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PRECISION INSTRUMENTATION

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TRAINER GUIDE

National Vocational Certificate Level 3

Version 1 - July, 2019

NAVTTC

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become competent in the required areas. This, in turn, contributes to improved efficiency where training and assessment are concerned.

3. **Increased productivity**

   When trainees become competent in the competence standards that their own industry has defined, when they know what the performance expectations are and receive recognition for their abilities through successful assessments, they are likely to be more motivated and experience higher job satisfaction. The result is improved productivity for organizations. The communication and constructive feedback between future employers and employees will improve as a result of a competence-based approach, which can also increase productivity.

4. **Reduced risk**

   Using a competence-based approach to training, development, and assessment, employers are able to create project teams of people with complementary skills. A trainee's record of the skills, knowledge and understanding relating to the competence standards they have achieved can be used by a future employer to identify and provide further relevant training and assessment for new skills areas. Competence standards can shape employee development and promotional paths within an organization and give employees the opportunity to learn more competencies beyond their roles. It can also provide organizations with greater ability to scale and flex as needed, thereby reducing the risk they face.

5. **Increased customer satisfaction**

   Employees who have been trained and assessed using a competence-based approach are, by the definition of the relevant competence standards, able to perform the required tasks associated with a job. The knock-on effect is that, in service-related industries, they are able to provide high service levels, thereby increasing customer satisfaction. In production or manufacturing industries, they are able to work closely to industry standards in a more effective and efficient way.

Lesson plans

This manual provides a series of lesson plans that will guide delivery of each module for the *Precision Instrumentation* qualification. It is important for trainers to be flexible and be ready to adapt lesson plans to suit the context of the subject and the needs of their trainees.

Good teachers acknowledge that CBT means each and every trainee in the class learns at a different speed. The good teacher is prepared to throw aside the day's lesson plan and do something different (and unplanned) for the class even if it means 'writing' a lesson plan for each trainee to match their learning pace for that day or week.

Learning by doing is different from learning theory and then applying it. To learn to do something, trainees need someone looking over their shoulder saying 'it's not quite like that, it's like this', and 'you do it like this because …', or even 'tell me why you chose to do it like this?'

In this way, trainees learn that theoretical knowledge is meaningless if it is not seen in the context of what they are doing. In other words, if a trainee doesn't know why they do something, they will not do it competently (skills underpinned by knowledge = competent performer).

This is how a *Precision Instrumentation* acquires a practical grasp of the standards expected. It's not by learning it in theory, but because those standards are acquired through correction by people who show what the standards are, and correct the trainee where they do not meet those standards, and where they repeat it correction until they have internalized those standards.

Demonstration of skill

Demonstration or modeling a skill is a powerful tool, which is used, in vocational training. The instructions for trainers for demonstration are as under:

a) Read the procedure mentioned in the Trainer Guide for the relevant Learning Unit before demonstration.
b) Arrange all tools, equipment and consumable material, which are required for demonstration of a skill.
c) Practice the skill before demonstration to trainees, if possible.
d) Introduce the skill to trainees clearly at the commencement of demonstration.
e) Explain how the skill relates to the skill(s) already acquired and describe the expected results or show the objects to trainees.
f) Carry out demonstration in a way that can be seen by all trainees.
g) Use the same tools and materials that the learner will be using.
h) Go through EACH of the steps involved in performing the skill.
i) Go SLOWLY - describe each step as it is completed.
j) Encourage the learners to move around and watch what you are doing from a number of different angles.
k) Identify critical or complex steps, or steps that involve safety precautions to be followed.
l) Explain theoretical knowledge where applicable and ask questions to trainees to test their understanding.
m) Try to involve the learners: Ask them questions about why they think the process may work that way.
n) Repeat critical steps in demonstration, if required.
o) Summarize the demonstration by asking questions to trainees.

Involvement in the process (actively seeing) is important at this stage. When you work on getting involved, getting people to participate, you make them a part of what is happening. Questions for clarification or explanation are important throughout the demonstration. It is up to the learners to ask questions about things they do not understand, but it is also important for trainers to seek out and elicit questions from learners. A trainer may need to do repeated demonstrations of difficult or complex skills.

Frequently Asked Questions

1. What is Competency Based Training (CBT) and how is it different from currently offered trainings in institutes?	Competency-based training (CBT) is an approach to vocational education and training that places emphasis on what a person can do in the workplace as a result of completing a program of training. Compared to conventional programs, the competency based training is not primarily content based; it rather focuses on the competence

	requirement of the envisaged job role. The whole qualification refers to certain industry standard criterion and is modularized in nature rather than being course oriented.
2. What is the passing criterion for CBT certificate?	You shall be required to be declared “Competent” in the summative assessment to attain the certificate.
3. How can I progress in my educational career after attaining this certificate?	You shall be eligible to take admission in the National Vocational Certificate Level-4 in Precision Instrumentation; and take admission in a level-5, DAE or equivalent course. In certain case, you may be required to attain an equivalence certificate from The Inter Board Committee of Chairmen (IBCC).
4. What is the importance of this certificate in National and International job market?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). These standards are also recognized worldwide as all the standards are coded using international methodology and are accessible to the employers worldwide through NAVTTC website.
5. Which jobs can I get after attaining this certificate? Are there job for this certificate in public sector as well?	You shall be able to take up jobs as Industrial Precision Instrumentation, pipe fabricator (within limitations), plumbing foreman and supervisor in the functions of installing pumps, pipe fixtures, testing and maintaining of pipe lines.
6. What are possible career progressions in industry after attaining this certificate?	You shall be able to progress up to the management level after attaining sufficient experience, knowledge and skills during the job. Attaining additional relevant qualifications may aid your career advancement to even higher levels.
7. Is this certificate recognized by any competent authority in Pakistan?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). The official certificates shall be awarded by the relevant certificate awarding body.
8. Is on-the-job training mandatory for this certificate? If yes, what is the duration of on-the-job training?	On-the-job training is not a requirement for final / summative assessment of this certificate. However, taking up on-the-job training after or during the course work may add your chances to get a job

