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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 *Pipe Fitter* 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 *Pipe Fitter* 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 Pipe fitter; 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 pipe fitter, 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 pipe fitter. You may need additional skills on entrepreneurship to support your initiative.

Overview of the program

Course: Precision Instrumentation Lev 4	**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: Measure Process Variables **Aim:** The aim of this module is to develop knowledge, skills and understanding to measure process variables	LU1 Operate Temperature Measuring Instruments LU2 Operate Pressure Measuring Instruments LU3 Operate Flow Measuring Instruments LU4 Operate Level Measuring Instruments	150 Hrs
Module 2: Set Up Process Controller **Aim:** The aim of this module is to develop knowledge, skills and understanding to set up process controller	LU1 Set up & adjust control loops LU2 Set up & adjust advanced process control loops LU3 Update control programmes LU4 Verify control programmes	150 Hrs

Module	Learning Unit	Duration
Module 3: Perform Fault Diagnosis **Aim:** The aim of this module is to develop knowledge, skills and understanding to set up process controller	LU1 Plan & prepare for fault diagnosis LU2 Verify fault LU3 Find fault LU4 Determine cause of fault	150 Hrs
Module 4: Carry out Repair & Maintenance of Instruments **Aim:** The aim of this module is to develop knowledge, skills and understanding to carryout repair & maintenance of instruments	LU1 Perform scheduled maintenance LU2 Perform preventive maintenance LU3 Perform corrective maintenance	150 Hrs
Module 5: Perform Advanced Communication **Aim:** The aim of this module is to develop knowledge, skills and understanding to perform advanced communication	LU1 Demonstrate professional skills LU2 Provide trainings at workplace	40 Hrs

Module	Learning Unit		Duration
Module 6: Establish & maintain the occupational health & safety system **Aim:** The aim of this module is to develop knowledge, skills and understanding to establish and maintain the occupational health and safety system	LU1 LU2 LU3 LU4 LU5 LU6	Organize consultation process Design occupational health and safety framework Design and implement an occupational health and afety awareness training program Establish, monitor and maintain occupational health and safety system Establish and maintain a system for accident investigation Evaluate the organization's oOccupational health and safety system and related policies procedures and programs	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: 0714001037 Measure Process Variables			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

LU1: Operate Temperature Measuring Instruments	Deliver an illustrated presentation about operating temperature measuring instrument. Ensure that the presentation focuses on the following key points:
	• Purpose and importance of temperature measurement in process industries
	• Types of temperature measuring methods
	  ○ Contact method
	  ○ Non-contact method
	• Types of different temperature measuring instruments along with:
	  ○ Measuring ranges
	  ○ Tolerances
	  ○ Accuracy
	• working principles of different types of temperature measuring instruments:
	  ○ Bimetallic thermometer
	  ○ Thermocouples
	  ○ RTDs
	  ○ Thermistors
	• The importance of PPEs when operating temperature measuring instruments
	• 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.
		Class or demonstration room
		Workshop
		Or
		Professional field work in domestic building and industrial complex
			Adjustable spanner set
			Allen key set (inch/mm)
			Computer
			Digital multimeter
			Digital Thermometer (0~400oC)
			Digital thermometer (-10~400o C)
			Electrician tool kit
			Flat screw driver set
			General tools kit
			Insulation tester
			Multimedia projector
			Operations Manual
			Printer
			Safety goggles
			Safety harness belt
			Safety helmet
			Safety mask
			Safety Shoes
			Work bench (8ftx4ftx3ft)
			Cable tie (assorted sizes)
			Contact cleaner
			Cotton gloves
			Cotton waste

Module 1: 0714001037 Measure Process Variables			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Learners must be able to demonstrate their knowledge and skills relating to operating temperature measuring instrument in a practical environment. Ensure that learners have the opportunity to ask questions to support their understanding.		Emery paper Fuses (0.01A to 20A) Insulation tape Lugs (1~10mm) Machine screw & nuts M3 to M12 Permanent marker PVC flexible pipe PVC tape Silicone sealants & Adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks Process SOPs Equipment maintenance manuals Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors

