IASC
SECTOR SKILL COUNCIL
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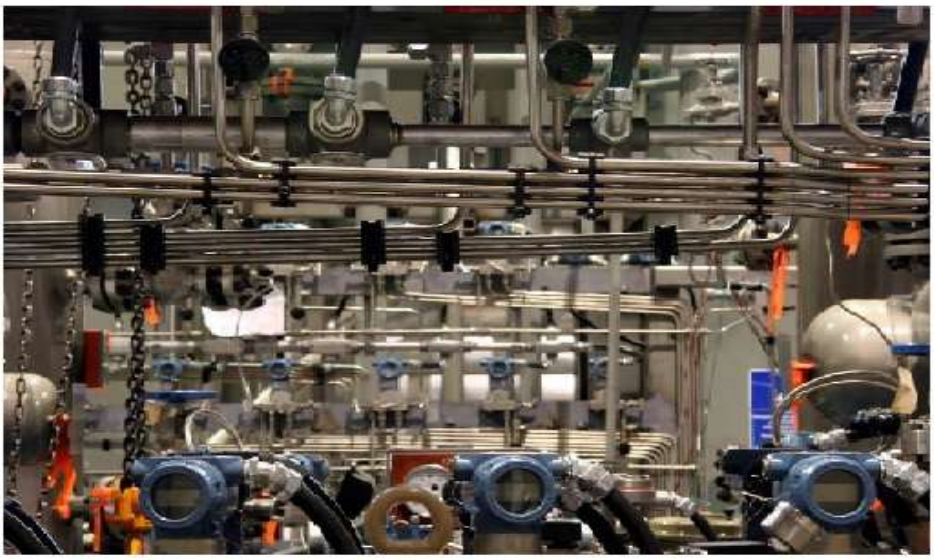
सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

Qualification Pack

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape



Junior Instrumentation Technician (Process Control)

QP Code: IAS/Q3003

NSQF Level: 3

Instrumentation, Automation, Surveillance & Communication Sector Skill Council || IASC SSC, 201-202, STBP NSIC Complex, Okhla Industrial Estate, New Delhi
110020

Contents

IAS/Q3003: Junior Instrumentation Technician (Process Control)

Brief Job Description

Junior Instrumentation Technician (Process Control) carries out duties related to general site/plant readiness and usability and assists in preventive maintenance under supervision and guidance.

Personal Attributes

This job requires the individual to be disciplined, assertive, team player, possess analytical skills and problem solving ability, effective communicator and have the ability to work under pressure.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. IAS/N0103: Task Reporting - Process Control
2. IAS/N0105: Safety, Health and Environment Process Control
3. IAS/N0300: Site Readiness and Instrument Usability - Process Control
4. IAS/N0301: Preventive Maintenance Process Control
5. IAS/N2105: Work Effectively With Teams

Qualification Pack (QP) Parameters

Sector	Instrumentation
Sub-Sector	Instrumentation & Automation
Occupation	Maintenance
Country	India
NSQF Level	3
Aligned to NCO/ISCO/ISIC Code	NCO-2015/NIL
Minimum Educational Qualification & Experience	12th Class
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA

Minimum Job Entry Age	18 Years
Last Reviewed On	30/07/2019
Next Review Date	30/06/2020
NSQC Approval Date	03/08/2018
Version	1.0

IAS/N0103: Task Reporting - Process Control

Description

The OS unit is about reporting and record keeping as per company processes and job description for Instrumentation Technicians

Scope

This Unit Task covers the following:

- Reporting- faults
- Reporting PM
- Reporting Corrective Maintenance
- Reporting unusual occurrence
- Reporting Theft
- Reporting security breach

Elements and Performance Criteria

Report faults

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

PC1. Report and Escalate faults/issues to immediate supervisor

Prepare PM Report

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

PC2. Complete entry of preventive maintenance check lists/reports

Prepare Corrective Maintenance report

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

PC3. Complete entry of Corrective Maintenance Check lists /reports

Report unusual occurrence

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

PC4. Complete report on noticing any visible changes in control valve installation or its accessories. Report for immediate attention of supervisor

Report theft

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

PC5. Report any theft in control valve assembly/spares to supervisor

Report security breach

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

PC6. Report suspicious movement of new persons near control valve installation to security and supervisor

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Understand basic company policy and maintenance strategy as applied to Control Valve
KU2. Understand importance of reporting potential failures during Control Valve Health visits / Preventive Maintenance checks/Observation to supervisor
KU3. Provide accurate time for jobs undertaken especially during opportunistic/annual shut down to supervisor
KU4. Provide status on critical spares consumption so that supervisor can take proactive steps
KU5. Prepare daily log and failure reports
KU6. Furnish basic data to supervisor related to specification of control valve
KU7. Send internal mails related to PM or Corrective maintenance to supervisor
KU8. Record Maintenance history

Generic Skills (GS)