	afterwards.
9. What is the examination / assessment system in this program?	Competency based assessments are organized by training institutes during the course which serve the purpose of assessing the progress and preparedness of each student. Final / summative assessments are organized by the relevant qualification awarding bodies at the end of the certificate program. You shall be required to be declared “Competent” in the summative assessment to attain the certificate.
10. Does this certificate enable me to work as freelancer?	You can start your small business as a Precision Instrumentation. You may need additional skills on entrepreneurship to support your initiative.

Overview of the program

Course: Precision Instrumentation Lev 3	**Total Course Duration:** 6 months
Course Overview:	
Precision instrument technicians maintain and repair delicate equipment and need to have a steady hand and excellent eyes to work with the tiny gears and parts of these instruments. Instrumentation can be broadly defined as any automated machine used to facilitate industries related to science and technology, such as engineering, medicine, or scientific laboratory research. Instrument technicians maintain and repair these devices, as well as ensure that they comply with industry standards. Technicians often are on call or work overtime.	

Module	Learning Unit	Duration
Module 1:Ensure Health, hygiene and safety of other individuals at work **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to ensure health, hygiene & safety of the trainee and others at work	LU1 Identify what can harm people in your workplace LU2 Identify who might be harmed LU3 Ensure health, hygiene and safety of individuals at work	40 Hrs
Module 2: Perform Benchwork **Aim:** The aim of this module is to develop knowledge, skills and understanding to perform bench work.	LU1 Perform sawing LU2 Perform filing LU3 Perform drilling LU4 Perform hand taping LU5 Perform hand reaming LU6 Perform counter boring LU7 Perform countersinking	90 Hrs

Module	Learning Unit	Duration
Module 3: Fabricate piping & tubing system **Aim:** The aim of this module is to develop knowledge, skills and understanding to fabricate piping & tubing system	LU1 Interpret drawings/ layouts LU2 Prepare work area LU3 Bend/ Cut pipes & tubes LU4 Perform threading LU5 Braze pipes LU6 Make welded joints through arc welding LU7 Install pipelines	150 Hrs
Module 4: Install & Commission Instruments **Aim:** The aim of this module is to develop knowledge, skills and understanding to install & commission instruments.	LU1 Install & commission temperature instruments LU2 Install & commission pressure instruments LU3 Install & commission level instruments LU4 Install & commission flow instruments LU5 Recommission process loop	180 Hrs
Module 5: Calibrate Instruments **Aim:** The aim of this module is to develop knowledge, skills and understanding to calibrate instruments.	LU1 Calibrate Temperature Instruments LU2 Calibrate Pressure Instruments LU3 Calibrate Level Instruments LU4 Calibrate Level Instruments	180 Hrs
Module 6: Communicate at workplace **Aim:** The aim of this module is to develop knowledge, skills and understanding to communicate at workplace	LU1 Communicate within the organization LU2 Communicate outside the organization	40 Hrs

Lesson Plan Template

Time	Content	Tutor activity	Learner activity	Resources	Outcomes / Assessment
	Introduction				
	BREAK				
	Conclusion				

Lesson Plan Template - EXAMPLE

Time	Content	Tutor activity	Learner activity	Resources	Outcomes / Assessment
	Introduction	State the learning objectives for this lesson (Install centrifugal pump). Link this to the previous lesson (Install mono-block pump) and ask questions for learners to check their prior knowledge and to arouse the interest and motivation	Answer questions about the previous lesson Ask questions as required about the learning objectives for this lesson	Flip chart or similar listing the learning objectives for this lesson	Question and answer
	Presentation	Introduce, explain and demonstrate procedure to Install centrifugal pump. Highlight special precautions and safety aspects.	Make notes for the installation procedure of of centrifugal pump	Appropriate tools and equipment Appropriate consumable material Personal protective clothing	Question and answer
	BREAK				
	Practical	Observe learner's practical activities and support as appropriate	Practice skills in using equipment and tools independently to install centrifugal pump with appropriate consumable material	Appropriate tools and equipment Appropriate consumable material Learner's own notes Personal protective clothing	Observation Question and answer Self-assessment Peer assessment

Time	Content	Tutor activity	Learner activity	Resources	Outcomes / Assessment
	Conclusion	Lead feedback session with discussion and question and answer Ask learners to complete self-assessment form	Provide feedback on the activity Test installation of piping Complete self-assessment form Ask questions	Completed installation of pump by learners	Question and answer Self-assessment forms Completed installation of pump by learners

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Module-1
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Trainer's guidelines

Module 1: Ensure health, hygiene and safety of other individuals at work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Identify what can harm people in your workplace		Class or demonstration room Workshop Or Professional field work in domestic building and industrial complex	Pen/ Pencils Papers Printers Notebook/ note pads Computer Multimedia Projectors USB White board Markers Dusters PPE'S
LU 2: Identify who might be harmed		Class or demonstration room or Workshop Or Professional field work in domestic building and industrial complex	

Module 1: Ensure health, hygiene and safety of other individuals at work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 3: Ensure health, hygiene and safety of individuals at work		Class or demonstration room or Workshop Or Professional field work in domestic building and industrial complex	