Module 1: 0714001037 Measure Process Variables			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4

LU 2: Operate Pressure Measuring Instruments	Deliver an illustrated presentation about operating pressure measuring instrument. Ensure that the presentation focuses on the following key points:
	• Purpose and importance of pressure measurement in process industries
	• Types of pressure measuring methods
	  ○ Analog
	  ○ Digital
	• Types of different pressure measuring instruments along with:
	  ○ Measuring ranges
	  ○ Tolerances
	  ○ Accuracy
	• working principles of different types of temperature measuring instruments:
	  ○ Bourdon gauge
	  ○ Bellows
	  ○ Diaphragm
	  ○ Load cells/strain gauges
	• The importance of PPEs when operating
		Class or demonstration room or
		Workshop
		Or
		Professional field work in domestic building and industrial complex
			Adjustable spanner set
			Allen key set (inch/mm)
			Computer
			Digital multimeter
			Electrician tool kit
			Flat screw driver set
			General tools kit
			Instrument air supply system
			Insulation tester
			Multimedia projector
			Operations manual
			Printer
			Safety goggles
			Safety harness belt
			Safety helmet
			Safety mask

Module 1: 0714001037 Measure Process Variables			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	pressure measuring instruments • 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 operating pressure measuring instrument in a practical environment. Ensure that learners have the opportunity to ask questions to support their understanding.		Safety soes Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses (0.01A to 20A) Insulation tape Lugs (1~10mm) Machine screw & nuts M3 to M12 Permanent marker PVC flexible pipe PVC tape Silicone sealants & Adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks Process SOPs Equipment maintenance manuals Logbook Handbooks

Module 1: 0714001037 Measure Process Variables			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box File Printing paper A4

LU 3: Operate Flow Measuring Instruments	Deliver an illustrated presentation about operating flow measuring instrument. Ensure that the presentation focuses on the following key points:
	• Purpose and importance of flow measurement in process industries
	• Principles of flow measurement w.r.t.:
	  ○ Velocity
	  ○ Volumetric flow
	  ○ Mass flow
	  ○ Nature of fluid
	• Types of different flow measuring instruments along with:
		Class or demonstration room or
		Workshop
		Or
		Professional field work in domestic building and industrial complex
			Adjustable spanner set
			Safety goggles
			Allen key set (inch/mm)
			Computer
			Digital multimeter
			Flat screw driver set
			Insulation tester
			Multimedia projector
			Operations manual
			Printer

Module 1: 0714001037 Measure Process Variables			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	○ Measuring ranges ○ Tolerances ○ Accuracy • working principles of different types of flow measuring instruments: ○ Differential Pressure Flow Meters ○ Velocity Flow Meters ○ Positive Displacement Flow Meters • The importance of PPEs when operating flow measuring instruments • 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 operating flow measuring instrument in a practical environment. Ensure that learners have the opportunity to ask questions to support their understanding.		Safety goggles Safety harness belt Safety helmet Safety mask Safety shoes Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Lugs (1~10mm) Machine screw & nuts M3 to M12 Permanent marker PVC flexible pipe PVC tape Silicone sealants & Adhesive Soldering wire(70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks

Module 1: 0714001037 Measure Process Variables			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Process SOPs Equipment maintenance manuals Logbook Handbooks Design books/ Sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box Files Printing paper A4
LU 4: Operate Level Measuring Instruments	Deliver an illustrated presentation about operating level measuring instrument. Ensure that the presentation focuses on the following key points: • Purpose and importance of level measurement in process industries • Principles of level measurement w.r.t.:	Class or demonstration room or Workshop Or	Adjustable spanner set Allen key set (inch/mm) Capacitance type level instrument Computer Digital multimeter

