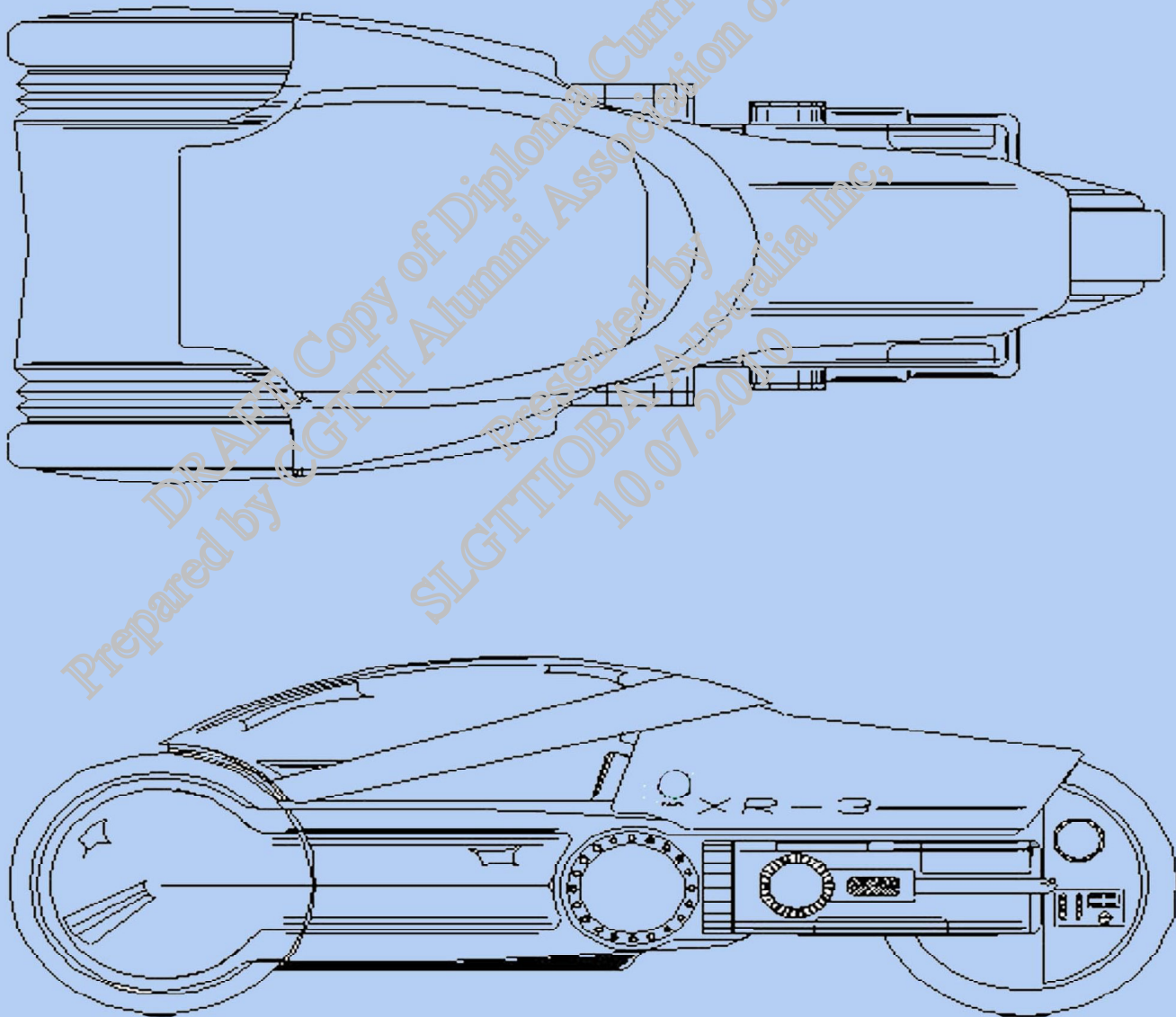


Diploma in Automobile Technology

Ceylon German Technical Training Institute

Curriculum Part 1

Course Structure
Curriculum Outline



Prepared By :-

Alumni Association - Ceylon German Technical Training Institute

Preface

Ceylon German Technical Training Institute (CGTTI), formerly named as Ceylon German Training School (CGTS) was established in year 1959 and had an excellent reputation as the only recognized institute producing skilled personnel in Automobile field in the country.

Today, after more than forty five years, a number of similar institutions with different objectives have come up in the country and the light of CGTTI has thinned down.

There was a long felt need to upgrade the institution and it's educational activities to match with current local & international requirements. As part of this work to prepare a new curriculum became as utmost important.

