

PERFORM PHYSICS TECHNIQUES

UNIT CODE: 0533 441 11A

TVET CDACC UNIT CODE: SLT/OS/SL/CR/05/5/MA

UNIT DESCRIPTION

This unit specifies the competencies required to perform physics techniques. It involves measuring physical quantities, performing pressure experiment, measuring heat capacity, conducting wave experiment, performing optical experiment, conducting electrical experiment, carrying out electromagnetism experiment and performing particulate nature of matter experiment.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function (to be stated in active)	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements (to be stated in passive voice) <i>Bold and italicized terms are elaborated in the Range</i>
1 Measure physical quantities	1.1 <i>Measurement tools, equipment and apparatus</i> are assembled according to work requirement 1.2 Body physical quantity is measured according to physics laboratory manual 1.3 Body physical quantity measurements are reported as per international system of units
2 Perform pressure experiment	2.1 Pressure tools and equipment are assembled according to physics manual 2.2 Pressure tools and equipment are set as per work requirement 2.3 Pressure variables determination is carried out as per physics laboratory manual 2.4 Pressure is calculated as per pressure formulae

3 Measure heat capacity	3.1 <i>Heat capacity tools, equipment</i> and <i>apparatus</i> are assembled according to work requirement 3.2 Body <i>heat capacity</i> is measured according to physics laboratory manual 3.3 Heat capacity measurement is reported as per physics laboratory manual
4 Conduct wave experiment	4.1 <i>Wave experiment tools</i> and <i>equipment</i> are assembled according to physics manual 4.2 <i>Wave characteristic</i> experiment is carried out as per physics laboratory manual 4.3 <i>Wave behavior</i> is reported as per the physics laboratory manual
5 Perform optical experiment	5.1 <i>Optical instruments</i> are assembled as per the work requirement 5.2 Optical experiment is carried out as per physics laboratory manual 5.3 Image characteristics are recorded as per the <i>mirror and lens formulae</i> 5.4 <i>Light behavior</i> is reported as per the physics laboratory manual
6 Conduct electrical experiment	6.1 <i>Electrical devices</i> and <i>apparatus</i> are assembled as work requirement 6.2 <i>Electrical circuit</i> is set based on the physics laboratory manual 6.3 <i>Electrical quantities</i> are read and reported as per physics laboratory manual
7 Carry out electromagnetism experiment	7.1 <i>Magnets</i> are assembled as per work requirement 7.2 <i>Magnetic properties</i> are determined based on magnetic principles

	7.3 Magnetization and demagnetization experiments are performed as per physics laboratory manual.
8. Perform particulate nature of matter experiment	<p>8.1 Particulate nature of matter experiment apparatus is assembled as per the physics laboratory manual</p> <p>8.2 Particulate nature of matter experiment is carried out as per physics laboratory manual</p> <p>8.3 Particulate nature of matter experiment results is reported as per physics laboratory manual.</p>

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. Measurement tools, equipment and apparatus includes but not limited to:	<ul style="list-style-type: none"> • Tape measure • Ruler • Vernier calipers • Micrometer screw gauge • Weighing balance • Pressure gauge • Stop watch
2. Physical Quantity includes but not limited to:	<ul style="list-style-type: none"> • Mass • Length • Time • Temperature • Density
3. Pressure tools and equipment includes but not limited to:	<ul style="list-style-type: none"> • Pressure gauge • Barometer

4. Pressure variables include but not limited to:	<ul style="list-style-type: none"> • Force • Density • Area
5. Pressure formulae include but not limited to:	<ul style="list-style-type: none"> • $P = \frac{F}{A}$ • $P = h\rho g$
6. Heat capacity tools, equipment and apparatus includes but not limited to:	<ul style="list-style-type: none"> • Calorimeter • Thermometer • Heat source
7. Heat capacity includes but not limited to:	<ul style="list-style-type: none"> • Heat transfer • Specific heat capacity • Latent heat <ul style="list-style-type: none"> • Latent heat of fusion • Latent heat of vaporization • Latent heat of sublimation
Wave experiment tools and equipment includes but not limited to:	<ul style="list-style-type: none"> • Ripple tank • Slinky spring • Resonance tube • Tuning fork • Sonometer
8. Wave characteristic includes but not limited to:	<ul style="list-style-type: none"> • Amplitude • Wavelength • Frequency
9. Wave behavior includes but not limited to:	<ul style="list-style-type: none"> • Refraction • Reflection • Diffraction • interference