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

GS1. Write mails about work
GS2. Write reports and logs in company prescribed formats
GS3. Make notes about the observations in the plant and share with the supervisor and co-workers as appropriate
GS4. Write to management about feedback and unresolved issues
GS5. Read and comprehend formats and check lists for preventive and corrective maintenance.
GS6. Read and understand company policies
GS7. Communicate the issues / faults / corrective actions / warnings / suggestions with complete details to the supervisor and co-workers as appropriate
GS8. Make decisions on a suitable course of action or response keeping in view resource utilization while meeting commitments
GS9. How to prioritize jobs during multiple breakdown situation
GS10. Plan and organize work to achieve targets and deadlines
GS11. Discuss customer needs with co-workers and identify most appropriate solution
GS12. Can diagnose control valve faults and communicate effectively to Process and Instrumentation supervisor.
GS13. Use the existing information to arrive at actionable decision points
GS14. Use the existing information for improving the customer satisfaction
GS15. Use the existing information to optimize solution and company business
GS16. Analyze problems and identify causes and possible solutions
GS17. Apply, analyze, and evaluate the information gathered from observation, experience, reasoning, or communication, as a guide to thought and action
GS18. Anticipate problems, risks and opportunities and utilize these for mitigation and business optimization

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Report faults	**5**	**5**	**-**	**-**
PC1. Report and Escalate faults/issues to immediate supervisor	5	5	-	-
Prepare PM Report	**10**	**15**	**-**	**-**
PC2. Complete entry of preventive maintenance check lists/reports	10	15	-	-
Prepare Corrective Maintenance report	**10**	**15**	**-**	**-**
PC3. Complete entry of Corrective Maintenance Check lists /reports	10	15	-	-
Report unusual occurrence	**10**	**10**	**-**	**-**
PC4. Complete report on noticing any visible changes in control valve installation or its accessories. Report for immediate attention of supervisor	10	10	-	-
Report theft	**5**	**5**	**-**	**-**
PC5. Report any theft in control valve assembly/spares to supervisor	5	5	-	-
Report security breach	**5**	**5**	**-**	**-**
PC6. Report suspicious movement of new persons near control valve installation to security and supervisor	5	5	-	-
NOS Total	**45**	**55**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	IAS/N0103
NOS Name	Task Reporting - Process Control
Sector	Instrumentation
Sub-Sector	Instrumentation & Automation
Occupation	Maintenance
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	30/07/2016
Next Review Date	30/07/2019
NSQC Clearance Date	03/08/2018

IAS/N0105: Safety, Health and Environment Process Control

Description

The OS unit is about adhering to Safety, Health and Environment (SHE) norms in Process Plants.

Scope

The scope of this task includes following / performing: SHE Instructions SHE Personal Protection Directives Support SHE Audit

Elements and Performance Criteria

Follow SHE-Instructions

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

PC1. Interpret and follow formal Instructions from SHE Dept.

PC2. Participate in the prescribed drills including familiarization of personal protective equipment, fire extinguisher and first aid.

PC3. Follow Instructions on Work permit, Fire permit and Hazardous Area Classification, Fire and explosion hazards

Follow SHE for Personal Protection

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

PC4. Use right personal protective equipment, such as: Use safety shoes and helmet at all times in plant Use ear muffs in prescribed high decibel areas Adapt right posture during lifting of heavy objects. Use correct gas mask/breathing air apparatus as per area and directives Use safety goggles and gloves as per directives

Support SHE - Audit

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

PC5. Support supervisor during SHE Audit Check for leaks Check for unsafe scaffolding and temporary installations Check for correct storage of cleaning solvents and consumable such as waste cloth Ensure safe working in crane movement area. Check housekeeping including oil and water spillages on floor Check for improper bolting or open enclosures / junction boxes

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Understands SHE Instruction Understands Safety, Health and Environment directives Understands emergency procedures during site emergencies Understands Hazards in process as well as process media associated with these hazards

KU2. Demonstrates familiarity and understanding of documents related to SHE Understands SHE emergency procedures for the site. Understands Hazardous Area Classifications and Zones 0,1,2 Understands procedures of permits to work issued by Process personnel for maintenance work.

Generic Skills (GS)

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

GS1. Use Formats and check list for SHE
GS2. Write emails and messages about SHE related issues
GS3. Companys SHE policy.
GS4. Use of Formats and check list for SHE audits
GS5. Understands SHE Directives and SOPs related to maintenance work
GS6. Product literature and manuals relevant for the job
GS7. Company information about working practices at the site
GS8. Information displayed at the workplace
GS9. Describe site conditions and issues to co-workers and supervisor
GS10. Communicate to the management in meetings about Control Valve Health issues to get their support
GS11. Interact with coworkers and gather information related to process and site conditions
GS12. Make decisions pertaining to SHE in the concerned area of work
GS13. Ensures his personal protective equipment and arrangement of tools conform to safe working norms before he commences his /her daily tasks
GS14. Follows SOP/Vendor manual safety instructions with respect to dismantling, assembly and gland repair work on Control Valve
GS15. Discuss customer needs with co-workers and identify most appropriate solution
GS16. Think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s)
GS17. Identify immediate or temporary solutions to resolve delays
GS18. Discuss use the available information with co-workers to arrive at actionable decision points
GS19. Analyze problems in team and identify causes and possible solutions
GS20. Collaborate with co-workers to analyze, and evaluate the information gathered from collective observation, experience, reasoning, or communication, as a guide to teamwork