At the request of Director - Principal , CGTTI ,the Alumni Association came forward with keen interest and taking into consideration of all possible scenarios developed a comprehensive curriculum for the institute.

The aim is to place CGTTI in par with international levels and also to be the best locally available educational institute in Motor Vehicle Engineering with both theory and practical .

The initial phase is completed and the proposed curriculum will be handed over to Director-Principal, CGTTI, to take up with the next steps.

Once the necessary approvals and authorization regularities are met the second phase will be added, which includes detailed modules, assessment criteria, and revising method.

The Alumni Association has reserved a place in the web site and hope to enter full curriculum, once CGTTI is able to initiate implementation work.

Contents

- Aim and objectives.
- Introduction.
- Course Units.
- Course Structure.
- Subjects and units.
- Curriculum Outline.
- Recommended facility requirements.
- References and Guidelines.

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Aim

- * To study and achieve necessary academic Qualification for continuing Higher education through the National and International educational streams. (annexure - A)
- * To study and gain nationally and internationally recognized knowledge and professional skills for relevant occupations in the industry. (annexure - B)
- * To study and become a successful Entrepreneur

Objectives Expected

- * Competent in the application of the well known principles of automobile technology.
- * Aware of related social, environmental and economic issues in the automobile field.
- * Self-motivated and capable of further advancement

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Introduction

Academic Program

- * The four year full time Diploma Program will comprise of eight [8] Semesters.
- * The course Structure set out in this program consists number of Course Units
- * Each course unit will be taught and evaluated within a Semester
- * [If required each course unit can be assigned a Credit Value , depending upon the number includes of study hours involved.]
- * 4th year Educational activities are conducted in English Medium .
- * After completion of 2nd year student will be at Certificate level and after 3rd year at Advanced certificate level.

The Semester System

- * One academic year consists of two semesters .
- * One semester comprises six months ,which includes 20 weeks of Academic activities ,two weeks of extra activities, one week revision , one week examination ,two weeks mid-semester break / Vacation,
- * One week comprises 36 educational hours. [6 hours a day @ 5 days] ,that includes 12 hours [40%] of theory and 18 hours [60%] of practical.

Summary

- * One semester = 06 months of duration
= 20 weeks of Academic activities
= 600 educational hours
- * Complete course = 04 years of duration
= 08 semesters
= 160 weeks of Academic activities
= 4800 educational hours
[1920 hours of theory and 2880 hours of practical]

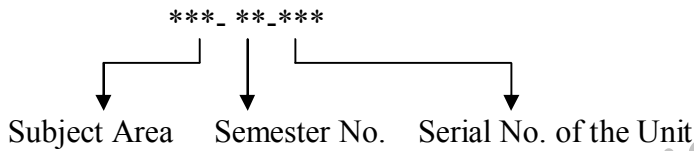
Course Units

Unit No.	Unit Code	Unit Title	study [Hours]
01	GEN-01-001	Mathematics and Science for Technology- I	80
02	GEN-02-002	Mathematics and Science for Technology- II	80
03	GEN-01-003	Materials Science - I	40
04	GEN-02-004	Materials Science - II	40
05	GEN-01-005	Engineering Drawing	60
06	GEN-01-006	Industrial Safety and Health	20
07	GEN-02-007	Computer Aided Drafting	60
08	GEN-01-008	Workshop Technology - I	40
09	GEN-02-009	Workshop Technology - II	40
10	GEN-02-010	Electrical & Electronic Science	20
11	GEN-01-011	English for Technology - I	20
12	GEN-02-012	English for Technology - II	20
13	GEN-03-013	English for Technology - III	40
14	GEN-04-014	English for Technology - IV	40
15	GEN-05-015	English for Technology - V	40
16	GEN-06-016	English for Technology - VI	40
17	GEN-01-017	Basic Training- I	360
18	GEN-02-018	Basic Training - II	360
19	AM-03-019	Workshop Technology - III	40
20	AM-04-020	Workshop Technology - IV	40
21	AM-03-021	Energy Engineering - I	40
22	AM-04-022	Energy Engineering - II	40
23	AM-05-023	Information & Communication Technology	40
24	AM-06-024	Automotive Hydraulics & Pneumatics	50
25	AM-05-025	Mechatronics- I	60
26	AM-03-026	Automobile Drawing - I	20
27	AM-04-027	Automobile Drawing - II	20
28	AM-03-028	Automobile Technology - I	60
29	AM-04-029	Automobile Technology - II	60
30	AM-05-030	Automobile Technology - III	60
31	AM-06-031	Automobile Technology - IV	60
32	AM-03-032	Automobile Mathematics - I	40
33	AM-04-033	Automobile Mathematics - II	40
34	AM-05-034	Automobile Mathematics - III	40
35	AM-06-035	Automobile Mathematics - IV	40
36	AM-06-036	Alternative Drive Technology	50
37	AM-03-037	Introductory Trade Training - I	360
38	AM-04-038	Introductory Trade Training - II	360
39	AM-05-039	Industrial Training - I	360
40	AM-06-040	Industrial Training- II	360
41	AM-07-041	Industrial Experience - I	360
42	AM-08-042	Industrial Experience - II	360
43	MAG-07-043	Business Systems	60
44	MAG-07-044	Financial Systems	60
45	MAG-07-045	Management skills & Human Resource Development	40
46	MAG-07-046	Supervisory Management	40
47	MAG-07-047	Workshop Management	40
48	MAG-08-048	Parts and Stores Management	40
49	MAG-08-049	Legal Aspects	40
50	MAG-08-050	Insurance Policies and Accident Assessment	60

