

## APPLY MATHEMATICAL SKILLS

UNIT CODE: CON/OS/ARC/CC/01/5/A

### UNIT DESCRIPTION:

This unit describes the competencies required by a technician in order to apply a wide range of mathematical skills in their work; apply ratios, rates and proportions to solve problems; estimate, carry out measurement; collect, organize and interpret statistical data; use common formulae and algebraic expressions to solve problems.

### ELEMENTS AND PERFORMANCE CRITERIA

| <b>ELEMENT</b><br><b>This describes the key outcomes which make up workplace functions</b> | <b>PERFORMANCE CRITERIA</b><br><b>These are assessable statements which specify the required level of performance for each element.</b><br><i><b>Bold and italicised terms are elaborated in the range</b></i>   |
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| 1. Apply algebra   | 1.1 Calculations involving Indices are performed as per the concept<br>1.2 Calculations involving Logarithms are performed as per the concept<br>1.3 Scientific calculator is used in solving mathematical problems in line with manufacturer's manual<br>1.4 Simultaneous equations are performed as per the rules<br>1.5 Quadratic equations are calculated as per the concept |
| 2. Apply Trigonometry and hyperbolic functions   | 2.1 calculations are performed using trigonometric rules<br>2.2 calculations are performed using <i><b>hyperbolic functions</b></i>  |
| 3. Apply Coordinate Geometry   | 3.1 Polar equations are calculated using coordinate geometry<br>3.2 Graphs of given polar equations are drawn using the Cartesian plane<br>3.3 Normal and tangents are determined using coordinate geometry  |
| 4. Carry out Mensuration   | 4.1 Perimeter and areas of figures are obtained<br>4.2 Volume and of Surface area of solids are obtained<br>4.3 Area of irregular figures are obtained<br>4.4 Areas and volumes are obtained using Pappus theorem  |
| 5. Apply Statistics  | 5.1 Identification, Collection and Organization of data is performed<br>5.2 Interpretation, analysis and presentation of data in appropriate format is performed<br>5.3 Mean, median, mode and Standard deviation are obtained from given data   |

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|                 | <p>5.4 Calculations are performed based on Laws of probability</p> <p>5.5 Calculation involving probability distributions, mathematical expectation sampling distributions are performed</p> <p>5.6 Sampling distribution methods are applied in data analysis</p> <p>5.7 Calculations involving use of standard normal table, sampling distribution, T-distribution and Estimation are done</p> |
| 6. Apply Matrix | <p>6.1 Determinant and inverse of 3x3 matrix are obtained</p> <p>6.2 Solutions of simultaneous equations are obtained</p> <p>6.3 Calculation involving Eigen values and Eigen vectors are performed</p>  |

### 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   |
|---|---|
| 1. Operations may include but not limited to:           | <ul style="list-style-type: none"> <li>• Addition</li> <li>• Subtraction</li> </ul>   |
| 2. Hyperbolic functions may include but not limited to: | <ul style="list-style-type: none"> <li>• Sinh x</li> <li>• Cosh x</li> <li>• Cosec x</li> <li>• Coth x</li> <li>• Tanh x</li> <li>• Sech x</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 formulas
- 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      | Assessment requires evidence that the candidate:<br>1.1 Applied algebra<br>1.2 Applied Trigonometry<br>1.3 Applied Co-ordinate Geometry<br>1.4 Carried out Mensuration<br>1.5 Applied Statistics<br>1.6 Applied Matrix                        |
| 2. Resource Implications               | The following resources should be provided:<br>2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place<br>2.2 Measuring equipment<br>2.3 Materials relevant to the proposed activity or tasks |
| 3. Methods of Assessment               | Competency in this unit may be assessed through:<br>1.1 Direct Observation<br>1.2 Demonstration with Oral Questioning<br>1.3 Written tests  |
| 4. Context of Assessment               | Competency may be assessed<br>4.1 On job<br>4.2 Off job<br>4.3 During Industrial Attachment   |
| 5. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.  |