APPRENTICESHIP CURRICULUM (OPTIONAL TRADE)

Hydrocarbon Sector Skill Council

Process Instrument Technician (Oil & Gas)

Course Code: CO012400026

☒**NAPS** ☐**Non-NAPS**

NSQF Level: 4

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Course Details

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<tr><td>2.</td><td>Course Code</td><td>CO012400026</td></tr>
<tr><td>3.</td><td>Apprenticeship Training Duration:
(2 to 4 weeks of BT is embedded in this duration as per the requirement of the establishment)</td><td>Months: 12 months</td></tr>
<tr><td></td><td>Remarks</td><td></td></tr>
<tr><td>4.</td><td>Credit</td><td>40</td></tr>
<tr><td>5.</td><td>NSQF Level (Mandatory for NAPS)</td><td>4 NSQC Approval Date: 29/09/2023</td></tr>
<tr><td>6.</td><td>Related NSQF aligned qualification details</td><td>
<table>
<tr><th>S. No.</th><th>QP/ Qualification/ NOS Name (As applicable)</th><th>QP/ NOS Code & Version</th><th>NQR Code</th></tr>
<tr><td>1</td><td>Process Instrument Technician (Oil & Gas)</td><td>HYC/Q06201 & Version 2.0</td><td>QG-04-HC-01019-2023-V2-HSSCI</td></tr>
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</td></tr>
<tr><td>7.</td><td>Brief Job Role Description</td><td>The individual in this position is responsible for monitoring and operation of instruments and control equipment installed at oil and gas setup like gas processing plants, oil refineries, fertilizer plants, chemical process plants, gas/oil pipelines, compressor stations etc. The person monitors, adjusts and maintains processing units and equipment in field as well as in control room in calibration and installation in accordance with approved procedures.</td></tr>
<tr><td>8.</td><td>NCO-2015 Code & Occupation (Access the NCO 2015 volumes from:</td><td>NCO-2015/7311.0101</td></tr>
<tr><td>9.</td><td>Minimum Eligibility Criteria
(Educational and/ or Technical Qualification)</td><td>Completed 2nd year of the 3-year Diploma (after 10th) in engineering trade
OR
10th Grade Pass plus 2-year of National Trade Certificate (NTC) in engineering trade
OR
8th Grade pass plus 2-years of NTC plus 1-year NAC
OR
12th Grade Pass
OR
11th Grade pass with 1- year of relevant experience</td></tr>
</table>

		OR 10th Grade pass with 2-years relevant experience OR Previous relevant Qualification of NSQF Level 3.5 with 1.5-year relevant experience OR Previous relevant Qualification of NSQF Level 3.0 plus 3-year of relevant experience
10.	**Entry Age for Apprenticeship**	18 Years
11.	**Any Licensing Requirements** (*wherever applicable*)	NA
12.	**Is the Job Role amenable to Persons with Disability**	**☐ Yes ☒ No** **If yes, check the applicable type of Disability** **☐ Locomotor Disability** **☐ Leprosy Cured Person** **☐ Cerebral Palsy** **☐ Dwarfism** **☐ Muscular Dystrophy** **☐ Acid Attack Victims** **☐ Blindness** **☐ Low Vision** **☐ Deaf** **☐ Hard of Hearing** **☐ Speech and Language Disability** **☐ Intellectual Disability** **☐ Specific Learning Disabilities** **☐ Autism Spectrum Disorder** **☐ Mental Illness** **☐ Multiple Sclerosis** **☐ Parkinson's Disease** **☐ Haemophilia** **☐ Thalassemia** **☐ Sickle Cell Disease** **☐ Multiple Disabilities**
13.	**Submitting Body Details**	**Name: Hydrocarbon Sector Skill Council** **E-mail ID: ceo@hsscindia.in** **Contact Number: 9872176558**

14.	**Certifying Body**	Hydrocarbon Sector Skills Council
15.	**Employment Avenues/Opportunities**	Oil & Gas sector
16.	**Career Progression**	Process Instrument Assistant Technician
17.	**Trainer's Qualification & Experience:**	Diploma (after 12th) in Electrical/Chemical/Petroleum with 2 years of experience in relevant field and 1 year of training experience in relevant field.
18.	**Curriculum Creation Date**	25/01/2024
19.	**Curriculum Valid up to Date**	24/01/2027