Unit No.	Unit Code	Unit Title	Study [Hours]
51	MAG-08-051	Entrepreneurship	60
52	MAG-08-052	Group/Individual Project	40

Total **4800 hrs.**

Explanation to the Unit Code



- ↓
- GEN = General
 - AM = Automobile
 - MAG = Management

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Course Structure

1st year

* Semester One

Unit Code	Unit Title	Hours / week	Hours/Unit
GEN-01-001	Mathematics and science for Technology 1	04	80
GEN-01-003	Material science 1	01	20
GEN-01-005	Engineering Drawing	03	60
GEN-01-006	Industrial safety and health	01	20
GEN-01-008	Workshop technology-1	02	40
GEN-01-011	English for technology-1	01	20
GEN-01-017	Basic training – 1*	18	360
Total			600 hours

* Semester Two

Unit Code	Unit Title	Hours / week	Hours/Unit
GEN-02-002	Mathematics and science for Technology - II	04	80
GEN-02-004	Materials Science - II	01	20
GEN-02-007	Computer Aided Drafting	03	60
GEN-02-010	Electrical & Electronic Science	01	20
GEN-02-009	Workshop technology - II	02	40
GEN-02-012	English for technology - II	01	20
GEN-02-018	Basic training – II*	18	360
Total			600 hours

2nd year

* Semester Three

Unit Code	Unit Title	Hours / week	Hours/Unit
AM-03-032	Automobile Mathematics- I	02	40
AM-03-028	Automobile Technology - I	03	60
AM-03-026	Automobile Drawing - I	01	20
AM-03-021	Energy Engineering - I	02	40
AM-03-019	Workshop Technology - III	02	40
GEN-03-013	English for Technology - III	02	40
AM-03-037	Introductory Trade Training – I*	18	360
Total			600 hours

* Semester Four

Unit Code	Unit Title	Hours / week	Hours/Unit
AM-04-033	Automobile Mathematics- II	02	40
AM-04-029	Automobile Technology - II	03	60
AM-04-027	Automobiles Drawing - II	01	20
AM-04-022	Energy Engineering - II	02	40
AM-04-020	Workshop Technology - IV	02	40
GEN-04-014	English for Technology - IV	02	40
AM-04-038	Introductory Trade Training – I*	18	360
Total			600 hours

3rd year

*** Semester Five**

Unit Code	Unit Title	Hours / week	Hours/Unit
AM-05-034	Automobile Mathematics - III	02	40
AM-05-030	Automobile Technology - III	03	60
AM-05-023	Information & Communication Technology	02	40
AM-05-025	Mechatronics	03	60
GEN-05-015	English for Technology - V	02	40
AM-05-039	Industrial Training - I*	18	360

Total 600 hours

*** Semester Six**

Unit Code	Unit Title	Hours / week	Hours/Unit
AM-06-035	Automobile Mathematics - IV	02	40
AM-06-031	Automobile Technology - IV	03	60
AM-06-024	Automotive Hydraulics & Pneumatics	02.5	50
AM-06-036	Alternative Drive Technology	02.5	50
GEN-06-016	English for Technology - VI	02	40
AM-06-040	Industrial Training- II*	18	360

Total 600 hours

4th year

*** Semester Seven**

Unit Code	Unit Title	Hours / week	Hours/Unit
MAG-07-043	Business Systems	03	60
MAG-07-044	Financial Systems	03	60
MAG-07-045	Management skills & HR Development	02	40
MAG-07-046	Supervisory Management	02	40
MAG-07-047	Workshop Management	02	40
AM-07-041	Industrial Experience - I*	18	360

