ENGINEERING MATHEMATICS

UNIT CODE: ENG/CU/EI/CC/01/5

Relationship to Occupational Standards

This unit addresses the unit of competency: Apply engineering mathematics

Duration of Unit: 70 hours

Unit Description

This unit describes the competencies required by a technician in order to apply algebra, binomial expansion, coordinate geometry, trigonometric functions, mensuration, statistic, matrix, vectors and calculus.

Summary of Learning Outcomes

1. Apply Algebra
2. Carry out Binomial Expansion
3. Apply Coordinate Geometry
4. Apply Trigonometric functions
5. Carry out Mensuration
6. Apply Statistics
7. Apply Matrix
8. Apply Vectors
9. Apply Calculus

Learning Outcomes, Content and Suggested Assessment Methods

Building Technology Curriculum		
Learning Outcome	**Content**	**Suggested Assessment Methods**

1. Apply Algebra	❑ Base and Index ❑ Law of indices ❑ Indicial equations ❑ Laws of logarithm ❑ Logarithmic equations ❑ Conversion of bases ❑ Use of calculator ❑ Reduction of equations ❑ Solutions of simultaneous linear equations in two unknowns ❑ Solution of quadratic equation	❑ Written tests ❑ Oral questioning ❑ Assignments ❑ Supervised exercises
2. Carry out Binomial Expansion	❑ Binomial theorem Power series using binomial theorem Roots of numbers using binomial theorem. ❑ Estimation of errors of small changes using binomial theorem.	❑ Written tests ❑ Oral questioning ❑ Assignments ❑ Supervised exercises
3. Apply Coordinate Geometry	❑ Polar equations ❑ Cartesian equation ❑ Graphs of polar equations ❑ Normal and tangents	❑ Written tests ❑ Oral questioning ❑ Assignments ❑ Supervised exercises
4. Apply Trigonometry and hyperbolic functions	❑ Half -angle formula ❑ Factor formula ❑ Trigonometric functions ❑ Parametric equations ❑ Relative and absolute measures ❑ Measures calculation ❑ Osborne's Rule ❑ Ashx+bshx=C equation ❑ One-to-one relationship in functions ❑ Inverse functions for one-to-one relationship ❑ Inverse functions for trigonometric functions ❑ Graph of inverse functions of trigonometry	❑ Written tests ❑ Oral questioning ❑ Assignments ❑ Supervised exercises

5. Carry out Mensuration	❑ Units of measurements ❑ Perimeter and areas of regular figures ❑ Volume of regular solids ❑ Surface area of regular solids ❑ Area of irregular figures ❑ Areas and volumes using Pappus theorem	❑ Written tests ❑ Oral questioning ❑ Assignments ❑ Supervised exercises
6. Apply Statistics	❑ Measures of central tendency mean, mode and median ❑ Measures of dispersion ❑ Variance and standard deviation ❑ Grouped and ungrouped data presentation ❑ Application of statistics ❑ Expectation variance and S.D. ❑ Types of sampling methods	❑ Assignments ❑ Oral questioning ❑ Supervised exercises ❑ Written tests ❑ Simulation ❑ Data modelling
7. Apply Matrix methods	❑ Matrix operation ❑ Determinant of 2x2 matrix ❑ Inverse of 2x2 matrix ❑ Solution of linear simultaneous equations in 2 unknowns ❑ Application of matrices	❑ Assignments ❑ Oral questioning ❑ Supervised exercises ❑ Written tests
8. Apply Vector	❑ Vectors and scalar in two dimensions ❑ Operations on vectors: Addition and Subtraction ❑ Dot and Cross product ❑ Gradient, Divergence and curl ❑ Position vectors ❑ Resolution of vectors	❑ Assignments ❑ Oral questioning ❑ Supervised exercises ❑ Written tests
9. Apply Calculus	❑ Definition of derivatives of a function ❑ Differentiation from fist principle • Quotient rule • Product rule ❑ Definition of integration	❑ Written tests ❑ Oral questioning ❑ Assignments ❑ Supervised exercises

	❑ Definite integral ❑ Methods of integration ❑ Application of integration.	

Suggested Delivery Methods

- Group discussions
- Demonstration by trainer
- Exercises by trainee

Recommended Resources

- Scientific Calculators
- Rulers, pencils, erasers
- Charts with presentations of data
- Graph books
- Dice
- Computers with internet connection