REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

AGRICULTURAL ENGINEERING TECHNICIAN

LEVEL 6

PROGRAMME ISCED CODE: 0716 454 A

TVET CDACC
P.O. BOX 15745-00100
NAIROBI

APPLY PRINCIPLES OF FLUID MECHANICS

UNIT CODE: 0716 441 17A

TVET CDACC CODE: ENG/OS/AGR/CC/02/6/MA

UNIT DESCRIPTION

This unit specifies the competencies required by an Agricultural Engineering Technologist Level 6 to apply principles of fluid mechanics. It involves applying principles of flow in fluids, knowledge in viscous flow, operation of fluid pumps, applying hydrostatic forces principles and hydraulic structures principles.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range.***
1. Apply principles of flow in fluids	2.1 Personal protective equipment's are worn based on OSHA 2.2 ***Tools and equipment*** in fluid mechanics are identified and assembled as per work requirement. 2.3 Flow rate in ***pipes*** is calculated as per fluid flow principles 2.4 ***Losses in pipes*** are determined as per flow rate measurement
2. Apply viscous flow principles	2.1 Personal protective equipment's are worn based on OSHA 2.2 Viscous flow between parallel surface is calculated using flow equations 2.3 Viscous flow equations in pipes are applied in problem solving
3. Apply open channel flow Principles	3.1 Flow in open channels is classified based on the flow characteristics 3.2 Open channel design elements are determined based on open channel design laws 3.3 Open channel carrying capacity is determined based on the formulae

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range.***
4. Apply fluid pumps principles	4.1 ***Classification of Fluid pumps*** is performed based on their use 4.2 Pumps are selected according to their ***performance characteristics*** 4.3 Pump equations and performance characteristics are applied in problem solving

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Tools and equipment may include but are not limited to:	• Reynold's apparatus • U tube manometer • Bernoulli's theorem apparatus • Venturi meter • Orifice and mouth piece apparatus • Pipe friction apparatus • Pitot tube apparatus • Notch Apparatus
2. Pipes may include but are not limited to:	• GI • HPDE • PVC
3. Losses in pipes may include but not limited to:	• Friction • Bents and pipe fitting • Obstruction • Enlargement • reduction in cross-sectional

4. Fluid pumps classification may include but are not limited to:	• Reciprocating pumps • Centrifugal pump • Gear type Pump • Diaphragm pumps
5. Performance characteristics may include but are not limited to:	• Pump efficiency • Flow • Net positive suction head • Discharge • Brake horsepower • Pressure • Mach number • Froude number

REQUIRED SKILLS AND KNOWLEDGE

This section describes the knowledge and skills required for this unit of competency.

Required knowledge

The individual needs to demonstrate knowledge of:

- Newton's law
- Laws of conservation of energy
- Laws of friction
- Type of forces
- Power transmission systems
- Units of measurement, conversions and abbreviations

Required Skills

The individual needs to demonstrate the following skills:

- Logical thinking
- Problem solving
- Communication
- Analytical
- Problem Solving

- Interpretation

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1 Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Worn personal protective equipment based on OSHA 1.2 Calculated flow rate in different pipes using standard equations 1.3 Determined losses in pipes based on flow rate measurements using standard equations 1.4 Applied viscous flow equations in pipes in problem solving 1.5 Selected pumps according to their performance characteristics 1.6 Applied pump equations and performance characteristics in problem solving
2. Resource Implications	The following resources should be provided: 2.1 Appropriately simulated environment where assessment can take place 2.2 Access to relevant work environment 2.3 Resources relevant to the proposed activity or tasks
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Practical 3.2 Project 3.3 Portfolio of evidence 3.4 Third party report 3.5 Written tests 3.6 Oral assessment
4. Context of Assessment	Competency may be assessed: 4.1 Workplace 4.2 Simulated work environment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.