Total 600 hours

*** Semester Eight**


Unit Code	Unit Title	Hours / week	Hours/Unit
MAG-08-048	Parts and Stores Management	02	40
MAG-08-049	Legal Aspects	03	40
MAG-08-050	Insurance Policies and Accident Assessment	02	60
MAG-08-051	Entrepreneurship	03	60
MAG-08-052	Group/Individual Project	02	40
AM-08-042	Industrial Experience- II*	18	360


Total 600 hours

* Practical Units


Subjects and Units


SL. No.	Subject	No. of Units	Study hours
01	Mathematics and Science for Technology	02	160
02	Materials Science	02	80
03	Engineering Drawing	01	60
04	Industrial Safety and Health	01	20
05	Computer Aided Drafting	01	60
06	Workshop Technology	04	160
07	Electrical & Electronic Science	01	20
08	English for Technology	06	200
10	Energy Engineering	02	80
11	Information & Communication Technology	01	40
12	Automotive Hydraulics & Pneumatics	01	50
13	Mechatronics	01	60
14	Automobile Drawing	01	40
15	Automobile Technology	04	240
16	Automobile Mathematics	04	160
17	Alternative Drive Technology	01	50
09	Basic Training	02	720
18	Introductory Trade Training	02	720
19	Industrial Training	02	720
20	Industrial Experience	02	720
21	Entrepreneurship	01	60
22	Business Systems	01	60
23	Road Transport Management	01	40
24	Workshop Management	01	40
25	Parts and Stores Management	01	40
26	Financial Systems	01	60
27	Management Skills & Human Resource Development	01	40
28	Legal Aspects	01	40
29	Insurance Policies and Vehicle Assessment	01	60
30	Group/Individual Project	01	40
Total	30 Subjects	52 Units	4800 hours

 Practical Units - 2880 hours

 Theoretical Units - 1920 of Class Room Teaching hours

 General Subjects

 Automobile Subjects

 Management Subjects

Mathematics and Science for Technology - I**a) Mathematics**

1. Algebra

- * Resolving algebra
- * Resolving equations
- * Quadratic Equations
- * Quadratic expression
- * Sets
- * Logarithms
- * Graphs
- * Series of Geometric / series of summation
- * Sum of series

2. Geometry and Trigonometry

- * Straight lines
- * Triangle
- * Circle
- * Square
- * Field force
- * Trigonometric ratio
- * Differentiation equation / integration
- * Trigonometric functions
- * Resolve of trigonometric
- * Equation of trigonometric
- * Trigonometric table
- * Logarithms
- * Mathematical tables

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b). Science

1. Mechanics

- * Motion
linear motion , force , linear accelerated motion , mass , linear momentum and Newton's laws of motion and their application
- * Rotational motion
moment of force , equilibrium of forces , angular velocity , angular - acceleration , angular momentum
- * Circular motion
concept of centrifugal and centripetal force
- * Energy and work
basic concept , transformation of energy and power
- * Pressure and thrust in fluid

2. Oscillations and waves

- * Oscillations
simple harmonic motion , Quantities related to oscillation and resonances
- * Wave motion
type of waves , properties of waves , stationary waves and superposition of two waves
- * Doppler effect
effect of motion when frequency wave length changed
- * Waves in gases
speed of waves , stationary waves in gas columns
- * Properties of sound
loudness and amplitudes
- * Electromagnetic waves
nature of electromagnetic waves , electromagnetic spectrum
- * Light waves
nature of light , ray treatment , refraction through lens and optical instruments

Duration – 80 hours in Semester one

Mathematics and Science for Technology - II

a) Mathematics

1. Dynamics

- * Linear motion
- * Definition of speed , Velocity and acceleration
- * Laws of linear motion
- * Uniform acceleration and in free fall
- * Velocity and acceleration as vector quantities
- * Definition of impulse and linear momentum
- * Principle of conservation of linear momentum
- * Introduction to angular motion , angular speeds , velocity and displacement units
- * Relationship between linear and angular motion
- * Law of angular motion
- * Moment of inertia , torque and angular acceleration of rotating bodies
- * Angular momentum and the conservation of angular momentum

2. Static

- * Point of mechanical force
- * Converge force & parallel force
- * Moment
- * Two dimensional force and Moment
- * Equilibrium
- * Friction
- * Works
- * Mechanic
- * Frame & structure

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b). Science

1. Fields

- * Concept of field
- * Gravitational field
Newton's law of gravitation , field intensity , field intensity around mass ,
Gravitational potential and energy equation
- * Electric field
- * Magnetic field

