

PHYSICS TECHNIQUES

UNIT CODE: 0533 441 12A

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

UNIT DURATION: 180 Hours

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Perform Physics Techniques

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.

Summary of Learning Outcomes

By the end of this unit, the learner should be able to:

S/No	Learning Outcomes	Duration (Hours)
1.	Measure physical quantities	20
2.	Perform pressure experiment	20
3.	Measure heat capacity	30
4	Conduct wave experiment	20
5	Perform optical experiment	20
6	Conduct electrical experiment.	20
7	Carry out electromagnetism experiment	30
8	Perform particulate nature of matter experiment	20
	Total	180

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Measure physical quantities	1.1 Basic and derived physical quantities 1.2 SI units 1.3 Conversion of units 1.4 Measuring instruments 1.5 Measuring physical quantities 1.6 Archimedes principle 1.7 Upthrust 1.8 Law of floatation 1.9 Density and Relative density	<ul style="list-style-type: none"> • Practical Assessment • Written • Oral • Observation • Third party
2. Perform pressure experiment	1.2 Definition of pressure 1.3 Pressure in solids, liquids and gases 1.4 Transmission of pressure in liquids 1.4.1 Hydraulics 1.5 Measurements of pressure 1.6 Atmospheric pressure 1.7 Applications of pressure	<ul style="list-style-type: none"> • Practical Assessment • Written • Oral • Observation • Third party
3. Measure heat capacity	3.1 Definition of heat, heat transfer and thermal equilibrium 3.2 Temperature scales 3.3 Modes of heat transfer 3.4 Change of states 3.5 Application of heat on matter 3.6 Thermal expansivity 3.7 Heat capacities 3.8 Latent heat	<ul style="list-style-type: none"> • Practical Assessment • Written • Oral • Observation • Third party
4. Conduct wave experiment	4.1 Types of waves 4.1.1 characteristics of wave motion 4.1.2 wavelength 4.1.3 frequency 4.1.4 period 4.1.5 speed 4.1.6 amplitude 4.2 Properties of waves	<p>12 Practical Assessment 13 Written 14 Oral 15 Observation 16 Third party</p>

	4.3 Reflection 4.4 Refraction 4.5 Diffraction 4.6 Interference	
5. Perform optical experiment	5.2 Nature of light 5.3 Propagation of light 5.4 Laws of reflection 5.5 Polarisation 5.6 Image formation by plain & curved mirrors 5.7 Laws of refraction. 5.8 Distances, sizes of object/images, magnification and focal lengths are determined as per the mirror and lens formula Refractive index, critical angle and total internal reflection. 5.9 Image formation by lenses 5.10 Optical instruments	<ul style="list-style-type: none"> • Practical Assessment • Written • Oral • Observation • Third party
6. Conduct electrical experiment	6.2 Electrical quantities <ul style="list-style-type: none"> 6.1.1 Current 6.1.2 Resistance 6.1.3 Voltage 6.1.4 Electromotive force (emf) 6.1.5 Potential Difference (pd) 6.3 Electrical Circuits <ul style="list-style-type: none"> 6.2.1 Series 6.2.2 parallel 6.4 Electrical measuring instruments 6.5 Ohm's law 6.6 Factors affecting resistance <ul style="list-style-type: none"> 6.6.1 Length 6.6.2 Cross section area 6.6.3 Temperature 6.6.4 Nature of the material/resistivity 	<ul style="list-style-type: none"> • Practical Assessment • Written • Oral • Observation • Third party

	6.7 Resistor networks 6.7.1 Parallel 6.7.2 series	
7. Carry out electromagnetism experiment	7.2 Types of magnets 7.3 Properties of Magnetism 7.4 Magnetization and de-magnetization methods 7.5 7.6 Uses of magnets 7.7 Laws of electromagnetism 7.8 Applications of electromagnetism	<ul style="list-style-type: none"> • Practical Assessment • Written • Oral • Observation • Third party
8. Perform particulate nature of matter experiment	8.1 States of matter 8.2 Properties of matter. 8.3 Brownian motion	<ul style="list-style-type: none"> • Practical Assessment • Written • Oral • Observation • Third party

Suggested Methods of Instruction

- Demonstration
- Viewing of related videos
- Discussion
- Direct Instruction
- Field study

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/Specifications	Quantity	Recommended Ratio (Item: Trainee)
A Learning Materials				
11.	Desktop computer/laptop	For trainer's use	1	1:25
12.	Internet connection	wifi		1:25
13.	Projector		1	1:25
14.	Whiteboard	4 x 8 ft	1	1:25

15.	Assorted colour of whiteboard markers	Red, blue and black	3	1:25
B Learning Facilities & infrastructure				
	standard Science laboratory		1	
c Tools and Equipment				
7.	Vernier calipers	Half division	25	1:1
8.	Micrometer screw gauge	Accuracy of 0.01mm	25	1:1
9.	Tape measure	5m	25	1:1
10.	Pressure gauge	20psi	5	1:5
11.	Barometer	Mercury	5	1:5
12.	Bunsen burner	500g	25	1:1
13.	Ripple tank	Perspex cover	5	1:5
14.	Meter rule	Wooden	25	1:1
15.	Slinky Spring	1m	25	1:1
16.	Resonance tube	Complete kit	10	2:5
17.	Tuning forks	2 harmonics	25	1:1
18.	Sonometer	20 KHz	25	1:1
19.	Mirror	Plain and curved	25	1:1
20.	Lenses	Perspex	25	1:1
21.	Glass block	Rectangular	25	1:1
22.	Optical pins	2 inches	100	4:1
23.	thermometers	-10 ⁰ c to 100 ⁰ c	25	1:1
24.	stopwatches	Digital	25	1:1
25.	weighing balances	0 to 2kg	5	1:5
26.	calorimeters	Copper	25	1:1
27.	ammeters	0 to 2A	25	1:1
28.	voltmeters	0 to 5A	25	1:1
29.	Variable Resistors	0 to 100 ohms	25	1:1
30.	Connecting wires	Wires with crocodile clips	200	8:1

31.	Dry cells	D size	50	2:1
32.	Galvanometer	Zero centred	25	1:1
33.	Magnets	Bar magnets	25	1:1
34.	Smoke cell	With glass cover	5	1:5
35.	Beakers	250ml	25	1:1
36.	Potassium permanganate crystals	500grams tin	25grams	1:1
37.	Glass tube	Clear	25	1:1