</b> identify near miss, unsafe condition and unsafe act	-	-	-	-
<i>Adopt healthy &amp; safe work practices</i>	<b>15</b>	<b>35</b>	-	-
<b>PC7.</b> use appropriate Personal Protective Equipment (PPE) as per work requirements for : Head Protection, Ear protection, Fall Protection ,Foot Protection, Face and Eye Protection, Hand and Body Protection , and Respiratory Protection (if required)	-	-	-	-
<b>PC8.</b> handle all required tools, tackles, materials and equipment safely	-	-	-	-
<b>PC9.</b> follow safe disposal of waste, harmful and hazardous materials as per EHS guidelines	-	-	-	-
<b>PC10.</b> check and install all safety equipment as per standard guidelines	-	-	-	-



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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC11.</b> follow safety protocols and practices as laid down by site EHS department	-	-	-	-
<b>PC12.</b> obtain "height pass" clearance for working at heights	-	-	-	-
<i>Implement good housekeeping practices</i>	<b>6</b>	<b>14</b>	-	-
<b>PC13.</b> collect, segregate and deposit construction waste into appropriate containers based on their toxicity or hazardous nature	-	-	-	-
<b>PC14.</b> apply ergonomic principles wherever required	-	-	-	-
<i>Follow infection control guidelines as per applicability</i>	<b>3</b>	<b>7</b>	-	-
<b>PC15.</b> follow recommended personal hygiene, workplace hygiene and sanitization practices	-	-	-	-
<b>PC16.</b> clean and disinfect all materials, tools and supplies before and after use	-	-	-	-
<b>PC17.</b> report immediately to concerned authorities regarding signs and symptoms of illness of self and others	-	-	-	-
<b>NOS Total</b>	<b>30</b>	<b>70</b>	-	-



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### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	CON/N9001
<b>NOS Name</b>	Work according to personal health, safety and environment protocols at construction site
<b>Sector</b>	Construction
<b>Sub-Sector</b>	Real Estate and Infrastructure construction
<b>Occupation</b>	Generic Safety
<b>NSQF Level</b>	4
<b>Credits</b>	1
<b>Version</b>	10.0
<b>Last Reviewed Date</b>	31/08/2023
<b>Next Review Date</b>	31/08/2026
<b>NSQC Clearance Date</b>	31/08/2023





## Qualification Pack

### DGT/VSQ/N0101: Employability Skills (30 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
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