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Follow SHE-Instructions	**15**	**15**	**-**	**-**
PC1. Interpret and follow formal Instructions from SHE Dept.	5	5	-	-
PC2. Participate in the prescribed drills including familiarization of personal protective equipment, fire extinguisher and first aid.	5	5	-	-
PC3. Follow Instructions on Work permit, Fire permit and Hazardous Area Classification, Fire and explosion hazards	5	5	-	-
Follow SHE for Personal Protection	**5**	**5**	**-**	**-**
PC4. Use right personal protective equipment, such as: Use safety shoes and helmet at all times in plant Use ear muffs in prescribed high decibel areas Adapt right posture during lifting of heavy objects. Use correct gas mask/breathing air apparatus as per area and directives Use safety goggles and gloves as per directives	5	5	-	-
Support SHE - Audit	**5**	**5**	**-**	**-**
PC5. Support supervisor during SHE Audit Check for leaks Check for unsafe scaffolding and temporary installations Check for correct storage of cleaning solvents and consumable such as waste cloth Ensure safe working in crane movement area. Check housekeeping including oil and water spillages on floor Check for improper bolting or open enclosures / junction boxes	5	5	-	-
NOS Total	**25**	**25**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	IAS/N0105
NOS Name	Safety, Health and Environment Process Control
Sector	Instrumentation
Sub-Sector	Instrumentation & Automation
Occupation	Maintenance
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	30/07/2016
Next Review Date	30/07/2019
NSQC Clearance Date	03/08/2018

IAS/N0300: Site Readiness and Instrument Usability - Process Control

Description

The OS unit is about maintaining general Site Readiness and Instrument Usability as applicable for process control industry

Scope

The scope of this task includes: Instructions relating to Process Plant Permits to work, Check Sheets & Formats Plant working and Instrumentation documents Field Instrumentation, control loops & Control valves On line Analyzers and Analyzer House DCS & PLC Package Units -Boilers, Heaters, Compressors, Chillers etc. Fire and Gas Detection system Site Guidelines of Field Installations - Visual, Integrity Checks & Electrical Safety norms Site Guidelines - House Keeping and Lighting Site Guidelines -Consumables, Execution and Follow up action

Elements and Performance Criteria

Observe Instructions relating to Process Plant

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

PC1. Follow Process Plant related instructions and directives, includingequipment, location, lay out, procedures, forms etc. covering: Process package units such as Boilers, compressors, heaters, chillers including equipment location /lay out etc. Work Permits Various formats and Check Sheets Field Instrumentation and Control loops Recognize and locate Control Valves Recognize and locate On line Analyzers and Analyzer House Recognize and locate DCS and PLC Recognize and locate Fire and Gas systems Safety, Health, Environment and emergency procedures

Follow Processes regarding Work Permits, Check Sheets& Formats

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

PC2. Follow rules regarding various permits to work and use the right onedepending on the job he/she undertakes. This includes: Normal working in plant WHITE permit Drilling, Grinding, Welding, Gas cutting in plant - RED Permit or Fire Permit. Excavation work for underground cables and pipe work etc.- EXCAVATION Permit

PC3. Understand the purpose of Check sheets used in InstrumentationMaintenance work and make entries in it: Site Hygiene Check Sheets Calibration Check Sheets Preventive Maintenance check sheets

Follow plant working and instrumentation documents

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

PC4. Read and Use the Plant working document relevant to a particularInstrument tag/control loop he/she is working on, as required, relating to: Main Process Plants Package units such as Boilers, Heaters, Compressors Chillers etc.

PC5. Read and use the Instrumentation document relevant to a particularInstrument tag he/she is working with, as required: P and I diagram Instrument Index Data Sheets Hook Up diagram Loop diagram Instrument lay out diagram. Wiring Diagrams Cause and Effect diagram

Support Servicing of Field Instrumentation and Control valves under guidance

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

PC6. Attend to maintenance requests and resolve the problems with guidance. Request for supervisors advice and assistance during difficult problem resolution. This includes: Measurement sensors and associated impulse lines/sensor cables Pneumatic/electronic transmitters Controllers and control room receivers Control valves and other final control elements.

PC7. Perform basic overhaul and testing under supervision. Globe, Cage type, Butterfly, Rotary control valves Control Valve accessories, Solenoid Valves, Fail safe shut down devices Pneumatic and Digital Valve positioners Control Valve Data Sheet, control Valve characteristics i.e. quick opening, equal percentage, Linear Overhaul, testing and calibration of Control Valves

Perform routine checks for On line Analyzers and Analyzer House

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

PC8. Carry out routine checks of: Analyzer sampling system Sensor and electronics section (liquid analyzers, Gas analyzers, Gas Chromatograph etc.) Receivers and accessories in Analyzer house. Calibration Gas cylinders storage and procedures.

Identify and locate DCS& PLC devices

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

PC9. Locate the field devices and identifies the interface units able to work on the system with guidance.

Locate and identify trouble in PackageUnits Boilers, Heaters, Compressors, Chillers etc.

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

PC10. Locate faults relating to operation of package units, location, relates instrument tags to respective Process package unit and undertakes routines and perform basic trouble shooting in these units.

Locate Fire and Gas Detection system and Maintain under guidance

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

PC11. Refer to overview of fire and gas detection, Locate the main field devices, identify interface units and perform maintenance work on the system with guidance.