Module Details

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
1.	**NOS Name –** Perform custody transfer metering **NOS Code -** HYC/N6201 **Version –** 2.0	**Bridge Module -** Introduction to the Hydrocarbon Sector • Describe the oil and natural gas sector and its subsectors. • Explain the importance of Energy Transition and usage of clean fuel • Explain the importance of a Process Instrument technician. • Explain the roles and responsibilities of compressed biogas plant operator. • Explain general discipline in the classroom (Do's & Don'ts) **Carry out Custody transfer metering activity** • Describe how to identify type of custody flow meter - eg- Turbine, Ultrasonic, Coriolis and principle of their operation • Describe how to check installation as per design considerations like maximum/minimum operating process parameters of the fluid, the general characteristics of the fluid, ambient conditions and location of skid • Describe how to check installation as per design consideration for uni-directional or bi-directional flow • Describe how to read general arrangement design for flowmeter skid as per the selected type of flowmeter • Describe how to apply relevant standard while installing flow meter depending on the type - eg - American. • Describe how to Gas Association (AGA) report 7 for turbine flowmeter, AGA report 9 for ultrasonic flowmeter etc.	**35**	**65**	70	70

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Describe how to interpret installation requirements for auxiliary instruments as per standard. • Describe how to identify upstream and downstream header piping and pipe components as per relevant standard specifications eg- straight run requirements, flow condition etc. • Describe how to identify material of construction (MOC) and corrosion resistance of the materials used, hot/cold insulation requirements. • Describe how to check meter body, bore, tapping, electronic housing, ports and cable entry as per relevant standard recommendations for the hazardous zone classification • Describe how to follow Original Equipment Manufacturer (OEM) recommendations specific for the installation of flowmeter e.g.- electro-magnetic interference, skid vibration limits etc. • Explain how to observe the physical condition of upstream & downstream piping, pipe components, hot/cold insulation, auxiliary instruments • • Explain how to analyse process parameters and their variation over time, sudden peak or fluctuations • Explain how to interpret flowmeter parameters, various component status, self-diagnostics, alarms and events logging				

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Explain how to analyze input sensor status, output signals and process diagnostic parameter and history trends • Explain how to verify meter reading using meter prover system • Explain how to perform leak test on joints, tapings, flanges, gasket etc • calibrate custody meter periodically as per standard requirement • Explain how to check configuration database, calibration constant, meter dimensions, parameter constant values, time averaging and sampling rate, hysteresis, flow cut-offs etc. and record it in calibration report As-found • Explain how to check and record line condition values on display such as flowrate, velocity, meter diagnostic parameters like gain, performance, signal t noise ratio etc. • Explain how to undertake zero flow verification with wet or dry calibration • Explain how to calculate error by comparing reading with reference/master flowmeter • Explain how to implement appropriate error correction method like flow weighted mean average, second order polynomial or piecewise linearization • Explain how to calculate calibration constants for meter configuration and prepare calibration report • Explain how to record configuration parameters				

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Explain how to calibrate auxiliary instruments like pressure & temperature transmitter, gas chromatograph etc. • Explain how to perform auto calibration setting and configuration for gas chromatograph • Explain how to validate calculations and constants used in flow-computer • Explain how to trace master calibration instruments used • Explain how to prepare spare parts list for repairing tools and special tools • Explain how to analyse OEM factory calibration report, factory configuration and calibration constants report. • Explain how to facilitate third party to witness calibration report based on as-found and as-left parameter records • Explain how to validate the calculation of flowmeter and calibration reports of Pressure Transmitter (PT), Temperature Transmitter (TT) and Gas chromatograph (GC) • Explain how to analyses reports specific to the type of flowmeter chosen like speed of sound and test report for ultrasound meter as per AGA report 10 • Explain how to perform repeatability test results for GC • Explain how to upgrade firmware, hardware and related parts replacement • Explain how to maintain diagnostic software upgradation				

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
2.	**NOS Name-** Maintain & calibrate pressure Safety Valves (PSV) **NOS Code** - HYC/N6202 **Version -** 2.0	• Describe how to obtain proper work permit from operation. • Describe how to know availability of proper non-sparking tools • Describe how to ensure proper PPEs are used while carrying out the job. • Describe how to information proper isolation of the safety valve from the process line and communicate the status to process department. • Describe how to How remove PSV from line with applicable safety permits & precautions. • Describe how to provide necessary blind after removal of PSV. • Describe how to check any hydrocarbon gas leakage by Lower Explosive Limit (LEL) meter. • Visual inspection for damage or wear. • Functionality testing for smooth operation. • Verify set pressure against specifications. • Measure and validate blowdown parameters. • Conduct seat tightness testing. • Compare performance to calibrated reference standard. • Maintain detailed documentation and records. • Adhere to regulations and standards. • Follow safety precautions. • Ensure proper training and competency. • calibrate pressure gauges used for Calibration of PSV with secondary master test equipment. • fix PSV on test bench, check all connections and pressurize the system near Cold Differential Set Pressure CDSP level (as provided in data sheet)	**15**	**35**		