#### Elements and Performance Criteria

##### *Introduction to Employability Skills*

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

**PC1.** understand the significance of employability skills in meeting the job requirements

##### *Constitutional values - Citizenship*

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

**PC2.** identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices

##### *Becoming a Professional in the 21st Century*

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

**PC3.** explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.

##### *Basic English Skills*

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

**PC4.** speak with others using some basic English phrases or sentences

##### *Communication Skills*

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

**PC5.** follow good manners while communicating with others

**PC6.** work with others in a team



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### *Diversity & Inclusion*

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

**PC7.** communicate and behave appropriately with all genders and PwD

**PC8.** report any issues related to sexual harassment

### *Financial and Legal Literacy*

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

**PC9.** use various financial products and services safely and securely

**PC10.** calculate income, expenses, savings etc.

**PC11.** approach the concerned authorities for any exploitation as per legal rights and laws

### *Essential Digital Skills*

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

**PC12.** operate digital devices and use its features and applications securely and safely

**PC13.** use internet and social media platforms securely and safely

### *Entrepreneurship*

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

**PC14.** identify and assess opportunities for potential business

**PC15.** identify sources for arranging money and associated financial and legal challenges

### *Customer Service*

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

**PC16.** identify different types of customers

**PC17.** identify customer needs and address them appropriately

**PC18.** follow appropriate hygiene and grooming standards

### *Getting ready for apprenticeship & Jobs*

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

**PC19.** create a basic biodata

**PC20.** search for suitable jobs and apply

**PC21.** identify and register apprenticeship opportunities as per requirement

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

**KU1.** need for employability skills

**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 basic spoken English language

**KU6.** Do and dont of effective communication

**KU7.** inclusivity and its importance

**KU8.** different types of disabilities and appropriate communication and behaviour towards PwD

**KU9.** different types of financial products and services



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- KU10.** how to compute income and expenses
- KU11.** importance of maintaining safety and security in financial transactions
- KU12.** different legal rights and laws
- KU13.** how to operate digital devices and applications safely and securely
- KU14.** ways to identify business opportunities
- KU15.** types of customers and their needs
- KU16.** how to apply for a job and prepare for an interview
- KU17.** apprenticeship scheme and the process of registering on apprenticeship portal

## Generic Skills (GS)

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

- GS1.** communicate effectively using appropriate language
- GS2.** behave politely and appropriately with all
- GS3.** perform basic calculations
- GS4.** solve problems effectively
- GS5.** be careful and attentive at work
- GS6.** use time effectively
- GS7.** maintain hygiene and sanitisation 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>	<b>1</b>	<b>1</b>	-	-
<b>PC1.</b> understand the significance of employability skills in meeting the job requirements	-	-	-	-
<i>Constitutional values - Citizenship</i>	<b>1</b>	<b>1</b>	-	-
<b>PC2.</b> identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	<b>1</b>	<b>3</b>	-	-
<b>PC3.</b> explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.	-	-	-	-
<i>Basic English Skills</i>	<b>2</b>	<b>3</b>	-	-
<b>PC4.</b> speak with others using some basic English phrases or sentences	-	-	-	-
<i>Communication Skills</i>	<b>1</b>	<b>1</b>	-	-
<b>PC5.</b> follow good manners while communicating with others	-	-	-	-
<b>PC6.</b> work with others in a team	-	-	-	-
<i>Diversity &amp; Inclusion</i>	<b>1</b>	<b>1</b>	-	-
<b>PC7.</b> communicate and behave appropriately with all genders and PwD	-	-	-	-
<b>PC8.</b> report any issues related to sexual harassment	-	-	-	-
<i>Financial and Legal Literacy</i>	<b>3</b>	<b>4</b>	-	-
<b>PC9.</b> use various financial products and services safely and securely	-	-	-	-



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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC10.</b> calculate income, expenses, savings etc.	-	-	-	-
<b>PC11.</b> approach the concerned authorities for any exploitation as per legal rights and laws	-	-	-	-
<i>Essential Digital Skills</i>	<b>4</b>	<b>6</b>	-	-
<b>PC12.</b> operate digital devices and use its features and applications securely and safely	-	-	-	-
<b>PC13.</b> use internet and social media platforms securely and safely	-	-	-	-
<i>Entrepreneurship</i>	<b>3</b>	<b>5</b>	-	-
<b>PC14.</b> identify and assess opportunities for potential business	-	-	-	-
<b>PC15.</b> identify sources for arranging money and associated financial and legal challenges	-	-	-	-
<i>Customer Service</i>	<b>2</b>	<b>2</b>	-	-
<b>PC16.</b> identify different types of customers	-	-	-	-
<b>PC17.</b> identify customer needs and address them appropriately	-	-	-	-
<b>PC18.</b> follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship &amp; Jobs</i>	<b>1</b>	<b>3</b>	-	-
<b>PC19.</b> create a basic biodata	-	-	-	-
<b>PC20.</b> search for suitable jobs and apply	-	-	-	-
<b>PC21.</b> identify and register apprenticeship opportunities as per requirement	-	-	-	-
<b>NOS Total</b>	<b>20</b>	<b>30</b>	-	-



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### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	DGT/VSQ/N0101
<b>NOS Name</b>	Employability Skills (30 Hours)
<b>Sector</b>	Cross Sectoral
<b>Sub-Sector</b>	Professional Skills
<b>Occupation</b>	Employability
<b>NSQF Level</b>	2
<b>Credits</b>	1
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	27/01/2022
<b>Next Review Date</b>	26/01/2025
<b>NSQC Clearance Date</b>	27/01/2022