Follow Site Guidelines of Field Installations Visual , Integrity Checks and Electrical Safety norms

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

PC12. .Check for visual damage, tampering: Check for visible damage to specified Instruments (in an inventory list or otherwise provided by the Supervisor) caused by impact of an external body.a. Check for prominent damage to Accessories of the specifiedInstruments caused by impact of an external body.b. Check for water ingress in indoor working area due to seepage/roof leaks /damaged windows.c. Check for misuse of installation by other agencies for example, using instrument installation as support or for scaffolding build up. d. Check for prominent deterioration due to environment for example, corrosion / proximity to hot surfaces / process leaks etc.

PC13. Check for any visible loss of installation integrity. Integrity here means that the instrument and the installation is in a healthy working condition without any unusual appearance, breakage or foreign objects fallen in/on/around the installation which is likely to cause or lead to instrument malfunction.a. Check for improper closure of junction boxes, panels, cable termination.b. Check for improper tubing /impulse piping connectionc. Check for unauthorized /unexplained cable connection disconnection d. Check for unauthorized /unexplained process impulse lines /instrument air connection /disconnection.

PC14. Check for potential electrical problems due to deviation from standard electrical practicesa. Check for unused flood light /field plug connections with trailing cable. b.Check for bare, untagged or un-insulated wiresc. Check for any modifications or deviation in explosion proof enclosures and intrinsic safety installation with special focus on bolting integrityd. Check to ensure no deviation in ex proof enclosures and intrinsic safety installation with special focus on bolting integrity

Follow guidelines regarding House Keeping and Lighting

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

PC15. Check for floor condition and cluttering of items Check for wet/slippery work areas, improper storage of items and cluttering of items on work areas. These are potential safety hazards

PC16. Check for lighting and their operation. Check for unsafe temporary wiring of lighting. Check in plant and indoor areas

Monitor and maintain Consumables and perform follow-up

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

PC17. Check consumption and storage of consumables. Check for excessive consumption /visible wastage of cleaning solvents, lubrication oil and grease Check for excessive consumption of other related consumables such as waste cloth and gloves Check for proper storage of solvent and waste cloth (potential fire hazard).

PC18. Complete follow up action as per assigned areas of responsibility and stipulated instructions. Items found unusual outside this boundary to be reported to supervisor. Complete entry of relevant site Readiness check sheet and obtain required approval /endorsement. Replace protective covers which have been removed

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Understands the purpose of the process plant and its operations.

KU2. Understands the layout of the plant and the location of various facilities.

KU3. Understands site conditions and how these impact the operation of instrumentation and control equipment.

KU4. Understands the organization and reporting structure

KU5. Understands rules and regulations to be followed under normal and emergency conditions

KU6. Understands working hours, shifts, off days and leave entitlements

KU7. Understands the job description and responsibility, if any.

KU8. Type of chemicals and other process material used in the organization and how these impact the site conditions

KU9. Hazardous chemicals and their handling procedures.

KU10. Type of instruments and controllers used in the plant.

KU11. Type of instruments, accessories and their locations that falls under the individuals domain of work.

KU12. How instrumentation is located using plant layout drawings.

KU13. How instrumentation maintenance is performed in the organization.

Generic Skills (GS)

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

GS1. Use Formats and check list for Site Readiness planning and reports

GS2. Write emails and messages about site related issues

GS3. Company policy related to site Readiness

GS4. Formats for site Readiness check sheets, list

GS5. Describe condition of instruments and accessories and issues to co- workers and supervisor

GS6. Communicate to the management in meetings about site issues which need management attention

GS7. Interact with coworkers and gather information related to process and instruments conditions

GS8. Make decisions about the site, in consultation with the Supervisor

GS9. Prioritize daily tasks to conduct site survey effectively

GS10. Understand real needs of the customer and suggest most appropriate solution

GS11. Support customer when they need help

GS12. Diagnoses reasons for down time due to instrument failure

GS13. Track recurring failures in instruments for reasons and concludes

GS14. Identify immediate or temporary solutions to resolve delays and discuss with the Supervisor

GS15. Use the existing information to arrive at actionable decision points

GS16. Use the existing information for improving the customer satisfaction

GS17. Use the existing information to optimize solution and company business

GS18. Analyze problems and identify causes and possible solutions

GS19. Apply, analyze, and evaluate the information gathered from observation, experience, reasoning, or communication, as a guide to thought and action

GS20. Anticipate problems, risks and opportunities and utilize these for mitigation and business optimization

