DPEBPC620: Use Basic Physics and Chemistry in Plant Operations

UNIT CODE		**DPEBPC620**	
UNIT TITLE		**Use basic physics and chemistry in plant operations**	
APPLICATION		This unit describes the performance outcomes, skills and knowledge required to apply basic principles of physics and chemistry applicable to plant operation. The unit of competency is applied by technicians in an engineering environment who complete basic physics calculations and apply physics and chemistry principles for plant operations. 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	Determine reactions to structures and/or parts of a structure	1.1	Draw a free body diagram of components using standard industry symbols.
		1.2	Apply the equations of equilibrium to determine reactions.
2	Determine the stress and strain in structural members	2.1	Calculate the stress in an axially loaded member.
		2.2	Calculate the strain in an axially loaded member.
		2.3	Calculate the extension of an axially loaded member.
		2.4	Calculate the stress in a member loaded in shear.
		2.5	Determine Young's modulus for relevant load extension data.
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 conversation of energy
		4.4	Solve problems involving loss of energy due to friction and drag
5	Explain basic thermodynamic concepts and principles	5.1	Define basic thermodynamic concepts
		5.2	Explain thermodynamic processes in working substances
		5.3	Describe the state of a system and its transformations
		5.4	Explain the concept of ideal gases
		5.5	Explain the concept of equilibrium state

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		5.6	Identify and explain the basic laws of thermodynamics
6	Outline basic principles of chemistry relevant to process plant operations	6.1	Explain basic principles of stoichiometry
		6.2	Explain basic principles of fluid mechanics
		6.3	Explain basic principles of heat and mass transfer
FOUNDATION SKILLS Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.'			
UNIT MAPPING INFORMATION No equivalent unit			

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TITLE	**Assessment requirements for DPEBPC620 Use basic physics and chemistry in plant operations**
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: • correctly solve written problems in physics • collect and analyse data from calculations • report and present data from calculations in an appropriate format • identify and assess industrial process applications where the laws of thermodynamics apply • identify and assess industrial applications where the principles of each of stoichiometry, fluid mechanics, and heat and mass transfer apply. 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:
	• Key concepts in basic physics, maths, and chemistry, including:
	  ○ estimation and rounding
	  ○ scientific and engineering notation
	  ○ ratios and percentages
	  ○ definitions in basic physics and chemistry
	  ○ basic problem solving in physics
	  ○ fundamental concepts in chemistry
	  ○ graphing and function notation
	  ○ the use of the scientific calculator

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 have: • the assessor requirements in the standards for registered training organisation (RTOs) current at the time of assessment • vocational competencies at least to the level being delivered and assessed

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	• current industry skills directly relevant to the training and assessment being provided • current knowledge and skills in vocational training and learning that informs their training and assessment • demonstrated, through their RTO, how they are continuing to undertake professional development in the fields of the knowledge and practice of vocational training, learning and assessment including competency-based training and assessment. 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.