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Module 2: 0714001033 Perform bench work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Perform sawing	Deliver an illustrated presentation about perform sawing operation. Ensure that the presentation focuses on the following key points: • Different types of hacksaw blades and its uses • Material of hacksaw blades • Interpret basic engineering drawing • Types and application of clamping devices • Types of material (i.e. M.S, Copper, Brass etc.) • Properties of material • Standard procedure of sawing i.e. gesture, griping, stroking etc • The importance of PPEs when carrying out sawing. • Importance of health and safety Use appropriate resources (see Media column) to reinforce various points. After presentation, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to demonstrate their knowledge and skills relating to how to perform sawing in a practical environment. Ensure that learners have the opportunity to ask questions to support their understanding.	Classroom or demonstration room Workshop Professional field work in domestic building and industrial complex	MS flat / Round Vernier caliper (0-150mm) Steel rule (0-300mm) Tri square (0-100mm) Scriber Marking ink Hacksaw blades (18-24 TPI) Hacksaw frame Bench vices 4 inches Divider Computer Speakers Multimedia projector Logbook Handbooks Design books/ Sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils Different tgs and locks

Module 2: 0714001033 Perform bench work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			WD-40
LU 2: Perform filing	Deliver an illustrated presentation about perform filing operation. Ensure that the presentation focuses on the following key points: • File types according to length, cross-section, roughness • Uses of different file types • Standard procedure of filing i.e. gesture, griping, stroking etc • Filing operation for different materials • The importance of PPEs when carrying out filing. • Importance of health and safety Use appropriate resources (see Media column) to reinforce various points. After presentation, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to demonstrate their knowledge and skills relating to perform filing in a practical environment. Ensure that learners have the opportunity to ask questions to support their understanding.	Classroom/Demonstration room workshop Professional field work in domestic building and industrial complex	MS flat bar Vernier caliper (0-150mm) Steel rule (0-300mm) Tri square (0-100mm) Bevel protector Files of different shapes, size, cut and coarseness Scriber Marking ink Bench vices 4 inches Emery paper (200-400) Computer Speakers Multimedia pojector Logbook Handbooks Design books/ Sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors

Module 2: 0714001033 Perform bench work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Color pencils Different tags and locks WD-40
LU 3: Perform drilling	Deliver an illustrated presentation about perform drilling operation. Ensure you focus on the following key points: • Types of drill machines • Major parts of drill machines • Types of metal i.e. Ferrous and non-ferrous • Types of drill bits • Cutting speed of common engineering materials • Calculation method for RPM • Steps to perform drilling • The importance of PPEs when carrying out drilling • Importance of health and safety Use appropriate resources (see Media column) to reinforce various points. After presentation, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to demonstrate their knowledge and skills relating to perform drilling in a practical environment.	Classroom/Demonstration room workshop Professional field work in domestic building and industrial complex	MS flat bar Steel rule (0-300mm) Tri square (0-100mm) Centre & dot punch Scriber Marking ink Hammer (ball peen 250gm) Hand vices 4 inches Bench type drill machine Drill chuck Coolant Computer Speakers Multimedia projector Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter

Module 2: 0714001033 Perform bench work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Ensure that learners have the opportunity to ask questions to support their understanding.		Scissors Color pencils Different tags and locks WD-40

LU 4: Perform hand taping	Deliver an illustrated presentation about perform hand taping operation. Ensure you focus on the following key points:
	• Types of thread
	  ○ Metric
	  ○ British
	  ○ Withworth
	  ○ American National
	  ○ Pipe thread
	• Types of taping
	• Equipment / tools used to perform tapping
	• Utility of taps:
	  ○ Internal threading
	  ○ Cleaning threads
	  ○ Maintenance of threads
	  ○ Extraction of tap
	• Procedures of hand taping
	• The importance of PPEs when carrying out hand taping.
	• Importance of health and safety
	
	Use appropriate resources (see Media column) to reinforce various points.
		Classroom/Demonstration room
		workshop
		Professional field work in domestic building and industrial complex
			MS flat bar
			Vernier caliper (0-150mm)
			Steel rule (0-300mm)
			Tri square (0-100mm)
			Centre & dot Punch
			Scriber
			Marking ink
			Hammer (Ball Peen 250gm)
			Drill bits of different sizes (4-20mm)
			Bench vices 4 inches
			Bench type drill machine
			Drill chuck
			Wire brush
			Coolant
			Tap set with handle (M3-M12)
			Computer
			Speakers
			Multimedia projector
			Logbook

Module 2: 0714001033 Perform bench work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	After presentation, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to demonstrate their knowledge and skills relating to perform hand taping in a practical environment. Ensure that learners have the opportunity to ask questions to support their understanding.		Handbooks Design books/ Sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color encils Different tags and locks WD-40
LU 5: Perform hand reaming	Deliver an illustrated presentation about perform hand reaming operation. Ensure you focus on the following key points: • Drill size for reaming • Types of reamer • Purpose of reaming • Tolerance and fits • Procedure of hand reaming • The importance of PPEs when carrying out hand reaming operation. • Importance of health and safety Arrange a question and answer session to clarify trainees understanding. After presentation, demonstrate the above stated competence for better understanding of the trainees.	Classroom/Demonstration room Workshop Professional field work in domestic building and industrial complex	Vernier Caliper (0-150mm) Steel Rule (0-300mm) Inside/ outside caliper Tri Square (0-100mm) Centre & Dot Punch Scriber Marking Ink Hammer (Ball Peen 250gm) Drill bits of different sizes (4-20mm) Bench vices 4 inches Bench type drill machine Drill chuck Hand reamers with handle (8-