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Observe Instructions relating to Process Plant	**10**	**10**	**-**	**-**
PC1. Follow Process Plant related instructions and directives, includingequipment, location, lay out, procedures, forms etc. covering: Process package units such as Boilers, compressors, heaters, chillers including equipment location /lay out etc. Work Permits Various formats and Check Sheets Field Instrumentation and Control loops Recognize and locate Control Valves Recognize and locate On line Analyzers and Analyzer House Recognize and locate DCS and PLC Recognize and locate Fire and Gas systems Safety, Health, Environment and emergency procedures	10	10	-	-
Follow Processes regarding Work Permits, Check Sheets& Formats	**10**	**10**	**-**	**-**
PC2. Follow rules regarding various permits to work and use the right onedepending on the job he/she undertakes. This includes: Normal working in plant WHITE permit Drilling, Grinding, Welding, Gas cutting in plant - RED Permit or Fire Permit. Excavation work for underground cables and pipe work etc.- EXCAVATION Permit	5	5	-	-
PC3. Understand the purpose of Check sheets used in InstrumentationMaintenance work and make entries in it: Site Hygiene Check Sheets Calibration Check Sheets Preventive Maintenance check sheets	5	5	-	-
Follow plant working and instrumentation documents	**10**	**10**	**-**	**-**
PC4. Read and Use the Plant working document relevant to a particularInstrument tag/control loop he/she is working on, as required, relating to: Main Process Plants Package units such as Boilers, Heaters, Compressors Chillers etc.	5	5	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC5. Read and use the Instrumentation document relevant to a particularInstrument tag he/she is working with, as required: P and I diagram Instrument Index Data Sheets Hook Up diagram Loop diagram Instrument lay out diagram. Wiring Diagrams Cause and Effect diagram	5	5	-	-
Support Servicing of Field Instrumentation and Control valves under guidance	**10**	**20**	**-**	**-**
PC6. Attend to maintenance requests and resolve the problems with guidance. Request for supervisors advice and assistance during difficult problem resolution. This includes: Measurement sensors and associated impulse lines/sensor cables Pneumatic/electronic transmitters Controllers and control room receivers Control valves and other final control elements.	5	15	-	-
PC7. Perform basic overhaul and testing under supervision. Globe, Cage type, Butterfly, Rotary control valves Control Valve accessories, Solenoid Valves, Fail safe shut down devices Pneumatic and Digital Valve positioners Control Valve Data Sheet, control Valve characteristics i.e. quick opening, equal percentage, Linear Overhaul, testing and calibration of Control Valves	5	5	-	-
Perform routine checks for On line Analyzers and Analyzer House	**5**	**5**	**-**	**-**
PC8. Carry out routine checks of: Analyzer sampling system Sensor and electronics section (liquid analyzers, Gas analyzers, Gas Chromatograph etc.) Receivers and accessories in Analyzer house. Calibration Gas cylinders storage and procedures.	5	5	-	-
Identify and locate DCS& PLC devices	**5**	**5**	**-**	**-**
PC9. Locate the field devices and identifies the interface units able to work on the system with guidance.	5	5	-	-
Locate and identify trouble in PackageUnits Boilers, Heaters, Compressors, Chillers etc.	**5**	**5**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. Locate faults relating to operation of package units, location, relates instrument tags to respective Process package unit and undertakes routines and perform basic trouble shooting in these units.	5	5	-	-
Locate Fire and Gas Detection system and Maintain under guidance	**5**	**5**	**-**	**-**
PC11. Refer to overview of fire and gas detection, Locate the main field devices, identify interface units and perform maintenance work on the system with guidance.	5	5	-	-
Follow Site Guidelines of Field Installations Visual , Integrity Checks and Electrical Safety norms	**15**	**25**	**-**	**-**
PC12. .Check for visual damage, tampering: Check for visible damage to specified Instruments (in an inventory list or otherwise provided by the Supervisor) caused by impact of an external body.a. Check for prominent damage to Accessories of the specifiedInstruments caused by impact of an external body.b. Check for water ingress in indoor working area due to seepage/roof leaks /damaged windows.c. Check for misuse of installation by other agencies for example, using instrument installation as support or for scaffolding build up. d. Check for prominent deterioration due to environment for example, corrosion / proximity to hot surfaces / process leaks etc.	5	10	-	-
PC13. Check for any visible loss of installation integrity. Integrity here means that the instrument and the installation is in a healthy working condition without any unusual appearance, breakage or foreign objects fallen in/on/around the installation which is likely to cause or lead to instrument malfunction.a. Check for improper closure of junction boxes, panels, cable termination.b. Check for improper tubing /impulse piping connectionc. Check for unauthorized /unexplained cable connection disconnection d. Check for unauthorized /unexplained process impulse lines /instrument air connection /disconnection.	5	10	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. Check for potential electrical problems due to deviation from standard electrical practicesa. Check for unused flood light /field plug connections with trailing cable. b.Check for bare, untagged or un-insulated wiresc. Check for any modifications or deviation in explosion proof enclosures and intrinsic safety installation with special focus on bolting integrityd. Check to ensure no deviation in ex proof enclosures and intrinsic safety installation with special focus on bolting integrity	5	5	-	-
Follow guidelines regarding House Keeping and Lighting	**7**	**6**	**-**	**-**
PC15. Check for floor condition and cluttering of items Check for wet/slippery work areas, improper storage of items and cluttering of items on work areas. These are potential safety hazards	5	3	-	-
PC16. Check for lighting and their operation. Check for unsafe temporary wiring of lighting. Check in plant and indoor areas	2	3	-	-
Monitor and maintain Consumables and perform follow-up	**7**	**10**	**-**	**-**
PC17. Check consumption and storage of consumables. Check for excessive consumption /visible wastage of cleaning solvents, lubrication oil and grease Check for excessive consumption of other related consumables such as waste cloth and gloves Check for proper storage of solvent and waste cloth (potential fire hazard).	2	5	-	-
PC18. Complete follow up action as per assigned areas of responsibility and stipulated instructions. Items found unusual outside this boundary to be reported to supervisor. Complete entry of relevant site Readiness check sheet and obtain required approval /endorsement. Replace protective covers which have been removed	5	5	-	-
NOS Total	**89**	**111**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	IAS/N0300
NOS Name	Site Readiness and Instrument Usability - Process Control
Sector	Instrumentation
Sub-Sector	Instrumentation & Automation
Occupation	Maintenance
NSQF Level	3
Credits	TBD
Version	1.0
Last Reviewed Date	30/07/2016
Next Review Date	30/07/2019
NSQC Clearance Date	03/08/2018

IAS/N0301: Preventive Maintenance Process Control

Description

The OS unit is about performing Preventive Maintenance for general instrumentation in Process Controls under guidance.