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• test pressure safety valve for Popping at its cold differential set pressure (CDSP) value.				
3.	**NOS Name-** Calibrate LEL gas detector **NOS Code** - HYC/N6203 **Version -** 2.0	• proper work permit from operations team. • check healthiness of cylinder pressure regulator and flow meter • check LEL cylinder gas composition and validity certificate. • implement hazard control measures and use of appropriate personal protective equipment (PPE) • purge the detector with air and observe the reading on the display unit as applicable. If required, adjust the zero reading. • check the execution of alarm 1 (set as 20% of reading) and alarm 2 (set as 60% of reading) and adjust respective pot-meters, if required • check LEL detector and ensure junction box is thoroughly inspected for any abnormality. • check the following: a. 24V DC supply indicator and alarm indicator. If not, check for blown fuse or power supply from control room (Type 1) b. Head Voltage (2V DC). If required, adjust voltage from control module installed in control room (Type2) • purge the detector with air and observe the reading on the display unit as applicable. If required, adjust the zero reading. • apply calibration gas, as applicable, to the detector and observe the reading on the display as per gas concentration. If required, adjust by span reading. • apply suitable correction factors for the intended LEL application as per OEM manual.	**20**	**30**		

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
4.	**NOS Name-** Carry out inspection, calibration and maintenance of instruments and control equipment in oil and gas setup. **NOS Code** - HYC/N6204 **Version -** 1.0	• Explain how to check the steadiness of the tools and equipment used for inspection. • Explain how to physically inspect the instruments for wear and tear or damage • Explain how to check the instrument for defects using testing equipment. • Explain how to analyze the reading and compare reading with defined standards. • Explain how to note the deviation in reading in logbook. • Explain how to clean the equipment to remove dirt or debris. • Explain how to lubricate the moving parts of the equipment. • Explain how to perform adjustments in the device using calibration instruments. • Explain how to test the device to ensure the proper functioning • Explain how to check the readings of device with standard parameters • Explain how to collect the instrument and equipment readiness report from maintenance department • Explain how to set parameters in the control equipment and instruments as per instruction • Explain how to monitor the reading in the instruments • Explain how to follow emergency procedure as per the SOP • Explain how to report any deviations in project activities to the concerned authority	**20**	**30**		

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Explain how to record all accidents and mishaps during project execution life cycle • Explain how to conduct internal and external audit periodically and maintain record • Explain how to maintain records of disposed and non-usable/expired/damaged goods as per company policy				
5.	**NOS Name**-Working effectively in a team **NOS Code** - HYC/N9301 **Version -** 3.0	**Effective team work** • Describe methods to communicate clearly with the colleagues, supervisor and reporting authorities • Explain how to share information in line with organizational requirements • Explain the importance of supporting and respecting colleagues and other members of the organization without any bias based on gender, culture, disability etc. • Demonstrate ways to handle interpersonal conflict at the workplace • Explain how to inform team members timely, if timelines can't be met • Describe ways/methods to resolve interpersonal conflict • Explain the importance of gender-neutral behavior while interacting with others	**20**	**30**		
3	**NOS Name-Maintain health, safety and security procedures**	**Practice health and safety measures** • Explain importance of using PPE like face mask, hand gloves, goggle, protective clothing/equipment, etc. at workplace.	**20**	**30**		

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
	NOS Code - HYC/N9302 **Version -** 3.0	• Explain how to monitor the health and safety of self and other team members • Explain how to identify possible causes of risk or accident in the workplace • Explain the hazard and risk associated with mishandling various tools and equipment. • Show the correct way to lift heavy objects. • Demonstrate how to follow safety signages **Follow fire safety procedures** • Demonstrate how to use fire extinguishers • Demonstrate various rescue techniques • Explain the good housekeeping practices to prevent any hazard • Describe list issues concerning the safety in work place • Explain how to record and report all incidents, damages or injury • Explain how to follow the applicable regulations and codes as per safety standard • Describe how to prepare incident reports. **Follow emergencies, rescue and first-aid procedures** • Explain how to provide appropriate first aid to victims in an emergency situation • Demonstrate basic techniques of bandaging • Demonstrate how to respond promptly and appropriately to an accident				

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Perform rescue activity during an accident in real or simulated environments • Demonstrate correct method to rescue injured people and others during an emergency				
	NOS Name- Employability Skills **NOS Code** - *DGT/VSQ/N0101* **Version -** 1.0	• Introduction to Employability Skills • Constitutional Values – Citizenship • Becoming a Professional in the 21st Century • Basic English Skills • Communication Skills • Financial and Legal Literacy • Essential Digital Skills • Diversity & Inclusion • Career Development & Goal Setting • Customer Service • Getting Ready for Apprenticeship & Jobs	**20**	**30**		
	Total Marks		**150**	**250**	**70**	**70**

Glossary

Term	Description
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 andinterests.
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 organization.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in theworkplace, 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 toperform 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 adatabase 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 that together specify the technical, generic, professional and organizational specific knowledge that an individual need in order to perform to the required standard.
Organizational Context	Organizational context includes the way the organization 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'sworld. 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 atleast 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.