10. Optical instruments include but not limited to:	<ul style="list-style-type: none"> • Mirror • Lenses • Glass block • Optical pins
11. Mirror and lens formulae includes but not limited to:	<ul style="list-style-type: none"> • $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ <ul style="list-style-type: none"> ○ f - Focal length ○ u - Object distance ○ v - Image distance • $m = \frac{u}{v} = \frac{hi}{ho}$ <ul style="list-style-type: none"> ○ hi - Image height • ho – Object height
12. Light behavior includes but not limited to:	<ul style="list-style-type: none"> • Polarization • Reflection • transmission
13. Electrical devices and apparatus include but not limited to:	<ul style="list-style-type: none"> • Ammeter • Voltmeter • Resistors • Capacitors • Connecting wires • Dry cells • LED • Diode • Galvanometer
14. Electrical quantities include but not limited to:	<ul style="list-style-type: none"> • Resistance • Voltage • current • Capacitance • Inductance • Power

15. Magnets includes but not limited to:	<ul style="list-style-type: none"> • Permanent • Temporary • Earth
16. Magnetic properties include but not limited to:	<ul style="list-style-type: none"> • Diamagnetic • Paramagnetic • Ferromagnetic • Lines of force • Magnetic flux patterns • Flux density
17. Magnetization and demagnetization include but not limited to:	<ul style="list-style-type: none"> • Electrical • Hammering • Induction • Stroking • Contact
18. Particulate nature of matter experiment apparatus includes but not limited to:	<ul style="list-style-type: none"> • Smoke cell • Lens • Beakers • Potassium permanganate crystals

REQUIRED SKILLS AND KNOWLEDGE

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

Required Skills

The individual needs to demonstrate the following skills:

- Technical
- Observation
- Problem solving
- Critical thinking

- Reporting
- Interpretation

Required Knowledge

The individual needs to demonstrate knowledge of:

- Physics equipment and apparatus
- Physics formulas
- Physical quantities
- Characteristics and behaviour of waves
- Light properties and behaviour
- Electromagnetic principles
- Electrical components
- Connection of circuits
- Electrical quantities

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	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Measured body physical quantity according to physics laboratory manual 1.2 Reported body physical quantity measurements as per international system of units 1.3 Set pressure tools and equipment as per work requirement 1.4 Calculated pressure as per pressure formulae 1.5 Measured body heat capacity according to physics laboratory manual 1.6 Reported heat capacity measurement as per physics laboratory manual
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	<p>1.7 Carried out wave characteristic experiment as per physics laboratory manual</p> <p>1.8 Reported wave behavior as per the physics laboratory manual</p> <p>1.9 Carried out optical experiment as per physics laboratory manual</p> <p>1.10 Recorded image characteristics as per the mirror and lens formulae</p> <p>1.11 Set electrical circuit based on the physics laboratory manual</p> <p>1.12 Read and reported electrical quantities as per physics laboratory manual</p> <p>1.13 Determined magnetic properties based on magnetic principles</p> <p>1.14 Performed magnetization and demagnetization experiments as per physics laboratory manual</p> <p>1.15 Carried out particulate nature of matter experiment as per physics laboratory manual</p>
2. Resource Implications	<p>The following resources should be provided:</p> <p>1.1 Appropriately simulated environment where assessment can take place.</p> <p>1.2 Access to relevant work environment.</p> <p>1.3 Resources relevant to the proposed activities or tasks.</p>
3. Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <p>1.4 Practical</p> <p>1.5 Project</p> <p>1.6 Third party report</p> <p>1.7 Portfolio of evidence</p> <p>1.8 Written test</p>

	1.9 Oral test
4. Context of Assessment	Competency may be assessed in a work place or simulated workplace
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.