Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

APPLIED MATHEMATICS

GENAT302 Apply Algebra and Trigonometry

Competence

RQF Level: 3

Learning Hours 60

Credits: 6

Sector: All Sector except Hospitality and Tourism, Arts and Crafts, ICT and Multimedia

Trade: All trades except Food and Beverages Operations, Front Office and Housekeeping operations, Tourism, Fashion design, Fine and Plastic Arts, Music and Performing Arts, Computer Systems and Architecture, Multimedia Production, Software Development, Networking and Internet Technologies, Software Programming and Embedded Systems

Module Type: General

Curriculum: GENAT302-TVET CERTIFICATE 3 - All Sectors except Hospitality AND Tourism, Arts and Crafts, ICT and Multimedia

Issue Date: April 2022

Purpose statement	This general module describes the knowledge, skills and attitude required to apply fundamental algebra and trigonometry. The ability to do fundamental algebra and trigonometry is absolutely vital to successfully passing any field. At the end of this module, the trainee of Level Three will be able to solve graphically and algebraically linear or quadratic equations and inequalities. He/she will also be able to apply fundamentals of trigonometry. As Algebra and trigonometry are tools of different fields, this module will be useful to trainee as a means of both measuring and improving their understanding of Mathematics and he/she will be prepared to perform well in any field that requires some knowledge of mathematics especially algebra and trigonometry.					
Delivery modality	**Training delivery**		**100%**	**Assessment**		**Total 100%**
	Theoretical content		30%	Formative assessment	30%	50%
	Practical work:		70%		70%	
	• Group project and presentation	20%				
	• Individual project /Work	50%				
				Summative Assessment		50%

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Solve algebraically or graphically linear and quadratic equations	1.1. A linear equation and inequality are correctly solved in accordance with the required steps
	1.2. The parameter from given equations is properly discussed based on established conditions
	1.3. Two simultaneous linear equations are properly solved in accordance with the required steps
	1.4. A quadratic equation is effectively solved in accordance with the required steps
2. Apply matrices in solving simultaneous linear equations	2.1. Matrices properties are properly described based on mathematical operations.
	2.2. Determinant is correctly computed in line with matrix order.
	2.3. Simultaneous linear equations are correctly solved based on Cramer's method.
3. Apply fundamentals of trigonometry	3.1. Angles are appropriately described based on rotating an initial side, from a fixed point to terminal considered position.
	3.2. Trigonometric ratios are appropriately determined based on isosceles right-angled triangle and equilateral triangle.
	3.3. Trigonometric identities are appropriately described based on comparison of

		trigonometric ratios of two defined angles.
	3.4.	Trigonometric equations are correctly solved based on trigonometric ratios.
	3.5.	A given triangle is appropriately solved based on Pythagorean Theorem and trigonometric ratios.
4. Apply fundamentals of complex numbers	4.1	Complex numbers are adequately described based on calculation process.
	4.2	Operations on complex numbers are properly performed based on imaginary unit.
	4.3	Complex number is correctly expressed in polar or exponential form based on modulus and argument.

Course content

Learning outcomes	**At the end of the module the learner will be able to:**
	1. Solve algebraically or graphically linear and quadratic equations **2.** Apply matrices in solving simultaneous linear equations **3.** Apply fundamentals of trigonometry **4.** Apply fundamentals of complex numbers

Learning outcome 1: Solve algebraically or graphically linear and quadratic equations	**Learning hours: 20**

Indicative content

- **Solving linear equations and inequalities**
  - ✓ Algebraic method
  - ✓ Graphical method
- **Discussion on parameter from a given equation**
- **Solving two simultaneous linear equations**
  - ✓ Algebraic method
  - ✓ Graphical method
- **Solving a quadratic equation**
  - ✓ Algebraic method
    - Factorizing method
    - Square root property
    - Completing the square
    - Quadratic formula
  - ✓ Graphical method
    - Construction of a parabola