Scope

This Unit Task covers the following : Obtaining PM-work permit. Organizing PM-Preparatory tasks Executing PM-Schedule Preparing PM-Process List PM-Planning Performing PM-Visual Checks & action Completion of PM schedule. Preparing PRM-List Listing PM to be taken during Shut down Following up consolidated PM list

Elements and Performance Criteria

Obtain PM-work permit

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

PC1. Obtain work permit (mandatory) from the Process supervisor before commencing maintenance work.

Organize PM- Preparatory tasks

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

PC2. Organize for the days Preventive Maintenance task which include: Check sheets and related documents Tools and tackles and calibrating equipment Personal protective safety equipment

Execute PM Schedule

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

PC3. Execute Preventive maintenance jobs as per available Preventive Maintenance Schedule.

Prepare PM-Process List

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

PC4. Prepare Process list from process supervisor.

Plan PM Schedule

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

PC5. Plan for next days preventive maintenance schedule

Perform PM Visual Checks & Actions

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

PC6. Carry out Visual Checks & takes corrective actions wherever possible or else transfer job to shut down list. Check abnormal noise & locates source. Check for abnormal vibration locates source- corrects /informs supervisor. Check for gland leak and arrests .If not possible informs supervisor and transfers to shut down list Check for Instrument air leaks arrests leak-if not possible informs supervisor and transfers to shut down list Check for control valve bonnet and body flange leaks-informs Process supervisor& Instrument supervisor Check for poor electric integrity like exposed terminal and opens enclosure- rectifies. If not permitted informs supervisor& transfer to shut down list Check pneumatic and electric connections to solenoid valve Check for pneumatic connections in Pneumatic transmitters and or I/Pconverters Check for integrity of valve positioners feedback link/connection and rectifies fault after informing Process supervisor Check for environment impact, water ingress/corrosion rectifies fault.Or else .transfers to shut down list. Check for loose bolting and rattling in control valve and accessories including manual operator- rectifies fault

Complete PM schedule

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

PC7. Complete preventive maintenance schedule list of Field Instrumentation and controls. Close the list.

Prepare PRM List

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

PC8. Collect and consolidate daily-diagnostic messages from control valves which have a digital valve controller and Smart Transmitters and record the same in either Preventive Maintenance list or Opportunistic shut down list for execution.

List PMs to be performed during Shut down

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

PC9. Include preventive maintenance jobs during annual shut down or opportunistic shut down list.

Follow up PM consolidated list

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

PC10. Follow up on consolidated preventive maintenance list and closes list.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Understands PM (Preventive Maintenance) norms as defined by the company

KU2. Understands Production targets and production loss figures for the month and contribution by control valves

KU3. Aware of Maintenance Policy of the company with respect to control valve maintenance strategy

KU4. Trouble Shooting of: Control valve body including valve movement and glands. Actuator section and valve positioners and diagnostic messages from Digital Valve controllerA. Control valve accessoriesB. Solenoid valve and Limit switches

KU5. Hazardous area zone classification and process media hazards

KU6. Use of Control Valve Manual when required

KU7. PST, a feature of DCS

Generic Skills (GS)

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

GS1. Use Formats and check list for Site Readiness planning and reports
GS2. Write emails and messages about site related issues
GS3. Company policy related to Preventive Maintenance
GS4. Monthly down time and resulting production loss
GS5. Use of Work Permit system
GS6. Formats for Preventive Maintenance check sheets, predictive maintenance list
GS7. Describe condition of control valves and accessories and issues to co- workers and supervisor
GS8. Communicate to the management in meetings about maintenance issues which need management attention
GS9. Interact with coworkers and gather information related to process and control valve conditions
GS10. Make decisions about timing and extent of preventive maintenance, in consultation with the Supervisor
GS11. Prioritize daily tasks to conduct Preventive Maintenance effectively
GS12. Understand real needs of the customer and suggest most appropriate solution
GS13. support customer when they need help
GS14. Diagnoses reasons for down time due to control valve failure
GS15. Track recurring failures in control valves and analyses reasons and concludes
GS16. Identify immediate or temporary solutions to resolve delays and discuss with the Supervisor
GS17. Use the existing information to arrive at actionable decision points
GS18. Use the existing information for improving the customer satisfaction
GS19. Use the existing information to optimize solution and company business
GS20. Analyze problems and identify causes and possible solutions
GS21. Apply, analyze, and evaluate the information gathered from observation, experience, reasoning, or communication, as a guide to thought and action
GS22. Anticipate problems, risks and opportunities and utilize these for mitigation and business optimization

