9.0 General Studies	• Communication skills • Family life • Population • Pollution and other hazards • National Philosophy & Development • Leisure and Culture • Production • Saving Borrowing & investing • Buying and selling • Book keeping • Science & Technology • Government	88	
10.0 Applied Geometry	• General Communication • Plane Geometry • Solid Geometry • Pictorial Drawing • Orthographic Projections • Occupational information	132	
11.0 Motor Vehicle Mechanics	• Introduction • Safety • Tools and equipment • Vehicle layout • Engine • Transmission • Suspension • Wheels(Rims, Tyres, Tubes) • Brakes • Steering system • Fuel systems • Ignition system • Cooling system • Lubrication system • Electrical systems • Basic panel beating & spray painting • Basic driving techniques • Estimating and costing • Workshop organization	1584	1980

7.0 MATHEMATICS

7.01 INTRODUCTION

The subject is intended for trainees taking either business or technical Artisan courses. It is aimed at providing the trainee with adequate manipulative skills necessary to enhance better understanding of their trades.

7.02 GENERAL OBJECTIVES

At the end of this course unit, the trainee should be able to:-

a) acquire concepts and techniques that are necessary for the understanding and appreciation of various trades;
b) apply relevant mathematical knowledge in his trade;
c) develop careful habits of accurate judgement in his work.

7.03 SUBJECT CONTENT
FIRST YEAR (44 HOURS)

TOPIC	SUB-TOPIC	TIME (HRS)
7.1.1.S Basic Arithmetic	• Numbers • Rational Arithmetic • Manipulative skills • Mensuration	22
7.1.2.S Algebra I	• Simple Equations • Algebraic Expressions • Algebraic Formulae • Simple Simultaneous Equations	10
7.1.3.S Geometrical Calculations I	• Area of Figures • Pythagras' Theorem	12

7.04 SYMBOLS AND NOTATIONS

Besides the usual operational symbols +, -, x, and the combined ± may be used (e.g. in solution of quadratic equation and calculation of errors).

7.041 Relational Symbols

= is equal to
≠ is not equal to
> is greater than
≥ is greater than or equal to
< is less than
≤ is less than or equal to
≒ is approximate to
a:b ratio of a to b
∝ varies as or proportional to
≡ is congruent to grids identical
∽ is similar to

7.042 Quantity Notation In Formular

m = mass
d = density
u = initial velocity
v = final velocity
a = accelaration
t = time
s = seconds
g = acceleration due to gravity
n = n^{th} term
S_n = sum of n terms (n is subcript)

FIRST YEAR (44 HOURS)

7.1.1.S BASIC ARITHMETIC (22 HOURS)

7.1.1.1.S NUMBERS

7.1.11.S1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) identify various types of numbers;
b) carry out arithmetical operations accurately;
c) find squares and square roots of numbers from 3-figure tables;
d)use indices in multiplication and division .

7.1.1.1.S11 Types of numbers

i) counting,
ii) positive,
iii) negative integers,
iv) rational and irrational,
v) real numbers,
vi) absolute values of numbers.

7.1.1.1.S12 Arithmetical operations

i) addition and substraction of both positive and negative numbers,
ii) multiplication and division of both positive and negative numbers,
iii) order of arithmetic operations on expressions with brackets.

7.1.1.1.S13 Use of 3-figure tables to find

i) squares of positive and negative numbers,
ii) reciprocals.

7.1.1.1.S14 Indices (positive and negative)

i) multiplication and division of numbers with indices,
ii) fractional indices,
iii) reciprocals.

7.1.1.2.S RATIONAL ARITHMETIC

7.1.1.2.S1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) convert fractions to percentages and vice-versa;
b) solve simple problems involving direct and inverse proportions.

7.1.1.2.S11 Percentages and fractions

7.1.1.2.S12 Ratios and Proportions (unitary method only);

i) direct proportion,
ii) inverse proportion.

7.1.1.3.S MANIPULATIVE SKILLS

7.1.1.3.S1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) express figures to correct decimal places;
b) distinguish between significant and non-significant figures;
c) make simple estimation of quantities;
d) express decimals into fractions and vice versa;
e) express numbers in standard form.

7.1.1.3.S11 Aproximations;

i) decimal places,
ii) approximations of errors.

7.1.1.3.S12 Significant figures

7.1.1.3.S13 Estimations of quantities

7.1.1.3.S14 Conversion of decimals into fractions and vice versa;

i) recurring decimals,
ii) non-recurring decimals.

7.1.1.3.S15 Standard form;

$A \times 10^n$ (where n is an integer)
and $(1 \leq A < 10)$

7.1.1.4.S MENSURATION

7.1.1.4.S1 Specific Objectives

At the end of this topic the trainee should be able to:-

a) identify various units of measurements;
b) convert units from one form to another;
c) calculate perimeters, areas, and volumes using correct formulae;
d) express dimensions of regular figures using sketches.

7.1.1.4.S11 Common units of measurements;
i) length in metres (m),
ii) mass in kilogramme (kg),
iii) time in seconds (s).

7.1.1.4.S12 Conversion of units;
e. g. i) mm to m
ii) m to km
iii) g to kg

7.1.1.4.S13 Perimeters, Areas and Volumes;
i) perimeters,
ii) surface areas,
iii) volumes of solids and hollow figures,
iv) circumferences.

7.1.1.4.S14 Sketching of;
i) regular figures,
ii) solids,
iii) nets.

7.1.2.S ALGEBRA 1 (10 HOURS)

7.1.2.S1 Specific Objectives

At the end of this topic, the trainee should be able to:-
a) solve simple algebraic equations;
b) form simple algebraic equations;
c) represent linear equations;
d) form simple formula;
e) transpose given formula;
f) solve simple simultaneous equations.