- ✓ Determination of solutions set

Resources required for the learning outcome	
Equipment	Black/white board, Computer, projector, Reference books
Materials	Piece of chalks/ markers
Tools	Geometric instruments
Facilitation techniques	Demonstration and simulation, Individual and group work ,Trainer guided ,Group discussion
Formative assessment methods	Written assessment , Performance assessment

Learning outcome 2: Apply matrices in solving simultaneous linear equations	**Learning hours: 10**

Indicative content

- **Description of matrices properties**
  - ✓ Matrices definition
  - ✓ Operations on matrices
    - Addition
    - subtraction
    - Multiplication
- **Computation of determinant**
  - ✓ Matrix of order 2
  - ✓ Matrix of order 3
- **Solving simultaneous linear equations**
  - ✓ **Cramer's rule**
    - Existence of uniqueness of solution
    - Two simultaneous linear equations
  - ✓ Three simultaneous linear equations

Resources required for the indicative content	
Equipment	Black/white board, Computer, projector, Reference books

Materials	Piece of chalks/ markers
Tools	Scientific calculator
Facilitation techniques	Demonstration and simulation, Individual and group work ,Trainer guided ,Group discussion
Formative assessment methods	Written assessment , Performance assessment

Learning outcome 3: Apply fundamentals of trigonometry	**Learning hours: 15**
Indicative content	

- **Description of angles**
  - ✓ Angle definition by rotation
  - ✓ Angles measurement
    - Radian
    - Degree
  - ✓ Units conversion
  - ✓ Pythagorean theorem
- **Determination of trigonometric ratios**
  - ✓ Definition of trigonometric ratios
  - ✓ Calculation of trigonometric ratios of special angles
    - 30^0
    - 45^0
    - 60^0
    - **90^0**
- **Description of trigonometric identities**
  - ✓ Relationship between trigonometric ratios of some angles
    - Complementary angles
    - Supplementary angles
  - ✓ Trigonometric ratios of Sum or difference of two angles
  - ✓ Trigonometric ratios of double angle
- **Solving trigonometric equations**
  - ✓ Equations reducible to the form;
    - $\sin(x+\alpha)=k,\ |k|\le 1$
    - $\cos(x+\alpha)=k,\ |k|\le 1$
    - $\tan(x+\alpha)=b$
    - $\sin nx=k$
    - $\cos nx=k$

- ✓ Equation of the form $a\sin x + b\cos x = c$
- **Solving a given triangle**
  - ✓ Sine law
  - ✓ Cosine law

Resources required for the indicative content	
Equipment	Computer, projector, black/white board, Reference books, Hand-out notes , Internet connection
Materials	Markers, Didactic materials
Tools	Scientific calculator
Facilitation techniques	Demonstration and simulation, Individual and group work, Practical exercise, Trainer guided
Formative assessment methods	Written assessment , Performance assessment

Learning outcome 4: Apply fundamentals of complex numbers	Learning hours: 15

Indicative content

- **Description of complex numbers**
  - ✓ Definition and properties of 'i'
  - ✓ Real part
  - ✓ Imaginary part
  - ✓ Argand diagram
- **Preforming operations on complex numbers**
  - ✓ Addition
  - ✓ Subtraction
  - ✓ Multiplication
  - ✓ Division
  - ✓ Modulus of a complex number
  - ✓ Square roots of a complex number
  - ✓ Solving equations in complex numbers
- **Expression of complex numbers**
  - ✓ Argument
  - ✓ polar form
    - Product and quotient
    - Power of complex number in polar form
    - De Moivre's theorem
  - ✓ Exponential form
    - Linearization

Resources required for the indicative content

Equipment	Computer, projector, black/white board, Reference books, Hand-out notes , Internet connection
Materials	Markers, Didactic materials
Tools	Scientific calculator
Facilitation techniques	Demonstration and simulation , Individual and group work, Practical exercise ,Trainer guided
Formative assessment methods	Written assessment , Performance assessment

References:

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