Module 2: 0714001033 Perform bench work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Learners must be able to demonstrate their knowledge and skills relating to perform hand reaming in a practical environment.		16mm) Computer Speakers Multimedia Projector Logbook Handbooks Design Books/ Sheets Pencils Erasers Pencil Sharpeners Paper Cutter Scissors Color Pencils Different Tags and Locks WD-40

LU 6: Perform Counter boring	Deliver an illustrated presentation about perform counter boring operation. Ensure you focus on the following key points:
	• Counter boring tools
	  ○ Counter boring tool
	  ○ Flat drill
	• Calculation method for RPM
	• Purpose of counter boring
	• Procedure of counter boring
	• The importance of PPEs when carrying out counter boring operation.
		Classroom/Demonstration room
		Workshop
		Professional field work in domestic building and industrial complex
			MS flat/ round bar
			Vernier Caliper (0-150mm)
			Micrometer (0-25mm)
			Steel Rule (0-300mm)
			Tri Square (0-100mm)
			Centre & Dot Punch
			Scriber
			Marking Ink
			Hammer (Ball Peen 250gm)

Module 2: 0714001033 Perform bench work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Importance of health and safety Use appropriate resources (see Media column) to reinforce various points. After presentation, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to demonstrate their knowledge and skills relating to perform counter boring in a practical environment		Drill bits of different sizes (4-20mm) Bench vices 4 inches Bench type drill machine Drill chuck Counter boring tools (10-20mm) Coolant Computer Speakers Multimedia Projector Logbook Handbooks Design Books/ Sheets Pencils Erasers Pencil Sharpeners Paper Cutter Scissors Color Pencils Different Tags and Locks WD-40
LU 7: Perform Countersinking	Deliver an illustrated presentation about perform countersinking operation. Ensure you focus on the following key points: • Purpose of countersinking	Classroom/Demonstration room	MS flat/ round bar Vernier caliper (0-150mm) Steel rule (0-300mm)

Module 2: 0714001033 Perform bench work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Calculation method for RPM • Tools use for countersinking • Process steps for countersinking • The importance of PPEs when carrying out countersinking operation. • Importance of health and safety Use appropriate resources (see Media column) to reinforce various points. After presentation, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to demonstrate their knowledge and skills relating to perform countersinking in a practical environment	Workshop Professional field work in domestic building and industrial complex	Tri quare (0-100mm) Centre & dot Punch Scriber Marking ink Hammer (ball peen 250gm) Drill bits of different sizes (4-20mm) Bench vices 4 inches Bench type drill machine Drill chuck Countersinking tools (10-20mm) Coolant Computer Speakers Multimedia projector Logbook Handbooks Design books/ Sheets Pencils Erasers Pencil sharpeners Papercutter Scissors Color pencils

Module 2: 0714001033 Perform bench work			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Different tags and locks WD-40

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Module-3
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Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

LU 1: Interpret Drawings/ Layout	Deliver an illustrated presentation on the importance of engineering drawing and different types of methods used in construction of drawings. Ensure you focus on the following key points:
	• Interpret basic engineering drawings
	• P&ID
	• Different drawing views
	  ○ Isometric
	  ○ Orthographic
	• Drawing projections
	  ○ 1st angle
	  ○ 3rd angle
	• The importance of engineering drawings
	
	Use appropriate resources (see Media column) to reinforce various points.
	After presentation, demonstrate the above stated competence for better understanding of the trainees.
	Learners must be able to demonstrate their knowledge and skills relating to interpret drawings in a practical environment.
		Classroom/Demonstration room
		Workshop
		Or
		Professional field work in domestic building and industrial complex
			Computer
			Speakers
			Multimedia projector
			Printer
			Logbook
			Handbooks
			Design books/ sheets
			Pencils
			Erasers
			Pencil sharpeners
			Paper cutter
			Scissors
			Color pencils
			Different tags and locks

LU 2: Prepare work area	Begin this session with an illustrated presentation on preparing work area. Ensure the presentation focuses on the following key points: • Potential hazards in work area ○ Fire	Classroom/Demonstration room workshop or Professional field	Cotton gloves/ leather gloves Goggles Safety mask Helmet

Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	○ Inflammable material ○ Explosive gases ○ Toxic chemicals • Selection of power & utilities supply to the work area ○ Compressed air ○ Electric power ○ Natural gas • Selection of tools according to job requirement • Importance of health and safety. Use appropriate resources (see Media column) to reinforce various points. After presentation, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to demonstrate their knowledge and skills relating to prepare work area in a practical environment.	work in domestic building and industrial complex	Safety belt Safety shoes Ear plug / earmuff Measuring tape Combination pliers Vernier caliper Cold chisel Ball peen hammer Pipe wrench 12” to 24” Pipe vise 6” with tripod Hand hack saw Adjustable wrench 8” to 12” Phillips screwdriverset Flat screwdriver Set Allen key set Pipe cutter ½” to 2” Combination spanner set (metric) Hand drill machine Twist drill set Masonry drill set Gas cutter set with torch, pipe and cylinders Magnet sprit level Soldering machine

Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Flaring tool set Swaging tool set Tube cutter Bench vise 6” Tri square 12”, 24” A ladder Chalk linerGrinder 4” Grip pliers Laser level Computer Speakers Multimedia projector Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40

Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

LU 3: Bend/ Cut pipes & tubes	Deliver an illustrated presentation on the procedure to perform bending and cut pipes/tubes. Ensure the presentation focuses on the following key points:
	• Types of pipe/tube joints
	  ○ Welded
	  ○ Seamless
	• Purpose and necessity of pipe/tube joints application according to the material
	• Joining methods of pipe/tube
	• Identification of different pipe/tube joint
	• Use of cutting & bending tools
	  ○ Pipe cutter
	  ○ Hacksaw
	  ○ Pipe bender
	  ○ Tube cutter
	• The importance of PPEs when carrying out bending/cutting pipes and tubes
	• Importance of health and safety
	
	After presentation, demonstrate the above stated competence for better understanding of the trainees.
	Trainees need to practice their skills in using basic methods and equipment to perform bending/cutting pipes and tubes, in a real or realistic environment.
		Classroom/Demonstration room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Cotton gloves
			Goggles
			Safety hoes
			Measuring tape
			Vernier caliper
			Hand hack saw
			Pipe Cutter ½” to 2”
			PVC tape
			Tube cutter
			Tube bender
			Cable tie
			Computer
			Speakers
			Multimedia projector
			Logbook
			Handbooks
			Design books/ sheets
			Pencils
			Erasers
			Pencil sharpeners
			Paper Cutter
			Scissors
			Color pencils
			Different tags and ocks

Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		WD-40

LU 4: Perform threading	Deliver an illustrated presentation on the procedure to perform threading.
	Ensure that the presentation addresses the following points, including demonstrations of equipment, preparation and method of threading:
	• Types of thread
	  ○ Metric
	  ○ Withworth
	  ○ American National
	  ○ Pipe thread
	  ○ NPT
	• Thread terminologies
	  ○ Crest
	  ○ Root
	  ○ Flank
	  ○ Pitch
	  ○ Depth of thread
	  ○ Major diameter
	  ○ Minor diameter
	  ○ Pitch diameter
		Classroom/Demonstration room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Goggles
			Safety shoes
			Measuring tape
			Pipe vise 6” with tripod
			Ratchet die set ½” to 2”
			Hand hack saw
			Pipe cutter ½” to 2”
			Multi-purpose grease
			Tube Cutter
			Bench vise 6”
			Computer
			Speakers
			Multimedia projector
			Logbook
			Handbooks
			Design books/ sheets
			Pencils
			Erasers

Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Application of thread plug gauge and ring gauge • Procedure of perform threading • The importance of PPEs when carrying out threading. • Importance of health and safety After presentation, demonstrate the above stated competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to perform threading, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Pencil sharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40

LU 5: Braze pipes	Deliver an illustrated presentation on the procedure to perform brazing pipes.
	Ensure that the presentation addresses the following points, including demonstrations of equipment, preparation and method of brazing pipes:
	• Selection of tools for brazing
	  ○ Acetylene cylinder
	  ○ Oxygen cylinder
	  ○ Welding torch
		Classroom/Demonstration room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Leather gloves
			Goggles
			Safety mask
			Helmet
			Safety shoes
			Face shield and holder with cable
			Measuring tape
			Cold chisel

Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	○ Filling material ○ Flux ○ Wire brush ○ Chipping hammer ○ PPEs • Setting up brazing equipment • Preparation of metal surface for brazing • Procedure of perform brazing operation on pipes • The importance of PPEs when carrying out brazing • Importance of health and safety After presentation, demonstrate the above stated competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to perform brazing pipes, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Straight peen hammer 2 lbs Brass &cCopper rods for brazing Gas welding set with torch, pipe and cylinders Pin grinder Computer Speakers Multimedia projector Logbook Handbooks Design books/ Sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40
LU 6: Make welded joints through arc welding	Deliver an illustrated presentation on the procedure to make welded joints through arc welding. Ensure that the presentation addresses the following	Classroom/Demonstration room workshop	Leather Gloves Goggles Safety Shoes

Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

	points, including demonstrations of equipment, preparation and method of welding joints:
	• Requirements of a workplace for welding specific job
	• Types & importance of electric arc welding
	• Preparation of welding machine including:
	  ○ Type of current (AC/DC)
	  ○ Current polarity
	• Importance of joint preparation, cleaning and tacking
	• Selection of tools for arc welding
	  ○ Electrode
	  ○ Tong
	  ○ Wire brush
	  ○ Chipping hammer
	  ○ PPEs
	• Types of welding joints
	  ○ Butt joint
	  ○ Angle joint
	  ○ Corner joint
	  ○ Lap joint
	  ○ Tee-joint
	  ○ Edge joint
	• Setting up arc welding equipment
	• Importance of alignment of pipes and pipefittings
	• Procedure of perform arc welding operation on pipes
	• The importance of PPEs when carrying out arc
		or
		Professional field work in domestic building and industrial complex
			Overall
			Face Shield and Holder with cable
			Welding Gloves
			Measuring tape
			Combination pPliers
			Pointing chisel
			Insulation tape
			Cold chisel
			Straight peen hammer 2 lbs
			Pipe vise 6” with tripod
			Portable welding machine 3 Phase 300 Amps.
			Electrodes of different specifications
			Pipe cutter ½” to 2”
			Tube cutter
			Bench vise 6”
			Baby grinder 4”
			Grip pliers
			Fusion machine (PE Pipe Set) butt fusion
			Computer
			Speakers
			Multimedia projector

Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	welding • Importance of health and safety After presentation, demonstrate the above stated competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to perform arc welding, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40
LU 7: Install pipelines	Deliver an illustrated presentation on the procedure to install pipelines. Ensure that the presentation addresses the following points, including demonstrations of equipment, preparation and method of install pipelines: • Types of flanges: o Slip-on flanges o Lap joint flanges o Welded neck flanges • Procedure to make flange joint • Use of angle grinder o Right angle cut-off wheel o Depressed center wheel	Classroom/Demonstration room workshop or Professional field work in domestic building and industrial complex	Cotton gloves Goggles Helmet Safety shoes Measuring tape Insulation tape Combination pliers Vernier caliper Cold chisel Ball peen hammer Pipe wrench 12” to 24” Pipe vise 6” with tripod

Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	○ Small diameter reinforced ○ Chop saw reinforced • Procedure to perform grinding of pipe • Interpret pipe drawing • Types of thread • Procedure of installing pipelines • The importance of PPEs when carrying out installation of pipelines • Importance of health and safety After presentation, demonstrate the above stated competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to install pipelines, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Ratchet die set ½" to 2" Hand hack saw Adjustable wrench 8" to 12" Phillips screwdriver set Cable tie Flat screwdriver set Allen key set Pipe cutter ½" to 2" Combination spanner set (Matric) Combination spanner set (imperial) Hand drill machine Twist drill set Masonry drill set Magnet sprit level Water level 12 meter Soldering machine Flaring tool set Swaging tool set Tube cutter Bench vise Tri square 12", 24" Grinder 4" Computer

Module 3: 0714001034 Fabricate piping & tubing system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Speakers Multimedia projector Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sSharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40

PRECISION INSTRUMENTATION

Module-4
TRAINER GUIDE
National Vocational Certificate Level 3

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Module 4: 0714001035 Install & Commission Instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

LU 1: Install & commission temperature instruments	Begin this session with an illustrated presentation about Install & commission temperature instruments.
	Ensure that the presentation addresses the following points:
	• Types of hazard
	  ○ Fire
	  ○ Inflammable Material
	  ○ Explosive gases
	  ○ Toxic Chemicals
	• Interpret Piping & Instrumentation Diagram P&ID
	• Process Control Loop
	• IFCD (Interface Control Diagram)
	• Electrical/ Electronic/Instrumentation symbols
	• Functional parameters of Temperature instruments
	• SOP of instrument commissioning process
	• The importance of PPEs when carrying out installation and commissioning of temperature instrument
	• Importance of health and safety
	
	After presentation, demonstrate the above stated competence for better understanding of the trainees.
	Trainees need to practice their skills in using basic methods and equipment to install & commission temperature instruments, in a real or realistic environment.
		Classroom/Demonstration room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Digital
			First Aid box
			Hand glove
			Flat screwdriver set
			Philips screwdriver set
			Tweezers
			Tagging marks
			Hand drill machine
			Insulation tape
			Lugs punch (up to 10mm)
			Computer
			Speakers
			Multimedia projector
			Logbook
			Handbooks
			Design books/ Sheets
			Pencils
			Erasers
			Pencil sharpeners
			Paper cutter
			Scissors
			Color cencils
			Different tags and lLocks
			WD-40

Module 4: 0714001035 Install & Commission Instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		

LU 2: Install & commission pressure instruments	Begin this session with an illustrated presentation about Install & commission temperature instruments.
	Ensure that the presentation addresses the following points:
	• Types of hazard
	  ○ Fire
	  ○ Inflammable Material
	  ○ Explosive gases
	  ○ Toxic Chemicals
	• Interpret Piping & Instrumentation Diagram P&ID
	• Process Control Loop
	• IFCD (Interface Control Diagram)
	• Electrical/ Electronic/Instrumentation symbols
	• Functional parameters of Pressure instruments
	• SOP of instrument commissioning process
	• The importance of PPEs when carrying out installation and commissioning of pressure instrument
	• Importance of health and safety
		Classroom/Demonstration room
		Workshop
		Or
		Professional field work in domestic building and industrial complex
			Bourdon tube pressure gauge (0~20 Bar)
			Bourdon tube pressure gauge (0~400 Bar)
			Bourdon tube pressure gauge (0~200 Bar)
			Combination plier electrical
			Nose plier
			Hacksaw
			Tape measures (0~3m)
			Safety shoes
			Safety goggles
			Hearing protection
			Respiratory mask
			First Aid box
			Hand glove
			Flat screwdriver set
			Philips screwdriver set
			Insulation tape

Module 4: 0714001035 Install & Commission Instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	After presentation, demonstrate the above stated competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to install & commission pressure instruments, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Open end spanner set (5~32mm) Ring spanner set (5~22mm) Tagging marks Computer Speakers Multimedia projector Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40

LU 3: Install & commission level instruments	Begin this session with an illustrated presentation about Install & commission level instruments.
	Ensure that the presentation addresses the following points:
	• Types of hazard
	  ○ Fire
	  ○ Inflammable Material
		Classroom/Demonstration room
		Workshop
		Or
		Professional field work in domestic
			Wire striper
			Digital multimeter
			Digital clamp meter (0~400A)
			Tape measures (0~3m)
			Safety shoes
			Safety goggles
			Hearing protection

Module 4: 0714001035 Install & Commission Instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	○ Explosive gases ○ Toxic Chemicals • Interpret Piping & Instrumentation Diagram P&ID • Process Control Loop • IFCD (Interface Control Diagram) • Electrical/ Electronic/Instrumentation symbols • Functional parameters of level instruments • SOP of instrument commissioning process • The importance of PPEs when carrying out installation and commissioning of level instrument • Importance of health and safety After presentation, demonstrate the above stated competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to install & commission level instruments, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.	building and industrial complex	Respiratory mask First Aid box Insulation tape Cable tie Hand glove Flat screwdriver set Philips screwdriver set Open end spanner set (5~32mm) Ring spanner set (5~22mm) Allen key set (1~10mm) Tagging marks Hand drill machine Lugs punch (up to 10mm) Computer Speakers Multimedia projector Logbook Handbooks Design books/ Sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors

