

## APPLY ENGINEERING MATHEMATICS

**UNIT CODE:** ENG/OS/IPO/CC/02/5/A

### UNIT DESCRIPTION

This unit describes the competencies required by a technician in order to apply algebra, carry out binomial expansion, apply coordinate geometry, trigonometric functions, carry out mensuration, apply statistics, matrix methods and vectors

### ELEMENTS AND PERFORMANCE CRITERIA

<b>ELEMENT</b> These describe the key outcomes which make up workplace function.	<b>PERFORMANCE CRITERIA</b> These are assessable statements which specify the required level of performance for each of the elements. <i><b>Bold and italicized terms are elaborated in the Range.</b></i>
1. Apply Algebra	1.1 Calculations involving Indices are performed as per the concept 1.2 Calculations involving Logarithms are performed as per the concept 1.3 Scientific calculator is used in solving mathematical problems in line with manufacturer's manual 1.4 Simultaneous equations are performed as per the rules 1.5 Quadratic equations are calculated as per the concept 1.6 Ratios and proportions are worked out
2. Apply Coordinate Geometry	3.1 Graphs of given polar equations are drawn using the Cartesian plane 3.2 Polar equations are calculated using coordinate geometry 3.3 Normal and tangents are determined using coordinate geometry
3. Apply trigonometric functions	3.1 Trigonometric rules are stated and derived 3.2 Calculations are performed using trigonometric rules
4. Carry out mensuration	4.1 Perimeter and areas of figures are obtained 4.2 Volume and surface area are obtained 4.3 Area of irregular figures are obtained
5. Apply Statistics	5.1 Mean, median, mode and Standard deviation

	are obtained from given data 5.2 Sampling methods are applied in data collection
6. Apply Matrix	6.1 Determinant and inverse of 2x2 matrix are obtained 6.2 Solutions of simultaneous equations are obtained
7. Apply Vectors	7.1 Vectors and scalar quantities are obtained in two dimensions 7.2 <i>Operations</i> on vectors are performed 7.3 Position of vectors is obtained

### 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
<ul style="list-style-type: none"> <li><i>Operations</i> may include but not limited to:</li> </ul>	<ul style="list-style-type: none"> <li>Addition</li> <li>Subtraction</li> </ul>

### 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:

- Applying fundamental operations (addition, subtraction, division, multiplication)
- Using and applying mathematical formulae
- Logical thinking
- Problem solving
- Applying statistics
- Drawing graphs
- Using different measuring tools

#### Required Knowledge

The individual needs to demonstrate knowledge of:

- Fundamental operations (addition, subtraction, division, multiplication)
- Calculating area and volume
- Types and purpose of measuring instruments
- Units of measurement and abbreviations
- Rounding techniques
- Types of fractions
- Types of tables and graphs
- Presentation of data in tables and graphs

- Vector operations
- Matrix operations

## 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"> <li>1.1 Applied Trigonometry functions</li> <li>1.2 Applied algebraic equations</li> <li>1.3 Carried out mensuration</li> <li>1.4 Applied Vector theory</li> <li>1.5 Applied Matrix</li> </ul>
2. Resource Implications	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> <li>2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place</li> <li>2.2 Measuring instruments and equipment</li> <li>2.3 Scientific calculator</li> <li>2.4 Materials relevant to the tasks</li> </ul>
3. Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <ul style="list-style-type: none"> <li>1.1 Direct Observation</li> <li>1.2 Demonstration with Oral Questioning</li> <li>1.3 Written tests</li> </ul>
4. Context of Assessment	<p>Competency may be assessed individually in the actual workplace or through accredited institution</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>