2. Electricity

- * Electric current
- * Resistivity and resistance
- * Ohm's law
- * Heating effect of current
- * Electromotive force
- * Kirchhoff's laws
- * Wheatstone bridge
- * Ammeters , voltmeters , and millimeters
- * Charge of resistance with temperature
- * Potentiometer
- * Electromagnetic induction
- * Laws of Electromagnetic induction
- * Generation of electricity
- * Transformer
- * Elements of alternating current

3. Electronics

- * Semiconductors
- * Semiconductor devices and their uses
- * Semiconductor diodes
- * Bipolar transistors
- * Basic logic gates

Duration – 80 hours in Semester two

Materials Science - I

1). Quantity and Units

- * SI units
- * Base units
- * Coherent units
- * Quantities and units
- * Conversion of units

2). Engineering Materials

- * Classification of materials
- * Properties of metallic materials
- * Strength of materials
- * Iron , Cast iron , Steel , Alloy steel , Stainless steel , High speed steel .
- * Structure of steel and changes of structure when heated and cooled .
- * Heat treatment of steel
- * Solder and Filler materials
- * Magnetic materials
- * Insulating materials
- * Non metallic materials [rubber , plastic , and other]
- * Vehicle body sheet metals
- * Corrosion and corrosion prevention
- * Coating systems
- * Automotive paints

Duration - 40 hours in Semester one

Materials Science - II

1). Tribology

- * Purpose , goals , definition
- * Types of wear and wear mechanism
- * Tribological test procedure
- * Inhibiting wear

2).Lubricants , Brake fluids and Coolants

- * Terms and Definitions
- * Viscosity and surface tension of liquids
- * Engine oils
- * Transmission lubricants
- * Lubricating oils
- * Lubricating grease
- * Brake fluids
- * Antifreeze and coolant

3). Fuels and Gases

- * Characteristics of Fuels
- * Properties of liquid and gaseous fuels
- * Fuels for spark ignition engines (Gasoline)
- * Fuels for compression ignition engine (Diesel)
- * Alternative fuels
- * A/C gases
- * Welding systems gases
- * Inert gases

Duration - 40 hours in Semester two

Engineering Drawing

- 1). General principles and Standards
 1. Introduction and drawing equipments
 - * Sri-Lanka standard for engineering drawings
 - * Drawing equipments
 - +Drawing boards and corresponding paper sizes
 - +Drawing instruments
 2. Layout of drawings
 - * Drawing sheets
 - * Title block
 - * Key plan
 3. Lettering and lines
 - * Type of lines and their applications
 - * Character sizes and style
 4. Types of drawings
 - * Single part drawings
 - * Single part collective drawings
 - * Combined drawings
 - * Constructional drawings
 5. Projection
 - * Systems of projections
 - First angle and Third angle
 - Symbol indicating projection method
 - * Auxiliary views
 6. Views on drawings
 - * Number of views
 - * Choice of views
 - * Partial views
 - * Symmetry
 - * Repetitive information
 7. Sections
 - * General [cutting plane , direction of view]
 - * Hatching and thin section
 - * Showing of ribs , bolts , shafts etc.
 - * Local sections and successive sections
 - * Revolved sections and adjacent sections
 - * Cutting planes
 8. Conventional representations
 - * Common features
 - * Symbols

9. Scales

- * Recommended scale ratio
- * Dual scale
- * Imperial scale

10. Abbreviations

- * Abbreviations for use on drawings

11. Dimensions and tolerances

- * Linear dimensions
- * Dual dimensions
- * Angular dimensions
- * Redundant dimensions
- * Arrangement of dimensions
- * Tolerance dimensions

12. Symbols

- * Machining and surface texture
- * Tolerance symbols and tolerance frame

2). Engineering Drawing Practices

1. Simple geometrical constructions

- * Bisectors , Perpendiculars , Solids , and Area.
- * Tangency
- * Conic sections
- * Ellipse , Parabola and Hyperbola

2. Orthographic Projections

- * First and Third angle projections
- * Pictorial views
- * Dimension
- * Sectional views

3. Isometric & Oblique projections

- * Isometric projections
- * Oblique projections
- * Free hand sketches

4. Geometrical Constructions

- * Curves and developments
- * Interpenetration curves

5. Assembly Drawings

- * Introduction to assembly drawing and machine drawings
- * Fastenings in machine assemblies
- * Assembly drawing with parts assembled
- * Assembly drawing with exploded views
- * Assembly drawing with orthographic exploded views
- * Assembly drawing with scattered exploded views