Module 4: 0714001035 Install & Commission Instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Color pencils Different tags and locks WD-40

LU 4: Install & commission flow instruments	Begin this session with an illustrated presentation about Install & commission flow instruments.
	Ensure that the presentation addresses the following points:
	• Types of hazard
	  ○ Fire
	  ○ Inflammable Material
	  ○ Explosive gases
	  ○ Toxic Chemicals
	• Interpret Piping & Instrumentation Diagram P&ID
	• Process Control Loop
	• IFCD (Interface Control Diagram)
	• Electrical/ Electronic/Instrumentation symbols
	• Functional parameters of flow instruments
	• SOP of instrument commissioning process
	• The importance of PPEs when carrying out installation and commissioning of flow instrument
	• Importance of health and safety
	
	After presentation, demonstrate the above stated competence for better understanding of the trainees.
		Classroom/Demonstration room
		Workshop
		Or
		Professional field work in domestic building and industrial complex
			Pipe vice
			Combination plier electrical
			Nose plier
			Wire striper
			Side cutter
			Pipe cutting tool
			Tube flaring tool
			Hacksaw
			Center punch
			Digital multimeter
			Digital clamp meter (0~400A)
			Tape measures (0~3m)
			Cable tie
			Safety shoes
			Safety goggles
			Hearing protection
			Respiratory mask
			First Aid box
			Insulation tape
			Hand glove
			Flat screwdriver set

Module 4: 0714001035 Install & Commission Instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Trainees need to practice their skills in using basic methods and equipment to install & commission flow instruments, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Philips screwdriver set Open end spanner set (5~32mm) Ring spanner set (5~22mm) Allen key set (1~10mm) Tagging marks Hand drill machine Lugs punch (up to 10mm) Pitot tube Computer Speakers Multimedia projector Logbook Handbooks Design books/ Sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40
LU 5: Recommission process loop	Begin this session with an illustrated presentation	Classroom/Demonstra	Digital thermometer (-10~400 Co) Infrared thermometer (0~2000

Module 4: 0714001035 Install & Commission Instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

	about recommission process loop.
	Ensure that the presentation addresses the following points:
	• Types of hazard
	  ○ Fire
	  ○ Inflammable Material
	  ○ Explosive gases
	  ○ Toxic Chemicals
	• Functional parameters of Instruments &Sensors related to:
	  ○ Temperature instruments
	  ○ Flow instruments
	  ○ Pressure instruments
	  ○ Level instruments
	• Interpret Piping & Instrumentation Diagram P&ID
	• Assembling & dismantling techniques
	• Testing techniques of connections
	• Electronic fault diagnosis
	• Component parameter, ratings and application of sensors
	• Different techniques necessary for installation procedures
	• Report final results
	• The importance of PPEs when carrying out recommissioning process loop
	• Importance of health and safety
	
	After presentation, demonstrate the above stated
		tion room
		Workshop
		Or
		Professional field work in domestic building and industrial complex
			Co)
			Bourdon tube pressure gauge (0~20 Bar)
			Bourdon tube pressure gauge (0~400 Bar)
			Insulation tape
			Bourdon tube pressure gauge (0~200 Bar)
			Surface level gauge (2 feet)
			Surface level gauge (8 feet)
			Capacitance type level instrument
			Cable tie
			Work Bench (4x8 feet, height 3 feet)
			Bench vice
			Pipe vice
			Combination plier electrical
			Nose plier
			Wire striper
			Side cutter
			Pipe cutting tool
			Tube flaring tool
			Hacksaw
			Chisel (8'')
			Pin punch set

Module 4: 0714001035 Install & Commission Instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to recommission process loop, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Hole punch set (5~ 20mm) Center punch Soldering / de soldering station Digital multimeter Digital RPM meter (0~10000 RPM) Digital clamp meter (0~400A) Frequency meter (0~20MHZ) Digital micrometer set (0~200mm) Phase tester Tape measures (0~3m) Tape measures (0~50m) Protection suite Safety shoes Safety goggles Hearing protection Respiratory mask First Aid Box Hand glove Flat screwdriver set Philips screwdriver set Watchmaker screwdriver set Tweezers Open end spanner set (5~32mm)

Module 4: 0714001035 Install & Commission Instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Ring spanner set (5~22mm) Allen key set (1~10mm) Tagging marks Hand drill machine Lugs punch (up to 10mm) Computer Speakers Multimedia projector Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40

PRECISION INSTRUMENTATION

Module-5
TRAINER GUIDE
National Vocational Certificate Level 3

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Module 5: 0714001036 Calibrate instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

LU 1: Calibrate temperature instruments	Begin this session with an illustrated presentation about calibrate temperature instruments.
	Ensure that the presentation addresses the following points:
	• Types of hazard
	  ○ Fire
	  ○ Inflammable Material
	  ○ Explosive gases
	  ○ Toxic Chemicals
	• Interpret Piping & Instrumentation Diagram P&ID
	• Process Control Loop
	• IFCD (Interface Control Diagram)
	• Electrical/ Electronic/Instrumentation symbols
	• Functional parameters of Temperature instruments
	• SOP of instrument commissioning process
	• Technical report
	• Functions of the temperature master calibrator
	• Importance of health and safety
	
	After presentation, demonstrate the above stated competence for better understanding of the trainees.
	Trainees need to practice their skills in using basic methods and equipment to calibrate temperature instruments, in a real or realistic environment.
	
