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 MECHANICAL SCIENCE PRINCIPLES

UNIT CODE: 0716 541 09A

TVET CDACC CODE: ENG/OS/AGR/CC/04/5/MA

UNIT DESCRIPTION

This unit describes the competencies required by an Agricultural Engineering Technologist Level 6 to apply mechanical science principles. Competencies include: applying force and moment in structural components, applying motion principles in structural components, applying work, energy and power principles in engineering operations, and applying density and pressure concepts in engineering operations.

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 force and moment in structural components	1.1 ***Types of forces*** are determined based on loading 1.2 Bending moments are determined based on law of moments 1.3 Forces and bending moments are applied in engineering systems as per work requirements
2. Apply motion principles in structural components	2.1 ***Types of motion*** in engineering systems are identified 2.2 **Laws of motion** are applied in engineering systems 2.3 ***Mechanical computation*** involving application of motion are performed
3. Apply work, energy and power principles in engineering operations	3.1 Work, energy and power are determined as per work requirement 3.2 ***Problems on simple machines*** are solved as per work procedure 3.3 Problems on levers are solved as per work procedures
4. Apply density and pressure concepts in engineering operations	4.1 Density problems are solved as per work requirements 4.2 Working principles of pressure are determined as per work requirements 4.3 Computation involving ***pressure application***s in engineering operations are performed as per work procedures

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** ***May include but are not limited to:***
1. Types of forces may include but are not limited to:	• Applied Force. • Gravitational Force. • Normal Force. • Frictional Force. • Air Resistance Force. • Tension Force. • Spring Force.
2. Types of motion may include but are not limited to:	• Linear Motion. • Rotary Motion. • Oscillatory Motion
3. Laws of motion may include but are not limited to:	• Newton's laws of motion • Law of conservation of linear momentum • Law of conservation of energy
4. Problems on simple machines may include but are not limited to	• Machine advantage • Velocity ratio • Efficiency
5. Mechanical computations may include but are not limited to:	• Mechanical advantage • Efficiency • Torque • Power/Energy • Work done
Pressure applications may include but not limited to:	• Vacuum pump • Hydraulic pump

	• Hydrometers

REQUIRED SKILLS AND KNOWLEDGE

This section describes 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
- Gas laws
- Heat transfer
- 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

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 Determined types of forces based on loading 1.2 Determined bending moments based on loading 1.3 Applied forces and bending moments in engineering systems

	1.4 Identified types of motion in engineering systems 1.5 Applied laws of motion are applied in engineering systems 1.6 Performed mechanical computation involving application of motion 1.7 Determined work, energy and power as per work requirement 1.8 Solved problems on simple machines as per work procedure 1.9 Problems on levers are solved as per work procedures 1.10 Applied gas in solving engineering problems 1.11 Performed computations involving heat capacity as per work requirements 1.12 Determined application of heat capacity based on work procedures 1.13 Solved density problems as per work requirements 1.14 Determined working principles of pressure as per work requirements 1.15 Performed computation involving pressure applications in engineering operations as per work procedures
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