7.1.2.S11 Simple equation;
i) simplification,
ii) substitution.

7.1.2.S12 Formulation of linear equations

7.1.2.S13 Graphical representation of linear equations

7.1.2.S14 Formation and transposition of formulae

7.1.2.S15 Simultaneous equations (involving linear equations with two unknowns) solution by;
i) substitution,
ii) elimination.

7.1.3.S GEOMETRICAL CALCULATIONS 1 (12 HOURS)

7.1.3.S1 Specific Objectives

At the end of this topic, the trainee should be able to:-
a) calculate areas of given;
i) quadrilaterals,
ii) triangles,
iii) circles.
b) apply pythagoras' theorem

7. 1. 3. S11 Areas of figures;
i) parallelogram,
ii) trapezium,
iii) circle,
iv) annulus,
v) sector,
vi) curved surface of a cylinder,
vii) surface area of a pyramid.

7.1.3.S12 Pythagoras' Theorem.

SUBJECT CONTENT
SECOND YEAR (44 HOURS)

TOPIC	SUB-TOPIC	TIME (HRS)
7.2.4.S Business Calculations	• Simple Social Arithmetic	12
7.2.5.S Statistics	• Data collection • Data organisation • Data representation • Median • Charts • Interpretation of data	8
7.2.7.S Geometrical Calculations II	• Cone • Pyramid	8
7.2.7.S Algebra I I	• Simple Quadratic Equations • Linear Graphs	11
7.2.8.S Geometrical Calculations III	• Trigonometry	5

7.2.4.S BUSINESS CALCULATIONS (12 HOURS)

7.2.4.S1 Specific Objectives

At the end of this topic the trainee should be able to carry out calculations commonly used in business.

7.2.4.S11 SIMPLE SOCIAL ARITHMETIC

i) profit and loss,
ii) discount and commission,
iii) rates and taxes,
iv) percentage loss and profit,
v) simple and compound interest.

7.2.5.S STATISTICS (8 HOURS)

7.2.5.S1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) collect data;
b) organize data;
c) represent data in frequency tables;
d) state the median of ungrouped data;
e) represent data in chart form;
f) interpret data from a given chart.

7.2.5.S11 Data Collection

e.g.i) class ages,
ii) heights,
iii) weights,
iv) sizes of waists.

7.2.5.S12 Data organization

i) range,
ii) arrange in order.

7.2.5.S13 Data Representation

Frequency table;

i) observation,
ii) tally marks,
iii) frequency,
iv) summation S_n (fx) and S_n (f),
v) identify mode,
vi) calculation of mean (average),

e.g Mean = $\frac{S_n (fx)}{S_n (f)}$

7.2.5.S14 Median;
i) array of numbers in order,
ii) determine the median.

7.2.5.S15 Charts;
i) pie and bar charts,
ii) pictograms.

7.2.5.S16 Interpretation of data;
i) reading of the data,
ii) drawing of conclusions.

7.2.6.S GEOMETRICAL CALCULATIONS II (8 HOURS)

(CONES AND PYRAMIDS)

7.2.6.S1 Specific Objectives

At the end of this topic, the trainee should be able:-
(a) calculate the volumes and surface areas of cones and pyramids using given formulae;
(b) calculate the lengths of;
i) slanting height of cone,
ii) slanting height of pyramid,
iii) slanting edge of pyramid.

7.2.6.S11 Volumes and surface areas;
i) cones,
ii) pyramids.

7.2.6.S12 Calculation of;
i) slanting height of cone,
ii) slanting height of pyramids,
iii) slanting edge of pyramid.

7.2.7.S ALGEBRA II (8 HOURS)

7.2.7.1.S SIMPLE QUADRATIC EQUATIONS

7.2.7.1.S1 Specific Objectives

At the end of this topic, the trainee should be able to:-
a) identify simple quadratic expressions;
b) write factors of quadratic expressions;
c) solve simple quadratic equations by factorization method , completion of square method and using the formula.

7.2.7.1.S11 Characteristic of quadratic expressions;
i) variables of 2nd degree
e.g. a^2, b^2, c^2, y^2.
ii) 3 terms: 1st, 2nd and 3rd
i.e. $ax^2 + bx + c$

7.2.7.1.S12 Factors;
Factorize quadratic expressions,

e.g. i) $x^2 + 2x = x(x+2)$
ii) $x^2 - 4 = (x + 2)(x - 2)$
iii) $x^2 + 6x + 5 = (x + 5)(x + 1)$

7.2.7.1.S13 Methods of solving quadratic equations;
i) factorization,
ii) completing the square,
iii) using the formula.

7.2.7.2.S LINEAR GRAPHS (3 HOURS)

7.2.7.2.S1 Specific Objectives

At the end of this topic, the trainee should be able to:-
a) plot a linear graph for a given set of data;
b) read and use information from a given linear graph.

7.2.7.2.S11 Linear Graphs;
e.g. i) Distance —Time,
ii) Temperature —Time,
iii) Area of cross-section — Volume,
iv) Velocity — Distance,
v) Ready reckoners.

7.2.7.2.S12 Information from a linear graph

7.2.8.S GEOMETRICAL CALCULATIONS III (5 HOURS)

(TRIGONOMETRY)

7.2.8.S1 Specific Objectives

At the end of this topic, the trainee should be able to:-
a) state the tangent, sine and cosine of an angle from a right-angled triangle;
b) read tangent, sine and cosine of a given angle from 3-figure tables;