	After the practical sessions are completed, lead a
		Classroom/Demonstration room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Temperature calibrator (0~600Co)
			Temperature calibrator (400~2000Co)
			Digital multimeter
			Millivolt source (-10~10v)
			Milliampere source (0~20mA)
			Safety shoes
			Safety goggles
			First Aid Kit
			Test probes
			Hand glove
			Digital thermometer (0~400Co)
			Screwdriver set
			Tweezers
			Wire cutter
			Combination plier
			Nose pliers
			Watch makers screwdriver set
			Allen key set
			Spanner set metric / imperial
			Adjustable spanner set
			Computer
			Speakers

Module 5: 0714001036 Calibrate instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Multimedia projector Logbook Handbooks Design Books/ Sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40

LU 2: Calibrate pressure instruments	Begin this session with an illustrated presentation about calibrate pressure instruments.
	Ensure that the presentation addresses the following points:
	• Types of hazard
	  ○ Fire
	  ○ Inflammable Material
	  ○ Explosive gases
	  ○ Toxic Chemicals
	• Interpret Piping & Instrumentation Diagram P&ID
	• Process Control Loop
	• IFCD (Interface Control Diagram)
	• Electrical/ Electronic/Instrumentation symbols
		Classroom/Demonstration room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Pressure Calibrator (0~20bar)
			Pressure Calibrator (100~600bar)
			Pressure Calibrator (-1~0bar)
			Digital multimeter
			Digital Leak tester
			Millivolt source (-10~10v)
			Milliampere source (0~20mA)
			Safety shoes
			Safety goggles
			First Aid Kit
			Test probes
			Hand glove

Module 5: 0714001036 Calibrate instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Functional parameters of pressure instruments • SOP of instrument commissioning process • Technical report • Functions of the pressure master calibrator • Importance of health and safety After presentation, demonstrate the above stated competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to calibrate pressure instruments, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Screwdriver set Tweezers Wire Cutter Combination Plier Nose pliers Allen key set Spanner set metric / imperial Adjustable spanner set Computer Speakers Multimedia projector Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper Cutter Scissors Color pencils Different tags and locks WD-40
LU 3: Calibrate level instruments	Begin this session with an illustrated presentation about calibrate level instruments.	Classroom/Demonstra	Level calibrator (0~20feet)

Module 5: 0714001036 Calibrate instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

	Ensure that the presentation addresses the following points:
	• Types of hazard
	  ○ Fire
	  ○ Inflammable Material
	  ○ Explosive gases
	  ○ Toxic Chemicals
	• Interpret Piping & Instrumentation Diagram P&ID
	• Process Control Loop
	• IFCD (Interface Control Diagram)
	• Electrical/ Electronic/Instrumentation symbols
	• Functional parameters of level instruments
	• SOP of instrument commissioning process
	• Technical report
	• Functions of the level master calibrator
	• Importance of health and safety
	
	After presentation, demonstrate the above stated competence for better understanding of the trainees.
	Trainees need to practice their skills in using basic methods and equipment to calibrate level instruments, in a real or realistic environment.
	
	After the practical sessions are completed, lead a feedback session.
	Ask questions to confirm their understanding.
	Provide opportunities for trainees to ask their own
		tion room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Digital multimeter
			Millivolt source (-10~10v)
			Milliampere source (0~20mA)
			Safety shoes
			Safety goggles
			First Aid kit
			Test probes
			Hand glove
			Screwdriver set
			Tweezers
			Wire cutter
			Combination plier
			Nose pliers
			Watch makers screwdriver set
			Allen key set
			Spanner set metric / imperial
			Adjustable spanner set
			Computer
			Speakers
			Multimedia projector
			Logbook
			Handbooks
			Design books/ Sheets
			Pencils

Module 5: 0714001036 Calibrate instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	questions.		Erasers Pencil sharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40

LU 4: Calibrate flow instruments	Begin this session with an illustrated presentation about calibrate flow instruments.
	Ensure that the presentation addresses the following points:
	• Types of hazard
	  ○ Fire
	  ○ Inflammable Material
	  ○ Explosive gases
	  ○ Toxic Chemicals
	• Interpret Piping & Instrumentation Diagram P&ID
	• Process Control Loop
	• IFCD (Interface Control Diagram)
	• Electrical/ Electronic/Instrumentation symbols
	• Functional parameters of flow instruments
	• SOP of instrument commissioning process
	• Technical report
	• Functions of the flow master calibrator
	• Importance of health and safety
		Classroom/Demonstration room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Gas Flow Calibrator (0~10m3)
			Liquid Flow Calibrator (0~10m3)
			Digital multimeter
			Digital Leak tester
			Millivolt source (-10~10v)
			Milliampere source (0~20mA)
			Safety shoes
			Safety goggles
			First Aid kit
			Test probes
			Hand glove
			Screwdriver set
			Tweezers
			Wire cutter
			Combination plier
			Nose pliers
			Watch makers screwdriver set

Module 5: 0714001036 Calibrate instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	After presentation, demonstrate the above stated competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to calibrate flow instruments, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Allen key set Spanner set metric / imperial Adjustable spanner set Computer Speakers Multimedia projector Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils Different tags and locks WD-40

PRECISION INSTRUMENTATION

Module-6
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Module 6: Communicate at workplace			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Communicate within the organization		Classroom/Demonstration room workshop or Professional field work in domestic building and industrial complex	Videos for related knowledge on multimedia Pen/Pencils Papers Printers Notebook/ note pads Computer Multimedia Projectors
LU 2: Communicate outside the organization		Classroom/Demonstration room workshop or Professional field work in domestic building and industrial complex	Videos for related knowledge on multimedia Pen/Pencils Papers Printers Notebook/ note pads Computer Multimedia Projectors

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