6. Mechanical engineering conventions

7. Civil engineering drawing practice

- * Types of drawings
[location plans , block plans , site plans , sketch drawings , working drawings
and enlarged details]
- * Scales and selection of scales
- * Symbols and conventions in civil engineering drawings

8. Electrical engineering drawing practice

- * Drawings and symbols for electrical systems
[block diagrams , circuit diagrams , wiring diagrams , layout diagrams ,
installation diagrams and service diagrams etc.]
- * Symbols [graphical symbols , letter symbols]

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Duration – 60 hours in Semester One

Computer Aided Drafting

- * Introduction to AutoCAD
- * Different Versions and Installing AutoCAD
- * CAD User Interface Describing
- * Units and Limits
- * Menus
- * Tools
- * Layers
- * Text in AutoCAD
- * Styles and Views
- * Plotting
- * Advanced Features

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Duration – 60 hours in Semester two

Workshop Technology I

- 1). Safe working practices
 - * safety wear and their usage
 - * Safe use of power tools
 - * Safe use of hand tools
 - * Safe use of workshop equipments [Air compressors, Generators etc.]
 - * Safe working environment
- 2). Tools and methods
 - * Hand and power tools
 - * Applications and proper methods of using tools
- 3). Measuring Instruments and Gauges
 - * Applications and proper methods of using
 - * Maintenance of instruments
- 4). Fundamental workshop processes:
 - * Bench work , filing , fitting , scraping , riveting , marking out , drilling , tapping, screwing , reaming etc.
- 5). Basic workshop calculation.

Duration – 40 hours in Semester One

Workshop Technology II

- 1). Safe working practices
 - * Safety wear and their usage
 - * Unguarded moving parts
 - * Safe working environment
 - * Fire and burning hazard in working with gas welding equipments
 - * Electric shock hazard in working with arc welding and other electrical equipments
- 2). Machine tools and turning
 - * Centre-lathe and its use of making parts , tools , and repair work.
- 3). Sheet metal work and Welding
 - * Soldering and Brazing
 - * Simple sheet metal work
 - * Gas and Arc Welding
- 4). Fundamental of Electricity
 - * Electrical safety and legislation
 - * Electrical Measuring Instruments and measurements
 - * AC and DC Circuits
- 5). Basic workshop calculations

Duration – 40 hours in Semester two

Workshop Technology- III

- 1). Safe working practices
 - * Safe in working with tools
 - * Use , storage , and disposal of hazardous materials
 - * Safe working environment when working with running engine , unguarded moving-equipments , heat / liquid /air and gas under pressure
- 2). Introduction to Automobile Repair work shop
 - * Workshop layout and equipment arrangement plan
- 3). Engine Repair and re-building
 - * Special tools and correct method of using them
 - * Cylinder boring , honing , Line boring , Crank grinding , Valve cutting machines
 - * Connecting rod aligner and boring machine
- 4). Engine testing and analyzing
 - * Engine dynamometer and testing technology
 - * Engine analyzer and diagnostic testing
 - * Exhaust gas analyzer and emission testing
- 5). Fuel Injection testing
 - * Diesel injection pump and injector testing
 - * Testing of Electronic Diesel Control systems
 - * Testing of Common-Rail Diesel Injection system
 - * Testing of Gasoline Injection systems
- 6).Electrical Equipment Testing
 - * AC and DC Generators
 - * Testing Equipment for generators and Starter motors
 - * Battery, Battery chargers and testing equipments
 - * Ignition system testing
 - * Spark plug , distributor and advance mechanism testing
 - * Head lamp systems aligning and adjusting
- 7). Air conditioning systems testing
 - * Testing equipments and testing method

Duration – 40 hours in Semester three

Workshop Technology- IV

- 1). Safe working practices
 - * Safe in working with tools
 - * Use , storage , and disposal of hazardous materials
 - * Safe use in jacks ,lifts , stands and chock blocks
 - * Safe and legal Road testing
 - * Towing [automatic / manual transmission] procedure
- 02). Brake testing
 - * Brake testing equipments and testing method
 - * Roller brake tester and testing procedure
- 03). Alignment testing
 - * Alignment testing equipments and testing method
- 04). Wheel balancing
 - * Wheel balancing equipments and testing method
- 05). Suspension systems testing
 - *Shock absorber and suspension testing equipments and testing method
- 06). Vehicle lifting and support equipments
 - *Hoist , Cranes , Electrical and Mechanical lifts , type of Jacks etc
- 07). Ramp and Service pits
- 08). Vehicle service and maintenance support equipments
 - * Oil changers and dispensers , Grease pumps , Air compressors etc.
- 09). Vehicle body and frame repair equipments
- 10). Vehicle painting equipments
- 11).Towing and rode side assistance equipments

