Instrument Mechanics Works - National Technical Certificate (NTC) and Advanced National Technical Certificate (ANTC)

Laboratory/Process Analytical Instruments

PROGRAMME: National Technical Certificate in Instrument Mechanics work.

MODULE: CIM 15 - Laboratory/Process Analytical Instrument.

DURATION: 144 Hours

GOAL: This module is designed to equip the trainee with the competence in the use of given laboratory/processes analytical instruments with a view to be able to maintain the instruments effectively.

General Objective:

On completion of this module the trainee should be able to:

1. Understand and measure PH values with the PH meters.

2. Understand and measure humidity with the hygrometer

3. Understand and measure viscosity with the viscometer

4. Understand the nature of colour in liquids and be able to apply the tintometer to measure colour.

5. Know and apply the instruments used for gas detection.

6. Understand the working of instrument used for liquid separation.

7. Know and use instrument for measuring tibidity.

Programme: INSTRUMENT MECHANICS WORKS			
Module: LABORATORY/PROCESS ANALYTICAL INSTRUMENTS		Module Code: CIM 15	Contact Hours: 12 Hrs/wk
Module Specification:			
	General Objective 1.0: Understand and measure PH values with the PH meters.		
Week	Specific Learning Objective:	Teacher Activities:	Learning Resources:
1- 7	1.1 Give a qualitative definition of $P^{H.}$ 1.2 State the P^{H} values of neutral liquid i.e (P^{H} 7) 1.3 State values for alkalinity and acidity with references to the neutral point. 1.4 Describe the instrument used for the measurement of P^{H} value with the aid of labeled sketches. E.g. P^{H} meters. 1.5 Measure P^{H} values of different solutions with the aid of P^{H} meter. 1.6 Service a P^{H} meter by cleaning, changing of probes and replacing the fuse.	• Discuss the operation of the P^{H} meters. • Use laboratory experiment to distinguish between alkalinity and acidity.	• P^{H} Meter acid alkaline beaker lab work sheet.
	General Objective 2.0: Understand And Measure Humidity With The Hygrometer.		
Week	Specific Learning Objective:	Teacher Activities:	Learning Resources:
8-13	2.1 Define a. Relative humidity b. Humidity ratio or specific humidity. 2.2 Give the unit of humidity as: a. Percentage of humidity b. Kilogram moisture per kilogram air. 2.3 Describe instruments used for measuring humidity. e.g. wet and dry bulb hygrometer hair hygrometer etc. 2.4 Measure the relative humidity of the process air in the laboratory with the aid of hygrometer and record the readings.	• Make hygrometer available to the learner. • Discuss effect of humidity on measurement. • Provide learners exercises on maintenance of the instrument.	• Hygrometer

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	General Objective 3.0: Understand And Measure Viscosity With The Viscometer		
Week	Specific Learning Objective:	Teacher Activities:	Learning Resources:
1-2	3.1 Define viscosity 3.2 Give the unit of measurement of viscosity i.e. Red Wood seconds. 3.3 Name, describe and identify the instruments used for the measurement of viscosity i.e viscometer.	• Explain viscosity and discuss the principle.	
3-6	3.4 Measure the viscosity of the following liquids and record the readings. a. water b. oil c. lubricating oil d. fuel oil etc.	• Demonstrate the action using viscometer involve learner in the activities.	• Viscometer liquid.
	General Objective 4.0: Understand The Nature Of Colour In Liquids And Be Able To Apply The Tintometer To Measure Colour.		
Week	Specific Learning Objective:	Teacher Activities:	Learning Resources:
7-9	4.1 Explain colour in liquids. 4.2 Name, describe and identify the instrument used for measuring coloured liquid e.g. tintometer. 4.3 Measure colour in liquids with the aid of the tintometer and record the readings	• Show different colours of liquid, identify, and use tintometer to measure.	• Liquid • tintometer
	General Objective 5.0: Know And Apply The Instruments Used For Gas Detection		
Week	Specific Learning Objective:	Teacher Activities:	Learning Resources:
10-11	5.1 Name, describe and identify the following instruments used for detection of presence of gases: e.g. a. carbon dioside analyzer b. oxygen analyzer c. chlorine analyzer, etc.	• Display different types of analysers and identify each	• Different Analyser

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	General Objective 5.0: Know And Apply The Instruments Used For Gas Detection		
Week	Specific Learning Objective:	Teacher Activities:	Learning Resources:
12-13	5.2 Use gas analysers to detect the presence of gases. 5.3 Describe the instruments for detecting radio active follouts: - Geiger counter.	• Demonstrate the use of gas analysers. Provide learners exercises	
1-3	5.4 Carry out proper care and maintenance of the analytical instruments named above.	• Demonstrate the practical analysis of the instrument. • Present the real.	
	General Objective 6.0: Understand The Working Of Instrument Used For Liquid Separation Year 3, Term 3 Contact Hour: 1-3		
Week	Specific Learning Objective:	Teacher Activities:	Learning Resources:
4-6	6.1 Explain the principles of liquid separation as applied to centrifuges. 6.2 Separate mixture of liquid in their separate components using a centrifuge. 6.3 Maintain and care for centrifuge.	• Instrument discussion and practical.	• Centrifuges liquid
	General Objective 7.0: Know And Use Instrument For Measuring Turbidity.		
Week	Specific Learning Objective:	Teacher Activities:	Learning Resources:
7-9	7.1 Define turgidity. 7.2 Measure turbidity with turbidity meter. 7.4 Maintain and care for turbidity meter.	• Discuss the operation and practical applications	
10-13	7.5 Students should be made aware that many open and close loop process control functions can be managed by Programmable Logic Control PLC control systems.	• Refer to manufacturer's data manuals for range of options available. • If possible arrange a visit to an industrial site to inspect a PLC Control System.	• Manufacturers data • PLC System.

EXPERIMENT

NTC INSTRUMENTS MECHANICS WORK (CIM 15)

Week	Experiment (Laboratory/Processing Analytical Instruments Cim 15)	Teachers/Students Activities	Resources
Term 1	Service a P^h by cleaning, changing of probes and replaceing the fuse. Perform experiment to measure the relative humidity of the process air in the laboratory with the aid of hygrometer and recover the readings.		
Term 2	Perform experiment to measure the viscosity of the following liquids and recover their readings: a. water b. lubricating oil c. fuel oil		
Term 3	Perform experiments to measure colour in liquids with the aid of the trio meter and record the readings.		
Term 4	Perform experiments to show how to use gas analyzer to detect the process of gasses.		
Term 5	Perform experiments to separate mixture of liquids in their separate colours using a centrifugal.		