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Obtain PM-work permit	**5**	**5**	**-**	**-**
PC1. Obtain work permit (mandatory) from the Process supervisor before commencing maintenance work.	5	5	-	-
Organize PM- Preparatory tasks	**10**	**30**	**-**	**-**
PC2. Organize for the days Preventive Maintenance task which include: Check sheets and related documents Tools and tackles and calibrating equipment Personal protective safety equipment	10	30	-	-
Execute PM Schedule	**10**	**10**	**-**	**-**
PC3. Execute Preventive maintenance jobs as per available Preventive Maintenance Schedule.	10	10	-	-
Prepare PM-Process List	**10**	**10**	**-**	**-**
PC4. Prepare Process list from process supervisor.	10	10	-	-
Plan PM Schedule	**-**	**-**	**-**	**-**
PC5. Plan for next days preventive maintenance schedule	-	-	-	-
Perform PM Visual Checks & Actions	**10**	**20**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC6. Carry out Visual Checks & takes corrective actions wherever possible or else transfer job to shut down list. Check abnormal noise & locates source. Check for abnormal vibration locates source- corrects /informs supervisor. Check for gland leak and arrests .If not possible informs supervisor and transfers to shut down list Check for Instrument air leaks arrests leak-if not possible informs supervisor and transfers to shut down list Check for control valve bonnet and body flange leaks-informs Process supervisor& Instrument supervisor Check for poor electric integrity like exposed terminal and opens enclosure- rectifies. If not permitted informs supervisor& transfer to shut down list Check pneumatic and electric connections to solenoid valve Check for pneumatic connections in Pneumatic transmitters and or I/Pconverters Check for integrity of valve positioners feedback link/connection and rectifies fault after informing Process supervisor Check for environment impact, water ingress/corrosion rectifies fault.Or else .transfers to shut down list. Check for loose bolting and rattling in control valve and accessories including manual operator- rectifies fault	10	20	-	-
Complete PM schedule	**5**	**15**	**-**	**-**
PC7. Complete preventive maintenance schedule list of Field Instrumentation and controls. Close the list.	5	15	-	-
Prepare PRM List	**7**	**8**	**-**	**-**
PC8. Collect and consolidate daily-diagnostic messages from control valves which have a digital valve controller and Smart Transmitters and record the same in either Preventive Maintenance list or Opportunistic shut down list for execution.	7	8	-	-
List PMs to be performed during Shut down	**10**	**15**	**-**	**-**
PC9. Include preventive maintenance jobs during annual shut down or opportunistic shut down list.	10	15	-	-
Follow up PM consolidated list	**5**	**15**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. Follow up on consolidated preventive maintenance list and closes list.	5	15	-	-
NOS Total	**72**	**128**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	IAS/N0301
NOS Name	Preventive Maintenance Process Control
Sector	Instrumentation
Sub-Sector	Instrumentation & Automation
Occupation	Maintenance
NSQF Level	3
Credits	TBD
Version	1.0
Last Reviewed Date	30/07/2016
Next Review Date	30/07/2019
NSQC Clearance Date	03/08/2018

IAS/N2105: Work Effectively With Teams

Description

This NOS 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

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

Create Team Environment

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

PC1. Know and understand the team objectives and goals

PC2. Know team members by name. Greet them appropriately and respond to their greetings.

PC3. Know the roles and responsibilities of team members. Ensure others know about you and your role in the team

PC4. Learn about the culture and preferences of team members especially if they belong to other organizations or nationalities

PC5. Follow organizations policies and procedures for working with team members within and outside the organization especially relating to privacy, confidentiality and security.

PC6. Create an environment of trust and mutual respect

Communicate Give and Receive

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

PC7. Use appropriate mode of communication verbal, written, mail, phone or text and clearly articulate your message to ensure that the recipient understands the message

PC8. Listen to team members and try to understand what they are wanting to say. Seek or provide clarifications if you see any gap in understanding

PC9. Communicate professionally and follow organization protocols. Do not overload the team members with unnecessary and unsolicited information

PC10. Share important information with the team timely.

PC11. Respond to communications promptly.

Work Cooperatively

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

PC12. Perform own role and produce output in time for other team members to consume

PC13. Receive inputs from others and work upon it per role requirement

PC14. Make adjustments within the permissible rules so that work flows smoothly.

PC15. Help team members to perform their role effectively and provide any clarifications and support they need

PC16. Share tools and common resources fairly, taking cognizance of others needs and schedules

PC17. Resolve any contentious issues amicably, involving the team lead or the supervisor if needed

PC18. Let team members know in good time if you cannot carry out your commitments, explaining the reasons and alternate solutions, if any. Let the team lead know about this.

Participate in Team Decision making

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

PC19. Think positively and make constructive suggestions to meet the goals

PC20. Accept and give suggestions with open mind

PC21. Take initiatives and volunteer to contribute

PC22. Help team members with facts and figures to arrive at workable decisions

PC23. Accept decisions professionally and support these, even if these do not match your suggestions and personal views

Demonstrate Sense of Responsibility

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

PC24. Act in the interest of the team and the organization to ensure that things do not fall through the gap and team goals are achieved.

PC25. Take initiative to correct the situation if something seems to be going wrong.

PC26. Seek help or escalate if the situation demands

Show Respect for Opinions, Customs and Preferences

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

PC27. Follow organizations and statutory guidelines about making references or comments to social customs or preferences

PC28. Refrain from making any comments to hurt sentiments

PC29. Accommodate team members preferences to the extent feasible. If these come in the way of fulfilling team goals, discuss with the supervisor/ team leader.