Module 1: 0714001037 Measure Process Variables			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	○ Contact methods ○ Non-contact methods • Types of different level measuring instruments along with: ○ Measuring ranges ○ Tolerances ○ Accuracy • Working principles of different types of level measuring instruments: ○ Differential pressure method ○ Bubble tube method ○ Ultrasonic Method • The importance of PPEs when operating flow measuring instruments • 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 operating level measuring instrument in a practical environment. Ensure that learners have the opportunity to ask questions to support their understanding.	Professional field work in domestic building and industrial complex	Electrician tool kit Flat screw driver set General tools kit Insulation tester Multimedia projector Operations manual Printer Safety goggles Safety harness belt Safety helmet Safety mask Safety shoes Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Lugs (1~10mm) Machine screw & nuts M3 to M12 Permanent marker

Module 1: 0714001037 Measure Process Variables			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			PVC flexible pipe PVC tape Silicone sealants & Adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and Locks Process SOPs Equipment maintenance manuals Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers

Module 1: 0714001037 Measure Process Variables			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Box files Printing paper A4

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Module-2
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Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

LU 1: Set up & adjust control loops	Deliver an illustrated presentation about set up & adjust control loops. Ensure that the presentation focuses on the following key points:
	• Importance of occupational health and safety at workplace
	• Application of problem-solving techniques in resolution of issues arising in D.C./A.C. Circuits
	• Interpreting:
	  ○ Instrumentation drawings
	  ○ Specification
	  ○ Standards
	  ○ Equipment manuals
	• Control and manipulated variables
	
	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 set up & adjust control loops 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
			Adjustable spanner set
			Allen key set (inch/mm)
			Computer
			Digital leak tester
			Digital multimeter
			Ear muffler/ plug
			Electrician tool kit
			Flat screw driver set
			Flat screw driver set
			General Tools kit
			Goggles
			Grip pliers
			Hand glove
			Helmet
			Instrument air supply system
			Insulation tester
			Lan cable cutter
			Lugs punch (up to 10mm)
			Monkey plier
			Combination plier
			Multimedia projector
			Nose plier
			Offset ring spanner set (imperial)
			Offset ring spanner set (metric)

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Open end spanner set (imperial) Open end set (metric) Operations manual Overall Phase tester Philips screwdriver set Pipe wrench set (8”/12”) Printer Safety goggles Safety harness belt Safety helmet Safety mask Safety shoes Side cutter Solder sucker Soldering / de soldering station Soldering machine Speakers Tape measures (0~50m) Test probes Tube cutter/ bender Watchmaker screwdriver set Wire cutter Work bench (8ftx4ftx3ft)

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20 A Insulation tape Number strips Permanent marker PVC flexible pipe PVC tape Silicone sealants & Adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks Equipment maintenance manuals Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4

LU 2: Set up & adjust advanced process control loops	Deliver an illustrated presentation about set up & adjust advance process control loops. Ensure that the presentation focuses on the following key points:
	• Importance of occupational health and safety at workplace
	• Open-Loop and Closed-Loop processes/systems
	• Various types of control modes:
	  ○ ON/OFF Control
	  ○ Proportional Control
	  ○ Proportional Derivative Control
	  ○ PID Control
	• Application of problem-solving techniques in resolution of issues arising in:
	  ○ Temperature
	  ○ Pressure
	  ○ Level
		Classroom/Demonstration room
		workshop
		Professional field work in domestic building and industrial complex
			Adjustable spanner set
			Allen key set (inch/mm)
			Bench vice 4 inch
			Bench Vice 6 inch
			Computer
			Digital Leak tester
			Digital multimeter
			Ear muffler/ plug
			Electrician tool kit
			Flat Screw driver set
			Flat screw driver set
			General tools kit
			Goggles
			Grip pliers

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	○ Flow measurement components and systems • Setting-up and adjust PID control loops 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 set up & adjust advance process control loops in a practical environment. Ensure that learners have the opportunity to ask questions to support their understanding.		Hand glove Helmet Instrument air supply system Insulation tester Lan cable cutter Lugs punch (up to 10mm) Monkey plier Multimedia projector Nose plier Offset ring spanner set (imperial) Offset ring spanner set (metric) Open end spanner set (imperial) Open end spanner set (metric) Operations manual Overall Phase tester Philips screwdriver set Pipe wrench set (8”/12”) Printer Safety goggles Safety harness belt Safety helmet Safety mask Safety shoes

