

15.2.0 MATHEMATICS II

15.2.01 INTRODUCTION

This module unit is intended to equip the trainee with relevant mathematical knowledge, skills and attitudes to enhance better understanding of specialised areas of the trade.

15.2.02 GENERAL OBJECTIVES

By the end of the module unit, the trainee should be able to:

- a) Understand mathematical concepts relevant to area of specialization
- b) Apply mathematical concepts to solve problems
- c) Appreciate mathematics as a tool for technological development

15.2.0 MODULE UNIT SUMMARY AND TIME ALLOCATION

MATHEMATICS II

Code	Sub Module Unit	Content	Time Hrs
15.2.1	Algebra	<ul style="list-style-type: none">• Simultaneous equations• Quadratic equations• Binomial theorem	10
15.2.2	Trigonometry and Hyperbolic Functions	<ul style="list-style-type: none">• Trigonometric ratios• Factor formulae• Solution of triangles• Trigonometric equations• Hyperbolic functions	18
15.2.3	Vector	<ul style="list-style-type: none">• Vector algebra and theorems• Dot and cross products• Gradient, divergence and curl of scalar and vector functions	12
15.2.4	Matrices II	<ul style="list-style-type: none">• Matrix operations	14

		<ul style="list-style-type: none"> • Determinants • Cofactor • Cramer's rule • Inverse of 3x3 matrix • Solution of simultaneous equations 	
15.2.5	Calculus	<ul style="list-style-type: none"> • Differentiation and its applications • Integration 	12
Total Time			66

15.2.1	ALGEBRA		theorem to estimate errors of small changes
15.2.1T0	Specific Objectives By the end of the sub module unit, the trainee should be able to:		Content
	a) solve linear simultaneous equations	15.2.1T1	Solution of linear simultaneous equations
	b) reduce equations to quadratic equations	15.2.1T 2	Reduction of equations to quadratic equations
	c) solve quadratic equations	15.2.1T 3	Solution of equations reduced to quadratic equations
	d) state and use the binomial theorem	15.2.1T 4	Statement and use of binomial theorem
	e) apply binomial theorem to estimate errors of small changes	15.2.1T 5	Application of binomial theorem to estimate errors
		15.2.2	TRIGONOMETRY AND HYPERBOLIC FUNCTIONS
15.2.1C	<i>Competence</i> The trainee should have the ability to apply binomial	15.2.2T0	Specific Objectives By the end of the sub-module unit, the

	trainee should be able to:		Application
	a) define trigonometrical ratios, compound angles, double angles and factor formulae	15.2.3T	VECTOR
	b) solve right angled	15.2.3T0	<i>Specific Objectives</i>
	c) triangular trigonometrical equations		By the end of the sub-module unit, the trainee should be able to:
	d) define hyperbolic ratios,		a) define a vector and scalar
	e) state obsbourné's rule and solve hyperbolic equations		b) distinguish between a vector and scalar quantity
15.2.1C	<i>Competence</i> The trainee should have the ability to apply trigonometry and hyperbolic functions in solving real life situations		c) define vector theorems
			d) solve problems involving the dot and cross products
			e) solve problems on gradient, divergence and curl operators
15.2.2T1	<i>Content</i> Trigonometric ratios Sketches Compound formulae Deviation of factor formulae	15.2.1C	<i>Competence</i> The trainee should have the ability to:
15.2.2T2	Solution of right angled triangle parameters		f) define a vector and scalar
15.2.2T3	Definition of hyperbolic ratios		g) distinguish between a vector and scalar quantity
15.2.2T4	Obsourné's rule Statement		h) define vector theorems

	i) solve problems involving the dot and cross products		operations
	j) solve problems on gradient, divergence and curl operators		b) determine the determinant of a 3x3 matrix using co-factor method and sirus rule
			c) solve a problem using crammers rule
			d) determine the inverse of a 3x3 matrix
			e) apply matrices in solving linear simultaneous equations with three unknowns
	<i>Content</i>		
15.2.3T 1	Definition of a vector and scalar		
15.2.3T 2	Distinction between a vector and scalar quantity		
15.2.3T 3	Definition of vector theorem		
	Resolution	15.2.1C	<i>Competence</i>
	Proof of ratio theorem		The trainee should have the ability to:
	Application of ratio theorem		i.perform 3x3 matrix
15.2.3T 4	Solution of problems on dot and cross products		ii.operations
15.2.3T5	Gradient, divergence and curl operators		iii.determine the
	Definition		iv.determinant of a 3x3 matrix using co-factor method and sirus rule
	Calculations		v.solve a problem
15.2.4	MATRICES II		vi.using crammers rule
15.2.4T0	<i>Specific Objectives</i>		vii.determine the
	By the end of the sub-module unit, the trainee should be able to:		viii.inverse of a 3x3 matrix
	a) perform 3x3 matrix		ix.apply matrices in
			x.solving linear simultaneous equations with three unknowns

	<i>Content</i>		
15.2.4T1	Performing 3x3 matrix operations		e) determine higher derivatives
15.2.4T2	Determination of determinant of a 3x3 matrix using: Co-factor method Sirus rule		f) define partial derivatives of a function of two variables
15.2.4T3	Solution of problems using cramer's rule		g) solve problems involving small changes or errors using partial derivatives
15.2.4T4	Determination of the inverse of a 3x3 matrix		h) determine stationary points of functions of two variables
15.2.4T5	Application of matrices in solving linear simultaneous equations with three unknowns		integrate equations
			<i>Content</i>
15.2.5	CALCULUS	15.2.5T1	Definition of differentiation
15.2.5T0	<i>Specific Objectives</i> By the end of the sub-module unit, the trainee should be able to:	15.2.5T2	Determination of derivatives (X^n , trigonometric)
	a) define the derivative of a function	15.2.5T3	Reference to tables of derivatives
	b) find derivative of a function from the first principles	15.2.5T4	Rules of differentiation
	c) refer to the table of derivatives of common functions	15.2.5T5	Determination of higher derivatives
	d) state and use rules of differentiation	15.2.5T6	Definition of partial derivatives
		15.2.5T7	Solution of problems involving small changes
		15.2.5T8	Determination of stationary points
		15.2.5T9	Integration - X^n - Trigonometric functions