## Qualification Pack

# CON/N0411: Perform ultrasonic testing on structural steel components and welded sections

## Description

This occupational standards unit is about performing ultrasonic testing on structural steel components and welded sections

## Scope

The scope covers the following :

- Perform ultrasonic testing

## Elements and Performance Criteria

### *Perform ultrasonic testing*

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

- PC1.** determine the transducers, instruments and calibration standards to be used based upon the testing conditions, location and accessibility of testing and purpose of test
- PC2.** interpret the standard specifications and perform the test in accordance to the same
- PC3.** run diagnostic checks following the calibration standards to ensure that readings obtained are accurate
- PC4.** apply coating of gel, water or solvent on the surface to be tested appropriately as per manufacturer's guidelines or standard practices
- PC5.** ensure the test specimen is appropriately immersed in solvent for immersed type of ultrasonic test
- PC6.** ensure the transducers are appropriately coated and ready for use
- PC7.** choose normal or angle beam as per the test requirement and instructions
- PC8.** set the frequency of ultrasound as per the test specifications and requirements
- PC9.** ensure the position and movement of both pieces is correct and simultaneous in case of dual element transducers
- PC10.** ensure the single piece transducer moves appropriately and the required test area is covered
- PC11.** check the graphs and other details mentioned on the display to compute the size and type of defect

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the standard practices for quality control
- KU2.** the safety measures concerning the handling and storage of required tools, equipment and materials
- KU3.** the importance of personal protection and the use of relevant safety gear and equipment



## Qualification Pack

- KU4.** the statutory compliance requirements related to working at heights
- KU5.** the different types of testing carried out on fabricated materials
- KU6.** the pros and cons and difference between destructive and non-destructive testing
- KU7.** the properties of sound how it is transmitted
- KU8.** wave and related parameters
- KU9.** the principle, application and limitations of ultrasonic testing
- KU10.** the different methods and procedures of performing ultrasonic testing
- KU11.** the process of performing ultrasonic test on structural steel components and sections to detect deformities present inside the weld, between weld and parent material, rolling defects under the surface of base material
- KU12.** the range, area of application, classification and principles of operation of different equipment used in ultrasonic testing
- KU13.** how to operate various settings on the ultrasonic testing equipment and their implication on testing
- KU14.** the types of defects inspected by ultrasonic testing
- KU15.** the precautions to be taken while conducting ultrasonic testing
- KU16.** the importance of cleaning the surface before and after conducting ultrasonic testing
- KU17.** the different methods of cleaning metal surface
- KU18.** how to interpret the readings and graphs shown on the display of ultrasonic testing equipment
- KU19.** how to classify a sample based upon the test report
- KU20.** how to calibrate the ultrasonic testing equipment

## Generic Skills (GS)

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

- GS1.** maintain the appropriate data and records
- GS2.** read the appropriate reports and literature concerning the field of work
- GS3.** communicate professionally with all the stakeholders
- GS4.** listen attentively to understand the information/ instructions being shared and take appropriate action
- GS5.** coordinate with the co-workers to achieve the work objectives
- GS6.** plan and execute tasks based on priority
- GS7.** identify possible disruptions to work and take appropriate mitigation measures
- GS8.** take prompt action to deal with workplace emergencies and accidents
- GS9.** evaluate all possible solutions to work-related problems and select the best one
- GS10.** follow the recommended practices for the timely completion of work and achievement of organizational objectives





## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform ultrasonic testing</i>	<b>30</b>	<b>60</b>	-	<b>10</b>
<b>PC1.</b> determine the transducers, instruments and calibration standards to be used based upon the testing conditions, location and accessibility of testing and purpose of test	-	-	-	-
<b>PC2.</b> interpret the standard specifications and perform the test in accordance to the same	-	-	-	-
<b>PC3.</b> run diagnostic checks following the calibration standards to ensure that readings obtained are accurate	-	-	-	-
<b>PC4.</b> apply coating of gel, water or solvent on the surface to be tested appropriately as per manufacturer's guidelines or standard practices	-	-	-	-
<b>PC5.</b> ensure the test specimen is appropriately immersed in solvent for immersed type of ultrasonic test	-	-	-	-
<b>PC6.</b> ensure the transducers are appropriately coated and ready for use	-	-	-	-
<b>PC7.</b> choose normal or angle beam as per the test requirement and instructions	-	-	-	-
<b>PC8.</b> set the frequency of ultrasound as per the test specifications and requirements	-	-	-	-
<b>PC9.</b> ensure the position and movement of both pieces is correct and simultaneous in case of dual element transducers	-	-	-	-
<b>PC10.</b> ensure the single piece transducer moves appropriately and the required test area is covered	-	-	-	-
<b>PC11.</b> check the graphs and other details mentioned on the display to compute the size and type of defect	-	-	-	-
<b>NOS Total</b>	<b>30</b>	<b>60</b>	-	<b>10</b>



## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	CON/N0411
<b>NOS Name</b>	Perform ultrasonic testing on structural steel components and welded sections
<b>Sector</b>	Construction
<b>Sub-Sector</b>	Real Estate and Infrastructure construction
<b>Occupation</b>	Quality Assurance & Quality Control
<b>NSQF Level</b>	3.5
<b>Credits</b>	2
<b>Version</b>	3.0
<b>Last Reviewed Date</b>	31/08/2023
<b>Next Review Date</b>	29/02/2024
<b>NSQC Clearance Date</b>	31/08/2023



## Qualification Pack

# CON/N0412: Perform magnetic particle test on structural steel welded joints

## Description

This occupational standards unit is about performing magnetic particle test on structural steel welded joints

## Scope

The scope covers the following :

- Perform magnetic particle test

## Elements and Performance Criteria

### *Perform magnetic particle test*

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

- PC1.** interpret the quality plan, WPS, fabrication shop drawings etc., to determine the technical specifications, locations of testing and method to be adopted
- PC2.** identify the location of joint or section for conducting the test as per the specification
- PC3.** estimate the quantity of materials and time required for the completion of test
- PC4.** interpret the standard specifications and perform the test in accordance to the same
- PC5.** check the surface to be tested can be magnetized
- PC6.** carry out pre-test cleaning activities using solvents, brushes, scrubs etc., to remove any paint, dust, oil, grease or scale etc., from the test surface
- PC7.** ensure the temperature of the test specimen is within the applicable limits prescribed in the test procedure
- PC8.** ensure appropriate storage of consumables to avoid contamination
- PC9.** ensure the lighting arrangements are appropriate and compatible to the type of indicator used
- PC10.** apply suspended magnetic particles to the test surface using appropriate method
- PC11.** apply dry powder indicators to the surface of the test specimen
- PC12.** select a suitable method for the application of magnetic field to the test specimen
- PC13.** apply the magnetic fields in two directions perpendicular to each other of the required magnitude
- PC14.** check for the appropriate application of magnetic field
- PC15.** clean the particulate matter under supervision
- PC16.** set up reverse magnetic field to demagnetize the component or structure under inspection

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:



## Qualification Pack

- KU1.** the fundamentals and concepts of magnetic field
- KU2.** the principle and process of conducting magnetic particle test
- KU3.** the concept of flux leakage
- KU4.** the areas of application, and limitations and advantages of different equipment and methods used for creating a magnetic field
- KU5.** the methods of measuring magnetic field
- KU6.** the range, principle of operation, area of operation, and limitations of different tools used to measure magnetic field
- KU7.** the limitations of magnetic particle method
- KU8.** the type of defects inspected by magnetic particle test
- KU9.** the precautions to be taken while conducting magnetic particle test
- KU10.** the importance of cleaning the surface before and after conducting magnetic particle test
- KU11.** different methods of cleaning metal surface
- KU12.** different types of indicators, their application and auxiliary items required by them
- KU13.** the definition, properties and effects of carrier in relation to magnetic particle test
- KU14.** the interpretation of magnetic patterns developed by particles on the surface of test specimen