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Side cutter Solder sucker Soldering / de soldering station Soldering machine Speakers Tape measures (0~50m) Test probes Tube cutter/ bender Watchmaker screwdriver set Wire cutter Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20 A Insulation tape Number strips Permanent marker PVC flexible pipe PVC tape Silicone sealants & adhesive Soldering wire (70/30)

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Teflon tape Emery paper (200-400) WD-40 Different tags and locks Equipment maintenance manuals Logbook Handbooks Design Books/ Sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4
LU 3: Update control programmes	Deliver an illustrated presentation about update control programs. Ensure you focus on the following key points: • Installations procedures necessary in case of	Classroom/Demonstration room workshop Professional field	Adjustable spanner set Allen key set (inch/mm) Bench vice 4 inch

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	new updated versions of control • Control programmes functions/ functionalities • Up grading of control programmes 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 update control programs in a practical environment. Ensure that learners have the opportunity to ask questions to support their understanding.	work in domestic building and industrial complex	Bench vice 6 inch Computer Digital leak tester Digital multimeter Ear muffler/ plug Electrician tool kit Flat screw driver set Flat screw driver set General tools kit Goggles Grip pliers Hand glove Helmet Instrument air supply system Insulation tester Lan cable cutter Lugs punch (up to 10mm) Monkey plier Multimedia projector Nose plier Offset ring spanner set (imperial) Offset ring spanner set (metric) Open end spanner set (imperial) Open end spanner set (metric)

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Operations manual Overall Phase tester Philips screwdriver set Pipe wrench set (8”/12”) Printer Safety goggles Safety harness belt Safety helmet Safety mask Safety Shoes Side cutter Solder sucker Soldering / de soldering station Soldering machine Speakers Tape measures (0~50m) Test probes Tube cutter/ bender Watchmaker screwdriver set Wire cutter Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Number strips Permanent marker PVC flexible pipe PVC tape Silicone sealants & adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks Equipment maintenance manuals Logbook Handbooks Design books/ sheets Pencils Erasers Pencil Sharpeners Paper Cutter Scissors

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4

LU 4: Verify control programmes	Deliver an illustrated presentation about verify control program. Ensure you focus on the following key points:
	• Tuning a PID Controller
	• Steps involved in the process:
	  ○ Set all gains to zero
	  ○ Increase the P gain until the response to a disturbance is steady oscillation
	  ○ Increase the D gain until the oscillations go away (i.e. it's critically damped)
	  ○ Repeat steps 2 and 3 until increasing the D gain does not stop the oscillations
	• Calculate the required PID tuning constants
	
	Use appropriate resources (see Media column) to reinforce various points.
	After presentation, demonstrate the above stated
		Classroom/Demonstration room
		workshop
		Professional field work in domestic building and industrial complex
			Adjustable spanner set
			Allen key set (inch/mm)
			Bench vise 4 inch
			Bench Vise 6 inch
			Computer
			Digital leak tester
			Digital multimeter
			Ear muffler/ Plug
			Electrician tool kit
			Flat screw driver set
			Flat screw driver set
			General tools kit
			Goggles
			Grip pliers
			Hand glove
			Helmet

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	competence for better understanding of the trainees. Learners must be able to demonstrate their knowledge and skills relating to verify control program in a practical environment. Ensure that learners have the opportunity to ask questions to support their understanding.		Instrument air supply system Insulation tester Lan cable cutter Lugs punch (up to 10mm) Monkey plier Multimedia projector Nose plier Offset ring spanner set (imperial) Offset ring spanner set (metric) Open end spanner set (imperial) Open end spanner set (metric) Operations manual Overall Phase tester Philips screwdriver set Pipe wrench set (8”/12”) Printer Safety goggles Safety harness belt Safety helmet Safety mask Safety shoes Side cutter Solder sucker