PC30. Seek information and clarifications from others if you do not understand any customs.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. The organizations policies and procedures for working with colleagues, roles and responsibilities in relation to this

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

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

Generic Skills (GS)

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

GS1. Complete written work with attention to detaill
GS2. Read instructions, guidelines/procedures
GS3. Listen effectively and orally communicate information
GS4. Ask for clarification and advice from the concerned person
GS5. Make decisions on a suitable course of action or response keeping in view resource utilization while meeting commitments
GS6. Plan and organize work to achieve targets and deadlines
GS7. Understand real needs of the customer and suggest most appropriate solution
GS8. Support customer when they need help
GS9. Apply problem solving approaches in different situations
GS10. Use the existing information to arrive at actionable decision points
GS11. Use the existing information for improving the customer satisfaction
GS12. Use the existing information to optimize solution and company business
GS13. Analyze problems and identify causes and possible solutions
GS14. Apply balanced judgments to different situations

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Create Team Environment	**6**	**11**	**-**	**-**
PC1. Know and understand the team objectives and goals	1	2	-	-
PC2. Know team members by name. Greet them appropriately and respond to their greetings.	1	1	-	-
PC3. Know the roles and responsibilities of team members. Ensure others know about you and your role in the team	1	1	-	-
PC4. Learn about the culture and preferences of team members especially if they belong to other organizations or nationalities	1	4	-	-
PC5. Follow organizations policies and procedures for working with team members within and outside the organization especially relating to privacy, confidentiality and security.	1	1	-	-
PC6. Create an environment of trust and mutual respect	1	2	-	-
Communicate Give and Receive	**5**	**10**	**-**	**-**
PC7. Use appropriate mode of communication verbal, written, mail, phone or text and clearly articulate your message to ensure that the recipient understands the message	1	1	-	-
PC8. Listen to team members and try to understand what they are wanting to say. Seek or provide clarifications if you see any gap in understanding	1	2	-	-
PC9. Communicate professionally and follow organization protocols. Do not overload the team members with unnecessary and unsolicited information	1	3	-	-
PC10. Share important information with the team timely.	1	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. Respond to communications promptly.	1	2	-	-
Work Cooperatively	**7**	**8**	**-**	**-**
PC12. Perform own role and produce output in time for other team members to consume	1	2	-	-
PC13. Receive inputs from others and work upon it per role requirement	1	1	-	-
PC14. Make adjustments within the permissible rules so that work flows smoothly.	1	1	-	-
PC15. Help team members to perform their role effectively and provide any clarifications and support they need	1	1	-	-
PC16. Share tools and common resources fairly, taking cognizance of others needs and schedules	1	1	-	-
PC17. Resolve any contentious issues amicably, involving the team lead or the supervisor if needed	1	1	-	-
PC18. Let team members know in good time if you cannot carry out your commitments, explaining the reasons and alternate solutions, if any. Let the team lead know about this.	1	1	-	-
Participate in Team Decision making	**5**	**7**	**-**	**-**
PC19. Think positively and make constructive suggestions to meet the goals	1	1	-	-
PC20. Accept and give suggestions with open mind	1	1	-	-
PC21. Take initiatives and volunteer to contribute	1	1	-	-
PC22. Help team members with facts and figures to arrive at workable decisions	1	1	-	-
PC23. Accept decisions professionally and support these, even if these do not match your suggestions and personal views	1	3	-	-
Demonstrate Sense of Responsibility	**3**	**5**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC24. Act in the interest of the team and the organization to ensure that things do not fall through the gap and team goals are achieved.	1	3	-	-
PC25. Take initiative to correct the situation if something seems to be going wrong.	1	1	-	-
PC26. Seek help or escalate if the situation demands	1	1	-	-
Show Respect for Opinions, Customs and Preferences	**4**	**4**	**-**	**-**
PC27. Follow organizations and statutory guidelines about making references or comments to social customs or preferences	1	1	-	-
PC28. Refrain from making any comments to hurt sentiments	1	1	-	-
PC29. Accommodate team members preferences to the extent feasible. If these come in the way of fulfilling team goals, discuss with the supervisor/ team leader.	1	1	-	-
PC30. Seek information and clarifications from others if you do not understand any customs.	1	1	-	-
NOS Total	**30**	**45**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	IAS/N2105
NOS Name	Work Effectively With Teams
Sector	Instrumentation
Sub-Sector	Instrumentation & Automation
Occupation	Maintenance
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	30/07/2016
Next Review Date	30/07/2019
NSQC Clearance Date	03/08/2018

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 center (as per assessment criteria below).

4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center 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

Recommended Pass % : 70

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
IAS/N0103.Task Reporting - Process Control	45	55	-	-	100	15
IAS/N0105.Safety, Health and Environment Process Control	25	25	-	-	50	10
IAS/N0300.Site Readiness and Instrument Usability - Process Control	89	111	-	-	200	30
IAS/N0301.Preventive Maintenance Process Control	72	128	-	-	200	35

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
IAS/N2105.Work Effectively With Teams	30	45	-	-	75	10
Total	**261**	**364**	**-**	**-**	**625**	**100**

Acronyms

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

Glossary

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

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
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.