## Generic Skills (GS)

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

- GS1.** maintain the appropriate data and records
- GS2.** read the appropriate reports and literature concerning the field of work
- GS3.** communicate professionally with all the stakeholders
- GS4.** listen attentively to understand the information/ instructions being shared and take appropriate action
- GS5.** coordinate with the co-workers to achieve the work objectives
- GS6.** plan and execute tasks based on priority
- GS7.** identify possible disruptions to work and take appropriate mitigation measures
- GS8.** take prompt action to deal with workplace emergencies and accidents
- GS9.** evaluate all possible solutions to work-related problems and select the best one
- GS10.** follow the recommended practices for the timely completion of work and achievement of organizational objectives



## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform magnetic particle test</i>	<b>30</b>	<b>60</b>	-	<b>10</b>
<b>PC1.</b> interpret the quality plan, WPS, fabrication shop drawings etc., to determine the technical specifications, locations of testing and method to be adopted	-	-	-	-
<b>PC2.</b> identify the location of joint or section for conducting the test as per the specification	-	-	-	-
<b>PC3.</b> estimate the quantity of materials and time required for the completion of test	-	-	-	-
<b>PC4.</b> interpret the standard specifications and perform the test in accordance to the same	-	-	-	-
<b>PC5.</b> check the surface to be tested can be magnetized	-	-	-	-
<b>PC6.</b> carry out pre-test cleaning activities using solvents, brushes, scrubs etc., to remove any paint, dust, oil, grease or scale etc., from the test surface	-	-	-	-
<b>PC7.</b> ensure the temperature of the test specimen is within the applicable limits prescribed in the test procedure	-	-	-	-
<b>PC8.</b> ensure appropriate storage of consumables to avoid contamination	-	-	-	-
<b>PC9.</b> ensure the lighting arrangements are appropriate and compatible to the type of indicator used	-	-	-	-
<b>PC10.</b> apply suspended magnetic particles to the test surface using appropriate method	-	-	-	-
<b>PC11.</b> apply dry powder indicators to the surface of the test specimen	-	-	-	-
<b>PC12.</b> select a suitable method for the application of magnetic field to the test specimen	-	-	-	-



## Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC13.</b> apply the magnetic fields in two directions perpendicular to each other of the required magnitude	-	-	-	-
<b>PC14.</b> check for the appropriate application of magnetic field	-	-	-	-
<b>PC15.</b> clean the particulate matter under supervision	-	-	-	-
<b>PC16.</b> set up reverse magnetic field to demagnetize the component or structure under inspection	-	-	-	-
<b>NOS Total</b>	<b>30</b>	<b>60</b>	<b>-</b>	<b>10</b>



## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	CON/N0412
<b>NOS Name</b>	Perform magnetic particle test on structural steel welded joints
<b>Sector</b>	Construction
<b>Sub-Sector</b>	Real Estate and Infrastructure construction
<b>Occupation</b>	Quality Assurance & Quality Control
<b>NSQF Level</b>	3.5
<b>Credits</b>	2
<b>Version</b>	3.0
<b>Last Reviewed Date</b>	31/08/2023
<b>Next Review Date</b>	29/02/2024
<b>NSQC Clearance Date</b>	31/08/2023



## Qualification Pack

# CON/N0413: Perform liquid /dye penetration test on structural steel welded joints

## Description

This occupational standards unit is about performing liquid/ dye penetration test on structural steel welded joints

## Scope

The scope covers the following :