Duration – 40 hours in Semester four

Electrical & Electronic Science

- * Definitions of Electrical terms and units
[voltage, current, resistance, power]
- * Relationship of voltage, current, resistance, power
[Numerical exercises]
- * Series circuits and applications
- * Parallel circuits and applications
- * Type of resistors [PTC / NTC]
- * Domestic Application [heaters, irons, water pumps]
- * Cable identification and selection [construction of cable]
- * Electrical safety devices [fuse , MCB, RCCB]
- * IEE – Regulations [Domestic wiring]
- * Three phase power source
[Line voltage, Phase voltage and Phase displaced]
- * Electrical machine classification [3~ Induction motors]
- * Electrical motors selections [motor name plate]
- * Motor starting methods [DOL, Star/Delta]
- * Single phase motors [Capacitor motors]
- * Transformers [construction and working principle , Ratio of V.N.I]
- * Structure and properties of Semiconductor Materials
- * Characteristics of diodes [P- N junction]
- * Rectification [Half wave, Two pulse, Full wave(bridge), 3~six pulse bridge]
- * Characteristics of Transistors and applications [as switching – as amplifier]
- * Bipolar transistors and basic logic gates
- * Relays and thermistors

Duration – 20 hours in Semester two

Energy Engineering - I

1). Temperature

- * Basic concept of thermal equilibrium
- * Zeroth law of thermodynamics
- * Thermometric properties and their requirements
- * Celsius scale , thermometer and absolute temperature scale
- * Thermal expansion

2). Heat

- * Energy source
- * Heat Induction and Fuels
- * Combustion and combustion process
- * First law of thermodynamics
- * Isothermal and adiabatic processes
- * Heat and solids , liquids and gases
- * Properties of vapors

3). Heat Transfer

- * Conduction , convection and radiation
- * Newton's law of cooling
- * Black body radiation – Stefan's law
- * Thermal conductivity
- * Heat Exchangers

4). Gases

- * Gas laws [Boyle's law and Charles's law]

5). Kinetic theory

Duration – 40 hours in semester three

Energy Engineering- II

1). Thermodynamics and Energy conversion

- * Thermodynamic properties of ideal gases and vapors
- * The open system flow processes
- * Applications of the first law of thermodynamics to non – flow and flow process
- * Introduction to second law of thermodynamics
- * Heat engines and refrigeration
- * Thermodynamic cycles
- * Internal combustion engines
- * Gas turbines
- * Vapor power cycles
- * Principles of thermal energy conversion in boilers
- * Steam Engines

4). Energy management in industry and transport

- * Effective use of energy
- * Simple energy saving methods

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Duration – 40 hours in semester four

Information and communication technology

- 1).Data processing and communication network in motor vehicles
 - * Requirements
 - * Electronic control unit (ECU)
 - * Architecture and cartronic
 - * Communication net works
 - * Controller area net work (CAN)
- 2). Instrumentation
 - * Information and communication areas
 - * Driver information systems
 - * Instrument clusters
 - * Display types
- 3). Vehicle information systems
 - * Operating concept
 - * Trip recorders
- 4). Parking systems
 - * Parking aid with ultrasonic sensors
- 5).Analog and Digital Signal transmission
 - * TV and radio broadcasting
 - * Information trans mission
- 6). Navigation systems
 - * Position location
 - * Destination entry
 - * Route computation and guidance
 - * Map display and road map memory
- 7). Traffic Telematics
 - * Transmission paths
 - * Standardization, referencing , selecting , and decoding traffic messages
 - * Telimatic services , and dynamic route guidance
 - * Recording of off board navigation information
- 8). Fleet management
 - * Definition and services
 - * Transmission paths
 - * Standardization

Duration - 40 hours in semester five

Automotive Hydraulics & Pneumatics

- 1). Automotive hydraulics
 - * Quantities and units
 - * Terms formulas
 - * Gear pumps and gear motors
 - * Piston pumps and motors
 - * Electrohydraulic pumps
 - * Valves and cylinders
 - * Hydrostatic drives
 - * Hydraulic accumulators
 - * Tractor hydraulics
- 2). Automotive pneumatics
 - * Vacuum pumps
 - * Air compressors
 - * Electropneumatic components

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Duration - 50 hours in Semester six