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Soldering / de soldering station Soldering machine Speakers Tape measures (0~50m) Test probes Tube cutter/ bender Watchmaker screwdriver set Wire cutter Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Number strips Permanent marker PVC flexible pipe PVC tape Silicone sealants & adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400)

Module 2: 0714001038 Set up Process Controller			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			WD-40 Different tags and locks Equipment maintenance manuals Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4

PRECISION INSTRUMENTATION

Module-3
TRAINER GUIDE
National Vocational Certificate Level 3

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Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

LU 1: Plan & prepare for fault diagnosis	Deliver an illustrated presentation about plan & prepare for fault diagnosis. Ensure you focus on the following key points:
	• Interpret P & ID/loop diagram
	• Use of electronic and process test equipment during fault finding:
	  ○ Multimeter
	  ○ Calibrator
	• Process variables and its units
	
	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 plan & prepare for fault diagnosis in a practical environment.
		Classroom/Demonstration room
		Workshop
		Or
		Professional field work in domestic building and industrial complex
			Adjustable spanner set
			Allen key set (inch/mm)
			Bench vise 4 inch
			Bench vise 6 inch
			Computer
			Digital leak tester
			Digital multimeter
			Ear muffler/ plug
			Electrician tool kit
			Flat Screw driver set
			Flat Screw driver set
			General Tools kit
			Goggles
			Grip Pliers
			Hand glove
			Helmet
			Instrument air supply system
			Insulation tester
			Lan cable cutter
			Lugs punch (up to 10mm)
			Monkey plier
			Multimedia projector
			Nose plier
			Offset Ring Spanner Set

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			(Imperial) Offset ring spanner set (metric) Open end spanner set (imperial) Open end spanner set (metric) Operations manual Overall Phase tester Philips screwdriver set Pipe wrench set (8”/12”) Printer Safety goggles Safety harness belt Safety helmet Safety mask Safety shoes Side cutter Solder sucker Soldering / de soldering station Soldering machine Speakers Tape measures (0~50m) Test probes Tube cutter/ bender Watchmaker screwdriver set

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Wire cutter Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Number strips Permanent marker PVC flexible pipe PVC tape Silicone sealants & adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks Equipment maintenance mManuals Logbook Handbooks Design books/ sheets

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box Files Printing paper A4

LU 2: Verify fault	Begin this session with an illustrated presentation on verify fault. Ensure the presentation focuses on the following key points:
	• Basic electrical/ electronic devices and circuits:
	  ○ Series circuits
	  ○ Parallel circuits
	  ○ Amplifier
	  ○ Filter & signal conditioner
	• Interpret P&ID/ Information Fusion, Control and Decision (IFCD)
	• Interpret the electrical/ electronic circuit diagrams
	• Testing of electrical / electronic components by using test equipment:
		Classroom/Demonstration room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Adjustable spanner set
			Allen key set (inch/mm)
			Bench vise 4 inch
			Bench vise 6 inch
			Computer
			Digital Leak tester
			Digital multimeter
			Ear muffler/ plug
			Electrician tool kit
			Flat screw driver set
			Flat screw driver set

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	○ Transistors ○ Diodes ○ Amplifiers • Functionality of process instruments: ○ D/P transmitter ○ Control valve ○ Solenoid valve • Faults in electronic cards: ○ Fuse blow ○ Dry solder ○ Component burnout • Electrical wiring and standards: ○ Domestic wiring ○ Industrial wiring • Standard safety procedures and safe practices in process industry • System parameters (normal & abnormal) • Fault diagnosis techniques: ○ Check wiring connection ○ Check fuses ○ Physical status of component 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 verify fault in a practical environment.		General tools kit Goggles Grip pliers Hand glove Helmet Instrument air supply system Insulation tester Lan cable cutter Lugs punch (up to 10mm) Monkey plier Multimedia projector Nose plier Offset ring spanner set (imperial) Offset ring spanner set (Metric) Open end spanner set (imperial) Open end spanner set (Metric) Operations manual Overall Phase tester Philips screwdriver set Pipe wrench set (8”/12”) Printer Safety goggles Safety harness belt