- Perform liquid/ dye penetration test

## Elements and Performance Criteria

### *Perform liquid/dye penetration test*

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

- PC1.** interpret the quality plan, WPS, fabrication shop drawings etc., to determine the technical specifications, locations of testing and method to be adopted
- PC2.** identify the location of joint or section for conducting the test as per the specification
- PC3.** estimate the quantity of penetrants and developers and time required for the completion of test
- PC4.** interpret the standard specifications and perform the test in accordance to the same
- PC5.** check the compatibility of penetrants and developers with each other, the base metal and conditions of testing
- PC6.** carry out pre-test cleaning activities using solvents, brushes, scrubs etc., to remove any paint, dust, oil, grease or scale etc., from the test surface
- PC7.** ensure the area surrounding the test surface is appropriately cleaned and free from impurities
- PC8.** identify and use suitable means to apply penetrant on the test surface
- PC9.** apply the penetrant uniformly across the test specimen and allow it to soak into the flaw for the recommended duration, and avoid the direct application of removers/solvents to the test surface
- PC10.** remove excess penetrant from the surface of test specimen using suitable means as per the type of penetrant used and manufacturer's guidelines
- PC11.** select and use appropriate developers based on the type of penetrant and inspection condition
- PC12.** apply the developer uniformly across the test specimen as per the manufacturer's guidelines or standard procedure
- PC13.** ensure the developer is not disturbed for the specified duration as per instructions for blotting to take place correctly
- PC14.** check the completion of blotting period and development of penetrant on the test surface
- PC15.** clean the developer and penetrant appropriately after inspection





## Qualification Pack

### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the principle, advantages and limitations of dye penetration test
- KU2.** different types of materials on which dye penetration test can be carried out
- KU3.** how to select materials used in dye penetration test for various conditions of testing
- KU4.** the types of defects inspected by dye penetration test
- KU5.** the precautions to be taken while conducting dye penetration test
- KU6.** the importance of cleaning the surface before and after conducting dye penetration test
- KU7.** different methods of cleaning metal surface
- KU8.** the use of different types of penetrants and developers
- KU9.** different methods of applying penetrants and developers
- KU10.** the guidelines for the application, and development time of various penetrants and developers
- KU11.** the appropriate safety measures to be taken while conducting the dye penetration test

### Generic Skills (GS)

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

- GS1.** maintain the appropriate data and records
- GS2.** read the appropriate reports and literature concerning the field of work
- GS3.** communicate professionally with all the stakeholders
- GS4.** listen attentively to understand the information/ instructions being shared and take appropriate action
- GS5.** coordinate with the co-workers to achieve the work objectives
- GS6.** plan and execute tasks based on priority
- GS7.** identify possible disruptions to work and take appropriate mitigation measures
- GS8.** take prompt action to deal with workplace emergencies and accidents
- GS9.** evaluate all possible solutions to work-related problems and select the best one
- GS10.** follow the recommended practices for the timely completion of work and achievement of organizational objectives



## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform liquid/dye penetration test</i>	<b>30</b>	<b>60</b>	-	<b>10</b>
<b>PC1.</b> interpret the quality plan, WPS, fabrication shop drawings etc., to determine the technical specifications, locations of testing and method to be adopted	-	-	-	-
<b>PC2.</b> identify the location of joint or section for conducting the test as per the specification	-	-	-	-
<b>PC3.</b> estimate the quantity of penetrants and developers and time required for the completion of test	-	-	-	-
<b>PC4.</b> interpret the standard specifications and perform the test in accordance to the same	-	-	-	-
<b>PC5.</b> check the compatibility of penetrants and developers with each other, the base metal and conditions of testing	-	-	-	-
<b>PC6.</b> carry out pre-test cleaning activities using solvents, brushes, scrubs etc., to remove any paint, dust, oil, grease or scale etc., from the test surface	-	-	-	-
<b>PC7.</b> ensure the area surrounding the test surface is appropriately cleaned and free from impurities	-	-	-	-
<b>PC8.</b> identify and use suitable means to apply penetrant on the test surface	-	-	-	-
<b>PC9.</b> apply the penetrant uniformly across the test specimen and allow it to soak into the flaw for the recommended duration, and avoid the direct application of removers/solvents to the test surface	-	-	-	-
<b>PC10.</b> remove excess penetrant from the surface of test specimen using suitable means as per the type of penetrant used and manufacturer's guidelines	-	-	-	-
<b>PC11.</b> select and use appropriate developers based on the type of penetrant and inspection condition	-	-	-	-



## Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC12.</b> apply the developer uniformly across the test specimen as per the manufacturer's guidelines or standard procedure	-	-	-	-
<b>PC13.</b> ensure the developer is not disturbed for the specified duration as per instructions for blotting to take place correctly	-	-	-	-
<b>PC14.</b> check the completion of blotting period and development of penetrant on the test surface	-	-	-	-
<b>PC15.</b> clean the developer and penetrant appropriately after inspection	-	-	-	-
<b>NOS Total</b>	<b>30</b>	<b>60</b>	<b>-</b>	<b>10</b>



## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	CON/N0413
<b>NOS Name</b>	Perform liquid /dye penetration test on structural steel welded joints
<b>Sector</b>	Construction
<b>Sub-Sector</b>	Real Estate and Infrastructure construction
<b>Occupation</b>	Quality Assurance and Quality Control
<b>NSQF Level</b>	3.5
<b>Credits</b>	2
<b>Version</b>	3.0
<b>Last Reviewed Date</b>	31/08/2023
<b>Next Review Date</b>	29/02/2024
<b>NSQC Clearance Date</b>	31/08/2023

### Assessment Guidelines and Assessment Weightage

#### Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) 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 knowledge part will be based on knowledge bank of questions created by Assessment Bodies subject to approval by SSC.
3. Individual assessment agencies will create unique question papers for knowledge/theory part for assessment of candidates as per assessment criteria given below.
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on assessment criteria.



## Qualification Pack

- The passing percentage for each QP will be 70%. To pass the Qualification Pack, every trainee should score a minimum of 70% individually in each NOS.
- The Assessor shall check the final outcome of the practices while evaluating the steps performed to achieve the final outcome.
- The trainee shall be provided with a chance to repeat the test to correct his procedures in case of improper performance, with a deduction of marks for each iteration.
- After the certain number of iteration as decided by SSC the trainee is marked as fail, scoring zero marks for the procedure for the practical activity.
- In case of successfully passing only certain number of NOSs, the trainee is eligible to take subsequent assessment on the balance NOSs to pass the Qualification Pack within the specified time frame set by SSC.
- Minimum duration of Assessment of each QP shall be of 4hrs/trainee.

### 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
CON/N0417.Prepare for the testing of structural steel components	30	60	0	10	100	50
CON/N9001.Work according to personal health, safety and environment protocols at construction site	30	70	0	0	100	10



### Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
DGT/VSQ/N0101.Employability Skills (30 Hours)	20	30	-	-	50	10
<b>Total</b>	<b>80</b>	<b>160</b>	<b>0</b>	<b>10</b>	<b>250</b>	<b>70</b>

Elective: 1 Ultrasonic Testing (UT)

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N0411.Perform ultrasonic testing on structural steel components and welded sections	30	60	0	10	100	30
<b>Total</b>	<b>30</b>	<b>60</b>	<b>-</b>	<b>10</b>	<b>100</b>	<b>30</b>

Elective: 2 Magnetic Particle Test (MPT)

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N0412.Perform magnetic particle test on structural steel welded joints	30	60	0	10	100	30
<b>Total</b>	<b>30</b>	<b>60</b>	<b>-</b>	<b>10</b>	<b>100</b>	<b>30</b>

Elective: 3 Dye Penetration Test (DPT)

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N0413.Perform liquid /dye penetration test on structural steel welded joints	30	60	0	10	100	30



### Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
Total	30	60	-	10	100	30



## Qualification Pack

### Acronyms

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





## Qualification Pack

### Glossary

<b>Sector</b>	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.
<b>Sub-sector</b>	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
<b>Occupation</b>	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
<b>Job role</b>	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
<b>Occupational Standards (OS)</b>	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.
<b>Performance Criteria (PC)</b>	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
<b>National Occupational Standards (NOS)</b>	NOS are occupational standards which apply uniquely in the Indian context.
<b>Qualifications Pack (QP)</b>	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.
<b>Unit Code</b>	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
<b>Unit Title</b>	Unit title gives a clear overall statement about what the incumbent should be able to do.
<b>Description</b>	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.
<b>Scope</b>	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

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