18.2.0   MATHEMATICS II

18.2.01   INTRODUCTION

This module unit is intended to equip the trainees with relevant mathematical knowledge, skills and attitudes to enhance their analytical skills and understanding in Electrical and Electronic sciences and other areas of the trade. Trainees undertaking this unit require to have completed Mathematics I of this course.

18.2.02   GENERAL OBJECTIVES

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

a) understand mathematical concepts relevant to electrical and electronic trade
b) apply mathematical concepts to solve problems
c) appreciate mathematics as a tool for technological development

18.2.0   MODULE UNIT SUMMARY AND TIME ALLOCATION

MATHEMATICS   II

Code	Sub Module Unit	Content	Hrs
18.2.1	Algebra	• Simultaneous equations Quadratic equations Binomial theorem	10
18.2.2	Trigonometry and Hyperbolic Functions	• Trigonometric ratios • Factor formulae • Solution of triangles • Trigonometric equations • Hyperbolic functions	18
18.2.3	Vector	• Vector algebra and theorems • Dot and cross products • Gradient, divergence and curl of scalar and • vector functions	12
18.2.4	Matrices II	• Matrix operations	14

195

		• Determinants • Cofactor • Crammer's rule • Inverse of 3x3 matrix • Solution of simultaneous equations	
18.2.5	Calculus	• Differentiation and its applications • Integration	12
Total Time			**66**

18.2.1 ALGEBRA

18.2.1T0 *Specific Objectives*
By the end of this unit, the trainee should be able to:
  a) solve linear simultaneous equations
  b) reduce equations to quadratic equations
  c) solve quadratic equations
  d) state and use the binomial theorem
  e) apply binomial theorem to estimate errors of small changes

Content
18.2.1T1 Solution of linear simultaneous equations
18.2.1T 2 Reduction of equations to quadratic equations
18.2.1T 3 Solution of equations reduced to quadratic equations
18.2.1T 4 Statement and use of binomial theorem
18.2.1T 5 Application of binomial theorem to estimate errors

18.2.2 TRIGONOMETRY AND HYPERBOLIC FUNCTIONS

18.2.2T0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:

  a) define trigonometrical ratios, compound angles, double angles and factor formulae
  b) solve right angled triangular trigonometrical equations
  c) define hyperbolic ratios,
  d) state Osborne's rule and solve hyperbolic equations

Content
18.2.2T1 Trigonometric ratios
  i) Sketches
  ii) Compound formulae
  iii) Deviation of factor formulae
18.2.2T2 Solution of right angled triangle parameters
18.2.2T3 Definition of hyperbolic ratios
18.2.2T1 Osborne's rule
  i) Statement
  ii) Application

18.2.3T VECTOR

18.2.3T0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
  a) define a vector and scalar
  b) distinguish between a vector and scalar quantity

197

c) define vector theorems
d) solve problems involving the dot and cross products
e) solve problems on gradient, divergence and curl operators

Content

18.2.3T 1 Definition of a vector and scalar

18.2.3T 2 Distinction between a vector and scalar quantity

18.2.3T 3 Definition of vector theorem
    i) Resolution
    ii) Proof of ratio theorem
    iii) Application of ratio theorem

18.2.3T 4 Solution of problems on dot and cross products

18.2.3T T5 Gradient, divergence and curl operators
    i) Definition
    ii) Calculations

18.2.4   MATRICES II

18.2.4T0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
a) Perform 3x3 matrix operations
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

Content

18.2.4T1 Performing 3x3 matrix operations

18.2.4T2 Determination of determinant of a 3x3 matrix using:
    i) Co-factor method
    ii) Sirus rule

18.2.4T3 Solution of problems using Cramer's rule

18.2.4T4 Determination of the inverse of a 3x3 matrix

18.2.4T5 Application of matrices in solving linear simultaneous equations with three unknowns

18.2.5   CALCULUS

18.2.5T0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
a) define the derivative of a function
b) find derivative of a function from the first principles

198

c)	refer to the table of derivatives of common functions	*Content*
d)	state and use rules of differentiation	18.2.5T1 Definition of differentiation
e)	determine higher derivatives	18.2.5T2 Determination of derivatives (X_n, trigonometric)
f)	define partial derivatives of a function of two variables	18.2.5T3 Reference to tables of derivatives
g)	solve problems involving small changes or errors using partial derivatives	18.2.5T4 Rules of differentiation
h)	determine stationary points of functions of two variables	18.2.5T5 Determination of higher derivatives
i)	integrate equations	18.2.5T6 Definition of partial derivatives

c) refer to the table of derivatives of common functions

d) state and use rules of differentiation

e) determine higher derivatives

f) define partial derivatives of a function of two variables

g) solve problems involving small changes or errors using partial derivatives

h) determine stationary points of functions of two variables

i) integrate equations

Content

18.2.5T1 Definition of differentiation

18.2.5T2 Determination of derivatives (X_n, trigonometric)

18.2.5T3 Reference to tables of derivatives

18.2.5T4 Rules of differentiation

18.2.5T5 Determination of higher derivatives

18.2.5T6 Definition of partial derivatives

18.2.5T7 Solution of problems involving small changes

18.2.5T8 Determination of stationary points

18.2.5T9 Integration
  i) X_n
  ii) Trigonometric functions