Acronyms

Acronym	Description
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
OS	Occupational Standard(s)
QP	Qualifications Pack
KU	Knowledge and understanding
GS	Generic Skills
DMA	Direct Marketing Agent
PNG	Piped Natural Gas
FAQ	Frequently Asked Questions
BP	Business Partner
KYC	Know Your Consumer
FAB	Feature Advantage Benefit

Annexure 1: Tools and Equipment

List of Tools and Equipment

The tools and equipment required are:

S. No.	Tool / Equipment Name	Specification
1	Flow meters, Pressure transmitters, Temperature sensor, Analyzers, Sampling equipment, Calibration standards, Communication devices, Safety equipment, Maintenance tools Documentation and record-keeping requirements.	NA
2	Flashlight, Magnifying glass, Inspection mirror, Pressure gauges, Relief valve test bench, Simulated relief scenario setup, Reference standards, Pressure calibrators, Adjustment tools, Vernier calipers, Micrometers, Pressure transducers, Leak test equipment, Logbooks, Data sheets, Safety glasses, Gloves, Protective clothing, Compliance documents, Manuals, Guidelines, Reference books, Workshop, Ventilation.	NA
3	Calibration gas, Calibration gas regulator, Calibration adapter or cap, Calibration station or kit, Screwdriver or adjustment tool, Clean air source, Personal protective equipment (PPE)	NA

Classroom Aids

The aids required to conduct sessions in the classroom are:

1 Projector
2 Computer/laptops
3 Internet connectivity
4 Whiteboard

Annexure 2: Assessment Strategy

This section includes the processes involved in identifying, gathering, and interpreting information to evaluate the apprentice on the required competencies of the program.

The overall assessment strategy and specific arrangements, which have put in place to ensure that assessment is always valid, reliable and fair andshow that these are in line with the requirements of the NSQF.

The assessment of candidates/trainees will be on the basis on assessment outcome/assessment criteria of the Qualification. In the assessment criteria for each NOS marks have been defined for theoretical and practical skills, on which the candidate will be assessed. The emphasis is on 'learning-by-doing' and performance criteria is based on the practical demonstration of skills and knowledge.

Theory/Knowledge test – This section will test the trainee on his/her knowledge on the subject/trade. The test will be carried out online/offline with a set of random Question paper that include multiple choice questions in multilingual, True/False Statement, audio-video question etc. The Question Bank will be developed by Subject Matter Experts (SME) of the hydrocarbon sector and these questions again be vetted by the Industry Experts, each performance criteria have its marks for theory based on the level of question i.e. easy, medium and difficult.

Practical/Demonstration Test – This stage involves the face-to-face interaction between Assessor and each trainee. The practical knowledge will be tested through trade test which demonstrates the skill required for the job, by which assessor would be able to evaluate the trainee for his/her practical knowledge on respective Qualification.

To ensure the maximum possible consistency in the assessment by different assessors at different locations, orientation of the assessors is also required about the stages involved in the assessment and the assessor role in the assessment process. The assessor must have knowledge of the following concepts before assessment:

- Qualification Pack Structure
- Guidance for the assessor to conduct theory and practical assessments
- Guidance for trainees to be given by assessor before the start of the assessments.
- Guidance on assessments process, practical brief with steps of operations practical observation checklist

- Practical/Demonstration Test guidance for uniformity and consistency.
- Guidance on assessment evidence collection (signed attendance copy, verification of the authenticity of the candidate by checking the photo IDcard, Photographs-while assessment undergoing etc.)

The empaneled assessment agencies will be instructed to hire assessors with integrity, reliability and fairness. Each assessor shall sign a document withits assessment agency by which they commit themselves to comply with the rules of confidentiality and conflict of interest, independence from commercial and other interests that would compromise impartiality of the assessments. The assessment agencies are instructed to ideally have assessor with sufficient amount of relevant industry experience related to Qualification. The assessors will also have scrutinized and have to undergo orientation of assessment framework, competency-based assessments etc.

Annexure 3: Mode of Training

The following Modules/NOS may also be delivered online for which the resources are provided in the given table.

S. No.	Module Name/NOS Name (As Per Curriculum)	Name of Mapped Online Component	URL of Mapped Online Component
	NA	NA	NA

Infra requirement:

- **NA**