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Safety helmet Safety mask Safety shoes Side cutter Solder sucker Soldering / de soldering station Soldering machine Speakers Tape measures (0~50m) Test probes Tube cutter/ bender Watchmaker screwdriver set Wire cutter Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Number strips Permanent marker PVC flexible pipe

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			PVC tape Silicone sealants & adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks Equipment maintenance manuals Logbook Handbooks Design books/ Sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

LU 3: Diagnose fault	Begin this session with an illustrated presentation on diagnose fault. Ensure the presentation focuses on the following key points:
	• Basic electrical/ electronic devices and circuits:
	  ○ Series circuits
	  ○ Parallel circuits
	• Interpret P&ID/ Information Fusion, Control and Decision (IFCD)
	• Interpret the electrical/ electronic circuit diagrams
	• Testing of electrical / electronic components by using test equipment:
	  ○ Transistors
	  ○ Diodes
	  ○ Amplifiers
	• Functionality of process instruments:
	  ○ D/P transmitter
	  ○ Control valve
	  ○ Solenoid valve
	• Faults in electronic cards:
	  ○ Fuse blow
	  ○ Dry solder
	  ○ Component burnout
	• Electrical wiring and standards:
	  ○ Domestic wiring
	  ○ Industrial wiring
	• Standard safety procedures and safe practices in process industry
	• System parameters (normal & abnormal)
		Classroom/Demonstration room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Adjustable spanner set
			Allen key set (inch/mm)
			Bench vice 4 inch
			Bench Vice 6 inch
			Computer
			Digital Leak tester
			Digital multimeter
			Ear Muffler/ Plug
			Electrician tool kit
			Flat Screw driver set
			Flat Screw driver set
			General tools kit
			Goggles
			Grip pliers
			Hand glove
			Helmet
			Instrument air supply system
			Insulation tester
			Lan cable cutter
			Lugs punch (up to 10mm)
			Monkey plier
			Multimedia projector
			Nose plier
			Offset ring spanner set (imperial)

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**

	• Fault diagnosis techniques:
	  ○ Check wiring connection
	  ○ Check fuses
	  ○ Physical status of component
	
	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 diagnose fault in a practical environment.
			Offset ring spanner set (metric)
			Open end spanner set (imperial)
			Open end spanner set (metric)
			Operations manual
			Overall
			Phase tester
			Philips screwdriver set
			Pipe wrench set (8”/12”)
			Printer
			Safety goggles
			Safety harness belt
			Safety helmet
			Safety mask
			Safety shoes
			Side cutter
			Solder sucker
			Soldering / de soldering station
			Soldering machine
			Speakers
			Tape measures (0~50m)
			Test probes
			Tube cutter/ bender
			Watchmaker screwdriver set
			Wire cutter

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Number strips Permanent marker PVC flexible pipe PVC tape Silicone sealants & adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks Equipment maintenance manuals Logbook Handbooks Design books/ sheets Pencils Erasers

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Pencil sharpeners Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4

LU 4: Determine cause of fault/ Perform root cause analysis	Deliver an illustrated presentation on the procedure to determine root cause analysis.
	Ensure that the presentation addresses the following points, including demonstrations:
	• Reasons of fault occurred
	  ○ Loose connection
	  ○ Corrosion
	  ○ Line blockage
	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 determine root cause analysis, in a real or realistic environment.
		Classroom/Demonstration room
		workshop
		or
		Professional field work in domestic building and industrial complex
			Adjustable spanner set
			Allen key set (inch/mm)
			Bench vise 4 inch
			Bench vise 6 inch
			Computer
			Digital leak tester
			Digital multimeter
			Earmuffs/ plug
			Electrician tool kit
			Flat screw driver set
			Flat screw driver set
			General tools kit
			Goggles

