REPUBLIC OF KENYA

COMPETENCY BASED MODULAR CURRICULUM

FOR AGRICULTURAL ENGINEERING
KNQF LEVEL 5

(CYCLE 3)

PROGRAMME ISCED CODE: 0716 454 A

TVET CDACC
P.O. BOX 15745-00100 NAIROBI

APPLIED MATHEMATICS

UNIT CODE: 0716 441 05A

TVET CDACC UNIT CODE: ENG/CU/AGR/CC/02/5/MA

Relationship to Occupational Standards

This unit addresses the Unit of Competency: **Apply Mathematics**

Unit Duration: 80 Hours

Unit Description

This unit describes the competences required to apply trigonometric functions, carry out mensuration, and apply statistics and probability

Summary of Learning Outcomes

S/No.	Learning Outcomes	Duration (Hours)
1.	Apply algebra	20
2.	Apply trigonometric functions	20
3.	Carry out mensuration	20
4.	Apply statistics and probability	20
TOTAL		**80**

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Apply algebra	1.1 Indices
	
	        1.1.1 Power zero
	
	        1.1.2 Negative powers
	
	        1.1.3 Fractional powers
	
	        1.1.4 Laws of indices
	
	            1.1.4.1 Addition
	
	            1.1.4.2 Subtraction
	
	            1.1.4.3 Division
	
	            1.1.4.4 Multiplication
	
	1.2 BODMAS
		• Written tests

	1.3 Roots	
	1.3.1 Square roots	
	1.3.2 Cube roots	
	1.3.3 n^{th} roots	
	1.4 Logarithms	
	1.4.1 Laws of Logarithms	
	1.4.1.1 Product Law	
	1.4.1.2 Quotient Law	
	1.4.1.3 Power Law	
	1.5 Use of scientific calculator	
	1.5.1 Power ON/OFF	
	1.5.2 Mode	
	1.5.2.1 Degree	
	1.5.2.2 Radian	
	1.5.2.3 Gradient	
	1.5.2.4 SD	
	1.5.3 Clear	
	1.5.4 Save	
	1.5.5 Shift	
	1.6 Simultaneous equations (up to 3 equations)	
	1.6.1 Elimination	
	1.6.2 Substitution	
	1.6.3 Reduction	
	1.6.4 Graphical	
	1.7 Quadratic equations	
	1.7.1 Factorization	
	1.7.2 Quadratic formula	
	1.7.3 Completing the square	
	1.7.4 Graphical	
2. Apply trigonometric functions	2.1 Angles	• Written tests
	2.1.1 Acute	
	2.1.2 Obtuse	

	2.1.3 Reflex	
	2.1.4 Right angle	
	2.2 Triangles	
	2.2.1 Isosceles	
	2.2.2 Equilateral	
	2.2.3 Right angled	
	2.2.4 Scalene	
	2.3 Trigonometric Ratios	
	2.3.1 Sine	
	2.3.2 Cosine	
	2.3.3 Tangent	
	2.3.4 Cosecant	
	2.3.5 Secant	
	2.3.6 Cotangent	
	2.4 Trigonometric Identities	
	2.4.1 Proof of identities	
	2.4.2 Pythagorean identities	
	2.5 Solve trigonometric equations	
	2.6 Hyperbolic functions	
	2.6.1 Sinh x	
	2.6.2 Cosh x	
	2.6.3 Cosech x	
	2.6.4 Tanh x	
	2.6.5 Sech x	
2. Carry out mensuration	4.1 Units and symbols of measurement	• Written tests
	4.1.1 Mass	
	4.1.2 Distance	
	4.1.3 Speed	
	4.1.4 Temperature	
	4.1.5 Time	
	4.2 Imperial and metric units	
	4.2.1 Conversions	
	4.3 Perimeter	

	4.3.1 Regular shapes
	4.4 Area
	    4.4.1 Regular shapes
	4.5 Volume
	    4.5.1 Regular shapes	

3. Apply statistics and probability	5.1 Data presentation
	    5.1.1 Continuous variables
	        5.1.1.1 Histogram
	        5.1.1.2 Line
	    5.1.2 Discrete variable
	        5.1.2.1 Bar graph
	        5.1.2.2 Pie graph
	    5.1.3 Grouped data
	        5.1.3.1 Histogram
	        5.1.3.2 Bar
	        5.1.3.3 Cumulative
	             frequency
	        5.1.3.4 ogive
	    5.1.4 Ungrouped data
	        5.1.4.1 Line
	        5.1.4.2 Cumulative
	             frequency
	5.2 Measures of central tendency
	    5.2.1 Mean
	        5.2.1.1 Grouped data
	        5.2.1.2 Ungrouped data
	    5.2.2 Mode
	        5.2.2.1 Grouped data
	        5.2.2.2 Ungrouped data
		• Written tests

	5.2.3 Medium
	
	   5.2.3.1 Grouped data
	
	   5.2.3.2 Ungrouped data
	
	5.3 Measures of dispersion
	
	 5.3.1 Standard deviation
	
	   5.3.1.1 Grouped data
	
	   5.3.1.2 Ungrouped data
	
	 5.3.2 Variance
	
	   5.3.2.1 Grouped data
	
	   5.3.2.2 Ungrouped data
	
	5.4 Probability
	
	 5.4.1 With replacement
	
	 5.4.2 Without replacement
	
	5.5 Probability distribution functions
	
	 5.5.1 Binomial distribution
	
	 5.5.2 Poisson distribution
	
	5.6 Normal distribution

Suggested Delivery Methods

- Demonstration
- Group discussions
- Exercises
- Online materials
- Direct instructions
- Simulation

Recommended Resources for 30 trainees

S/No.	Category/Item	Description/Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	**Learning Materials**			
1.	Textbooks	Comprehensive textbooks on Engineering Mathematics	30	1:1

2.	Graph books	For graphical representation of solutions	30	1:1
3.	Projector	Functional projector for displaying content during presentations	1	1:30
4.	Computer	Functional desktop computer with online instructional content	1	1:30
5.	White board	Quality whiteboard of approximately 6 ft by 3 ft for writing during theory instruction	1	1:30
6.	Printer	An ink-jet, laser-jet or toner-cartridge printer for printing notes, instructions and working drawings	1	1:30
B	**Learning Facilities & Infrastructure**			
	Lecture/Theory Room	Spacious room with seats for 25 trainees, approximately 60 sqm	1	1:30
C	**Materials and Supplies**			
	First Aid kit	Fully equipped First Aid kit for use in case of accidents	1	1:30
D	**Tools and Equipment**			
	Set of Mathematical instruments	For constructions and measurements	30	1:1
	Scientific Calculator	For Calculations	30	1:1
	Firefighting equipment	Water, carbon dioxide and chemical powder fire extinguishers for fire fighting	1	1:30

E	Reference Materials			
	Training Presentations/Slides	Digital format for shared access among trainees	1	1:30
	Standard Mathematical Tables	For reference on formulae, identities, laws and principles	30	1:1