

1. Module details

Module name

Electrotechnology Calculations

Module duration

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 18-20 hours.

Module code

NUE077

Discipline code

2. Module purpose

This module is intended to give learners the preparatory calculations necessary to carry out installation, maintenance, modification, planning, commissioning, testing, fault diagnosis, and repair work in the Electrotechnology industry.

3. Prerequisites

Nil.

4. Relationship to competency standards

This module partly supports the achievement of competency for units of competency in the National Electrotechnology Training Package Competency Standards. Full competence is achieved through relevant off-job and on-job training as prescribed by the industry for the requisite qualification.

5. Content

- 1. Basic operations and estimating the results of a calculation**
- 2. Graphs and tables**
- 3. Transposition**
- 4. Trigonometry**
- 5. Vectors/phasors**
- 6. Systematic Problem Solving**

6. Assessment strategy

Assessment methods

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met and students are well prepared for work placement. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests. Written tests should include, multiple choice, short answer and problem type items.

Conditions of assessment	Learning and assessment will take place in an environment that is conducive to a learner's development.
7. Learning outcome details	
Learning outcome 1	Perform basic mathematical operations including fractions, decimals, and scientific notation.
Assessment criteria	<p>1.1 Solve problems involving fractions.</p> <p>1.2 Express numbers as multiples and sub-multiples.</p> <p>1.3 Without the aid of a calculator estimate the result of a calculation involving mathematical operations verifying answers with a calculator.</p> <p>1.4 Estimate the result of a problem involving fractions.</p> <p>1.5 Convert fractions to decimal numbers.</p> <p>1.6 Convert decimal numbers into scientific notation.</p>
Learning outcome 2	Using graphs and tables show the relationship between two variables.
Assessment criteria	<p>2.1 Describe the different types of graphs and tables used in Electrotechnology.</p> <p>2.2 Identify dependent and independent variables.</p> <p>2.3 Derive equations from graphs and tables.</p> <p>2.4 Draw graphs involving two variables.</p> <p>2.5 Interpret graphical presentations.</p>
Learning outcome 3	Transpose a given equation for any variable in equation.
Assessment criteria	<p>3.1 Transpose an equation in order to calculate an unknown value.</p> <p>3.2 Transpose an equation involving several variables (eg series/parallel resistors).</p> <p>3.3 Transpose an equation involving parentheses.</p>

Learning outcome 4	Apply trigonometry to problem solving
Assessment criteria	<p>4.1 Use trigonometric ratios to solve practical problems</p> <p>4.2 Apply Pythagoras' theorem to practical problems</p> <p>4.3 Solve problems using the sine and cosine rules</p> <p>4.4 Determine the sine and cosine of angles up to 720°</p>
Learning outcome 5	Resolve vectors/phasors given any combination of magnitude and direction:
Assessment criteria	<p>5.1 Describe the use of vectors/phasors in electrotechnology situations</p> <p>5.2 Define a vector/phasor</p> <p>5.3 Draw a vector/phasor diagram.</p> <p>5.4 Resolve a vector/phasor into horizontal and vertical components</p> <p>5.5 Determine a resultant using a vector/phasor polygon.</p>
Learning outcome 6	Solve electrotechnology calculations systematically
Assessment criteria	<p>6.1 Analyse word problems and identify data</p> <p>6.2 Convert relevant data to <i>SI Unit</i> format</p> <p>6.3 Insert <i>SI Unit</i> data into relevant equations and obtain solution</p>
8. Delivery of the module	
Delivery strategy	<p>Delivery strategies must be suitable for both theoretical and practical learning and address the module purpose.</p> <p>It is recommended that learning and assessment be facilitated in a holistic manner, which may require a learning outcome sequence other than that indicated in the body of the module.</p> <p>Also an integrated theory/practice approach should be used where students learn by experimentation and through practical application.</p>

Resource requirements

Resources should be sufficient for students to carry out exercises on an individual basis.

Trainers/teachers/facilitators must have qualifications in the relevant subject area they are engaged to deliver recognised trainer and assessment training and at least five years relevant work experience.

Useful references include:

Class notes

Mathematical reference books/manuals

Vocational problems and applications to be derived from real workplace experiences using industry sources and/or personnel

Bridging the Gap.

Occupational health and safety requirements

A safe and healthy environment will be provided for students and teachers as well as safety procedure with regard to learning/teaching activity.