Module 3: 0714001039 Perform Fault Diagnosis			
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.		Grip pliers Hand glove Helmet Instrument air supply system Insulation tester Lan cable cutter Lugs punch (up to 10mm) Monkey plier Multimedia projector Nose plier Offset ring spanner set (imperial) Offset ring spanner set (metric) Open end spanner set (imperial) Open end spanner set (metric) Operations manual Overall Phase tester Philips screwdriver set Pipe wrench set (8”/12”) Printer Safety goggles Safety harness belt Safety helmet Safety mask

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Safety shoes Side cutter Solder sucker Soldering / de soldering station Soldering machine Speakers Tape measures (0~50m) Test probes Tube cutter/ bender Watchmaker screwdriver set Wire cutter Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Number strips Permanent marker PVC flexible pipe PVC tape Silicone sealants & dhesive

Module 3: 0714001039 Perform Fault Diagnosis			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks Equipment maintenance manuals Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4

PRECISION INSTRUMENTATION

Module-4
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Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Perform Scheduled Maintenance	Begin this session with an illustrated presentation about perform Scheduled Maintenance. Ensure that the presentation addresses the following points: • All types of maintenance as per SOP: o Scheduled o Corrective o Preventive o Documentation 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 Scheduled Maintenance, 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.	Classroom/Demonstration room workshop or Professional field work in domestic building and industrial complex	Adjustable spanner set Allen key set (inch/mm) Bench vise 4 inch Bench vise 6 inch Computer Digital leak tester Digital multimeter Earmuffs/ plug Electrician tool kit Flat screw driver set Flat screw driver set General tools kit Goggles Grip pliers Grease gun Hand glove Helmet Hacksaw frame Hammer (ball peen 250gm) Instrument air supply system Insulation tester Lan cable cutter Lugs punch (up to 10mm) Masonry drill set

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Monkey plier Multimedia projector Nose plier Offset rsing spanner set (imperial) Offset ring spanner set (metric) Open end spanner set (imperial) Open end spanner set (metric) Operations manual Overall Offset ring spanner set (mtric) Oil funnel Oil spray gun Phase tester Philips screwdriver set Pipe wrench set (8”/12”) Pin punch set Printer Safety goggles Safety harness belt Safety helmet Safety mask Safety shoes Side cutter Solder sucker

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Soldering / de soldering station Soldering machine Speakers Tape measures (0~50m) Test probes Tube cutter/ bender Watchmaker screwdriver set Wire cutter Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Number strips Permanent marker PVC flexible pipe PVC tape Silicone sealants & adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400)

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			WD-40 Different tags and locks Equipment maintenance anuals Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper Cutter Scissors Color pencils White chart paper White board Markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4
LU 2: Perform Preventive Maintenance	Begin this session with an illustrated presentation about perform Preventive Maintenance. Ensure that the presentation addresses the following points: • Recording the ongoing maintenance in the	Classroom/Demonstration room Workshop	Adjustable spanner set Allen key set (inch/mm) Bench vise 4 inch Bench vise 6 inch Computer

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	equipment history card • Equipment consumables/spares involved in preventive maintenance • Inventory maintenance in order to ensure availability of necessary parts 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 Preventive Maintenance, 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.	Or Professional field work in domestic building and industrial complex	Digital leak tester Digital multimeter Earmuffs/ plug Electrician tool kit Flat screw driver set Flat screw driver set General tools kit Goggles Grip pliers Grease gun Hand glove Helmet Hacksaw frame Hammer (ball peen 250gm) Instrument air supply system Insulation tester Lan cable cutter Lugs punch (up to 10mm) Masonry drill set Monkey plier Multimedia projector Nose plier Offset Ring Spanner Set (Imperial)

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Offset ring spanner set (metric) Open end spanner set (imperial) Open end spanner set (metric) Operations manual Overall Offset ring spanner set (metric) Oil funnel Oil spray gun Phase tester Philips screwdriver set Pipe wrench set (8”/12”) Pin punch set Printer Safety goggles Safety harness belt Safety helmet Safety mask Safety shoes Side cutter Solder sucker Soldering / de soldering station Soldering machine Speakers Tape measures (0~50m)

