5.1.0   MATHEMATICS I

5.1.01 Introduction
This module unit is intended to equip the trainee with knowledge, skills and attitudes to enable him/her operate effectively in an organization.

5.1.02   General Objectives
By the end of the module unit, the trainee should be able to:
a) use mathematical concepts and techniques in solving problems in mechanical engineering.
b) Organize, draw simple deductions and conclusions from the given data in mechanical engineering
c) Interpret graphical representation of functions relevant to mechanical engineering

5.1.03   Module Unit Summary and Time Allocation

Mathematics I

Code	Sub-Module Unit	Content	Time (Hrs)
5.1.01	Fractions and Decimals	• Proper fractions and mixed fractions • Conversion of mixed fractions to improper fractions and vice versa • Comparison of fractions • Application of fractions to real life situations • Conversion of fractions into decimals and vice versa • Recurring decimals • Conversion of recurring decimals • Application of the knowledge of decimals to engineering problems	10
5.1.02	Indices and Logarithms	• Base and index • Laws of indices • Operation on indices • Definition of logarithms • Laws of logarithms	

		• Operation of logarithms		10
		• Conversion of bases of logarithms		
		• Use of calculator in solving problems related to logarithms		
5.1.03	Sequence and Series	• Sequences and series		
		• Arithmetic and geometric progressions		
		• Simple and compound interest		9
5.1.04	Ratios and Proportions	• Definition of terms		
		• Examples		
		• Expressions of ratios as a percentage and vice- versa		10
		• Solve problems involving ratios and proportions		
5.1.05	Algebra	• Manipulation of algebraic expressions		
		• Transposition of formulae		
		• Solution of simultaneous equations		9
		• Solutions of quadratic equations		
5.1.06	Graphs & Charts	• Plotting of linear graphs		
		• Interpretations of linear graphs		
		• Use of linear graphs		
		• Solution of linear equations		
		• Plotting curves of second degree		
		• Presentation of data in charts		9
5.1.07	Measurements	• Units of measurements		
		• Conversion of units		
		• Perimeter and area of regular figures		9
		• Area of irregular figures		
		• Surface area and volumes of solids		
Total Time				**66**

34

5.1.01   FRACTIONS AND DECIMALS

5.1.01T   *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to;
a) identify proper, improper and mixed fractions
b) convert mixed fractions to improper fractions and vice versa
c) compare fractions
d) apply the knowledge of fractions to real life situations
e) convert fractions into decimals and vice versa
f) identify recurring decimals
g) convert recurring decimals into fractions
h) apply the knowledge of decimals to engineering problems

Content
5.1.01T1   Proper fractions and mixed fractions
5.1.01T2   Conversion of fractions and vice versa
5.1.01T3   Comparison of fractions
5.1.01T4   Application of fractions to real life situations
5.1.01T5   Conversion of fractions into decimals and vice versa
5.1.01T6   Recurring decimals

5.1.01T7   Conversion of recurring decimals into fractions
5.1.01T8   Application of the knowledge of decimals to engineering problems

5.1.02   INDICES AND LOGARITHMS

5.1.02T   *Specific Objectives*
By end of the sub-module unit, the trainee should be able to;
a) define the terms base and index
b) state the laws of indices
c) perform simple operations of indices
d) define the term logarithm
e) state laws of logarithms
f) perform simple operations of logarithms
g) change the bases of logarithms
h) use the calculator in solving problems related to logarithms

Content
5.1.02T1   Base and index
5.1.02T2   Laws of indices
5.1.02T3   Operations on indices
5.1.02T4   Definition of logarithm
5.1.02T5   Laws of logarithms
5.1.02T6   Operations of logarithms
5.1.02T7   Conversion of bases of logarithms

5.1.02T8 Use of calculator in solving problems related to logarithms

5.1.03 SEQUENCE AND SERIES

5.1.03T *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to;
a) distinguish between a sequence and a series
b) solve problems involving series
c) apply the knowledge of series in calculating simple and compound interest

Content
5.1.03T1 Sequences and series
5.1.03T2 Arithmetic and geometric progressions
5.1.03T3 Simple and compound interest

5.1.04 RATIOS AND PROPORTIONS

5.1.04T *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to;
a) define terms
b) give examples of ratios and proportions
c) express ratios as a percentage and vice-versa

d) solve problems on ratios and proportions

Content
5.1.04T1 Definition of terms
i) ratio
ii) proportions
5.1.04T2 Examples
i) ratios
ii) proportion
- direct
- inverse
5.1.04T3 Ratios as percentage and vice-versa
5.1.04T4 Problems on ratios and proportions

5.1.04 ALGEBRA

5.1.04T *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to;
a) manipulate algebraic expressions
b) transpose formulae
c) solve simultaneous equations
d) solve quadratic equations

Content
5.1.04T1 Manipulation of algebraic expressions
i) addition
ii) subtraction
iii) multiplication
iv) simplification
5.1.04T2 Transposition of formulae
5.1.04T3 Solution of simultaneous equations

i) elimination method
ii) substitution method
5.1.04T4 Solution of quadratic equations
   i) factorization
   ii) completing squares
   iii) quadratic formula

5.1.05 GRAPHS & CHARTS

5.1.05T *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to;
   a) plot linear graphs
   b) make interpretation from linear graphs
   c) explain uses of linear graphs
   d) solve linear equations
   e) plot and interpret curves of second degree
   f) present data in charts

Content
5.1.05T1 Plotting linear graphs
   i) $y = a$
   ii) $x = b$
   iii) $y = mx + c$
5.1.05T2 Interpretation of linear graphs
   i) Y-intercepts
   ii) gradients
5.1.05T3 Uses of linear graphs
5.1.05T4 Solving linear equations
5.1.05T5 Plotting curves of second degree
5.1.05T6 Presentation of data in charts
   i) pie chart
   ii) bar chart

iii) pictogram
iv) histogram

5.1.06 MEASUREMENTS

5.1.06T *Specific objectives*
By the end of the sub-module unit, the trainee should be able to;
   a) select appropriate units of measurements
   b) convert units from one form to another
   c) calculate the perimeter and area of regular figures
   d) calculate areas of irregular figures
   e) calculate surface areas and volumes of solids

Content
5.1.06T1 Units of measurements
5.1.06T2 Conversion of units
5.1.06T3 Perimeter and area of regular figures
   i) rectangles/squares
   ii) triangles
   iii) circles
   iv) trapezium
   v) parallelogram/rhombus
5.1.06T4 Area of irregular figures
   i) trapezoidal rule
   ii) mid-ordinate rule
   iii) Simpson's rule
5.1.06T5 Surface areas and volumes of solids
   i) spheres
   ii) cones
   iii) cylinders
   iv) pyramids