DCSPHY633: Use Physics in Engineering

UNIT CODE		**DCSPHY633**	
UNIT TITLE		**Use physics in engineering**	
APPLICATION		This unit describes the performance outcomes, skills and knowledge required to solve problems involving linear motion, momentum, impulse, forces, work, energy, power, friction, heat transfer, thermal expansion, the atomic model, basic electricity and to conduct and report on experiments. The unit of competency is applied by technicians in an engineering environment to perform basic calculations and solve problems relating to physics. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.	
ELEMENTS		**PERFORMANCE CRITERIA**	
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1	Use unit systems for the measurement of quantities.	1.1	Measure quantities using S.I. units.
		1.2	Convert quantities between different unit systems.
2	Solve problems involving linear motion.	2.1	Solve motion problems involving constant velocity and constant acceleration.
		2.2	Evaluate acceleration, velocity, displacement and duration using graphical and/or numerical procedures.
3	Solve problems involving momentum, impulse and force.	3.1	Solve problems involving the principle of conservation of momentum.
		3.2	Solve problems involving impulse and change of momentum.
		3.3	Solve problems involving forces in accelerated linear motion.
		3.4	Distinguish between mass and weight.
4	Solve problems involving work and energy.	4.1	Solve problems involving the evaluation of quantities of work and energy (potential and kinetic energy).
		4.2	Solve engineering problems involving mechanical power and efficiency.
		4.3	Apply the principle of conservation of energy.
		4.4	Solve problems involving loss of energy due to friction and drag.
5	Solve problems involving temperature and heat.	5.1	Convert temperature between different scales.
		5.2	Identify different heat transfer processes (conduction, convection, radiation).

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		5.3	Solve problems involving heat energy transfer and states of matter.
		5.4	Solve problems involving thermal expansion.
6	Describe the atomic model of matter and solve problems involving electric circuits.	6.1	Identify the components and configuration of the atom.
		6.2	Identify the components and variables in an electric circuit.
		6.3	Solve problems involving electric circuits, electrical machinery and power.
7	Perform, report and assess experiments.	7.1	Apply procedures for experiments.
		7.2	Perform and analyse measurements.
		7.3	Analyse experiment results to assess the validity of stated hypotheses and attainment of aims.
		7.4	Report and comment on experiment aims, procedure and conclusions.

FOUNDATION SKILLS
Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

UNIT MAPPING INFORMATION
DCSPHY606 Use physics in engineering is equivalent.

TITLE	**Assessment requirements for DCSPHY633 Use physics in engineering**
PERFORMANCE EVIDENCE	To achieve competency in this unit, a person must satisfy the requirements of the elements and performance criteria, foundation skills and range of conditions included in the unit. The person must also: • perform arithmetical calculations typically required in engineering. • read, plan and apply experiment procedures, analyse measurements and report on findings. Note: If a specific volume or frequency is not stated, then evidence must be provided at least once for each criterion.
KNOWLEDGE EVIDENCE	To achieve competency in this unit, a person must demonstrate knowledge of: – S.I. basic and secondary units – arithmetic operations – algebra – properties of scalar and vector quantities – equilibrium of forces

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	– motion in constant velocity – motion in constant acceleration – momentum and its conservation – Newton's three laws – mass and weight – work done by a force – potential and kinetic energies – Conservation of Energy – power and efficiency – temperature and Heat – heat transfer by conduction, convection and radiation. – Heat Energy – thermal expansion – The Atomic Model • electric circuits: potential, current, resistance, resistivity of materials and power. (V=I×R, P=V×I)

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ASSESSMENT CONDITIONS	**Assessment Conditions:** All assessment must be completed in accordance with work health and safety standards. When assessments are conducted remotely, invigilation software must be used to ensure authenticity of work completed. Model answers or marking guides must be provided for all assessments to ensure reliability of assessment judgements when marking is undertaken by different assessors. Assessors must gather a range of evidence that is valid, sufficient, authentic, and current. Questioning techniques must not require language, literacy and numeracy skills beyond those required in this module. The candidate must have access to all tools, equipment, materials and documentation required. **Assessor Requirements:** Assessment must be conducted only by persons who: • hold vocational competencies at least to the level being delivered and assessed • maintain current industry skills directly relevant to the training and assessment being provided • hold a tertiary qualification in engineering or a related field • meet the assessor requirements specified in the current Standards for Registered Training Organisations (RTOs) • undertake ongoing professional development in vocational training, learning, and assessment, including competency-based training and assessment, as required by their RTO. The RTO must also ensure that trainers and assessors keep their industry knowledge up to date through ongoing professional development. The RTO must take appropriate steps, as an ongoing procedure, to verify information about trainer and assessor's qualifications.