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Test probes Tube cutter/ bender Watchmaker screwdriver set Wire cutter Work bench (8ftx4ftx3ft) Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Number strips Permanent marker PVC flexible pipe PVC tape Silicone sealants & adhesive Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks Equipment maintenance manuals Logbook

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4

LU 3: Perform Corrective Maintenance	Begin this session with an illustrated presentation about perform Corrective Maintenance.
	Ensure that the presentation addresses the following points:
	• Various fault-finding and resolving/fixing techniques
	• Interpret P&ID and IFCD loop drawings
	• Use of an appropriate test equipment:
	  ○ Multimeter
	  ○ Calibrator
		Classroom/Demonstration room
		Workshop
		Or
		Professional field work in domestic building and industrial complex
			Adjustable spanner set
			Allen key set (inch/mm)
			Bench vise 4 inch
			Bench vise 6 inch
			Computer
			Digital leak tester
			Digital multimeter
			Earmuffs/ plug
			Electrician tool kit

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• All necessary documentation involved in the process 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 Corrective Maintenance, 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.		Flat screw driver set Flat screw driver set General Tools kit Goggles Grip pliers Grease gun Hand glove Helmet Hacksaw frame Hammer (ball peen 250gm) Instrument air supply system Insulation tester Lan cable cutter Lugs punch (up to 10mm) Masonry drill set Monkey plier Multimedia projector Nose plier Offset ring spanner set (imperial) Offset ring spanner set (metric) Open end spanner set (imperial) Open end spanner set (metric) Operations manual Overall

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Offset ring spanner set (metric) Oil funnel Oil spray gun Phase tester Philips screwdriver set Pipe wrench set (8”/12”) Pin punch set Printer Safety goggles Safety harness belt Safety helmet Safety mask Safety shoes Side cutter Solder sucker Soldering / de soldering station Soldering machine Speakers Tape measures (0~50m) Test probes Tube cutter/ bender Watchmaker screwdriver set Wire cutter Work bench (8ftx4ftx3ft)

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Cable tie (assorted sizes) Contact cleaner Cotton gloves Cotton waste Emery paper Fuses 0.01A to 20A Insulation tape Number strips Permanent marker PVC flexible pipe PVC tape Silicone sealants & sdhesive Soldering wire (70/30) Teflon tape Emery paper (200-400) WD-40 Different tags and locks Equipment maintenance manuals Logbook Handbooks Design books/ sheets Pencils Erasers Pencil sharpeners

Module 4: 0714001040 Carryout repair & maintenance of instruments			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			Paper cutter Scissors Color pencils White chart paper White board markers (red, blue, green, black) Permanent markers (black) File covers Box files Printing paper A4

PRECISION INSTRUMENTATION

Module-5
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Module 5: Perform advanced communication			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Demonstrate professional skills		Classroom/Demonstration room workshop or Professional field work in domestic building and industrial complex	Pen/ Pencils Papers Printers Notebook/ notepads Computer Multimedia Projectors USB White board Marker Dusters Display printing sketches /diagrams White board Board marker Duster Computer Projector
LU 2: Provide trainings at workplace		Classroom/Demonstration room workshop or Professional field work in domestic	Pen/ pencils Papers Printers Notebook/ notepads Computer Multimedia

Module 5: Perform advanced communication			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
		building and industrial complex	Projectors USB White board Markers Dusters Display printing sketches /diagrams White board Board marker Duster Computer Projector

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Module 6: Establish and maintain the occupational health and safety system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Organize consultation process		Classroom/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: Design Occupational Health and Safety framework		Classroom/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 Local laws and regulations on

Module 6: Establish and maintain the occupational health and safety system			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
			health, hygiene and safety Standard operating procedures for health, hygiene and safety Formats of reports

National Vocational and Technical Training Commission (NAVTTC)

Plot 38, Kirthar Road, Sector H-9/4, Islamabad, Pakistan
+92 51 9044 322
+92 51 9044 322
info@navttc.org
www.navttc.org