Mechatronics

- 1). Mechatronic systems , components and Development Methodology
 - * Definition
 - * Application
 - * Examples at system level
 - * Examples at component level
 - * Examples in the field of micromechanics
 - * Development Methodology
- 2). Sensors
 - * Basic principles
 - * Sensor types
- 3). Actuators
 - * Electromechanical actuators
 - * Fluid- mechanical actuators
- 4). Controls in mechatronics
- 5). Mechatronic Applications in Automobiles
 - * Engine management systems [Ignition systems]
 - * Fuel injection systems [Gasoline]
 - * Fuel injection systems [Diesel]
 - * Emission control systems
 - * Turbo charging and EGR systems
 - * Variable valve timing system [VVT]
 - * Automatic transmission systems
 - * Traction control systems [TCS]
 - * Electronic stability program [ESP]
 - * Antilock brake systems [ABS]
 - * Vehicle body electronics
 - * Vehicle safety and occupant safety systems

Duration – 60 hours in Semester five

Automobile Drawing – I

- * Symbols
- * Crank assembly [piston, connecting rod and four stroke]
- * Two stroke
- * Valve timing diagram [four stroke and two stroke]
- * Various pistons and their sections
- * Definition of technical , simplified and schematic Drawings
- * Cam driven systems
- * Belt driven systems
- * Bearings
- * Gear wheels and gear assembly
- * Carburetors [choke position , Throttle positions in various speeds]
- * acceleration pump
- * Diesel injection components [F.I.Pump, feed pump, injector etc.]
- * Water pump, Oil pump
- * Circuit diagrams [ignition , fuel , cooling and lubricating systems]

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Duration - 20 hours in Semester three

Automobile Drawing – II

- * Clutch and clutch operating systems [mechanical and hydraulic]
- * Manually shifting Gear boxes [sliding mesh , constant mesh , synchromesh]
- * Automatically shifting Gear boxes
- * Final drive and differential systems
- * Suspension system and components
- * Steering systems and it's angles
- * Wheel angles and Ackerman principal
- * Circuit diagram [Brake , Electrical and Air conditioning systems]

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Duration – 20 hours in Semester four

Automobile Mathematics -I

1). Engine system- I

- * Bore and stroke , swept volume , clearance volume
- * Engine Capacity
- * Compression ratio
- * Changes in Compression
- * Valve timing and opening periods
- * Piston speed and gas velocity
- * Ratio of connecting rod to crank radius
- * Gas pressure and piston force
- * Variation of force on crank shaft
- * Engine work

2). Electrical system

- * Definitions
- * Ohm's law

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Duration - 40 hours in Semester three

Automobile Mathematics - II

1). Chassis System- I

- * Clutch
 - Friction - spring force (clutch pressure)
 - Operation system (mechanical)
 - Paddle force
- * Gear box
 - Gear ratio, speed , torque
- * Final drive and differential
 - Gear ratio , speed , torque
- * Tyre
 - Tyre pressure and its variation
- * Wheel angle
 - Wheel base and track
 - Toe in / out
- * Vehicle speed
- * Steering gear ratio
- * Brake paddle force (mechanical / hydraulic)
- * Vehicle retardation

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Automobile Mathematics - III

1). Engine system – II

- * Engine power
- * Mean effective pressure
- * Engine internal power / Useful power / Piston pressure
- * Engine efficiency , Engine torque , Engine speed
- * Engine speed – Engine capacity
- * Engine internal power / Piston – Piston speed
- * Mechanical efficiency
- * Engine (dynamometer) Testing
- * Torque power and speed drop
- * Fuel consumption , Specific fuel consumption and effective efficiency
- * Fuel injection quantity (diesel Engine)
- * Lubricating oil consumption – pumping speed
- * Roller dynamometer testing
- * Capacity / weight ratio (engine)
- * Power weight ratio (engine)
- * Power weight ratio of vehicle
- * Air fuel ratio
- * Liquid pressure and gas pressure
- * Cooling and cooling efficiency

2). Electrical system

- * Electrical units
- * Electrical power and electrical work
- * Capacity of battery
- * Series and parallel circuits
- * Efficiency of starter

Duration - 40 hours in Semester five

Automobile Mathematics - IV

Chassis System- II

* Friction

- Coefficient of friction
- Friction force of clutch lining and bearing
- Transferable torque
- Torque capacity and Safety factor
- Mechanical and hydraulic operation
- Paddle air gap

* Transmission

- Transmission of power
- Belt drive and gear drive
- Velocity and gear ratio
- Torque input / output
- Speed input / output
- Planetary gear ratio
- Complete transmission ratio and efficiency
- Torque converter

* Forces on Vehicle

- Axle force
- Vehicle speed and air resistance
- Velocity, acceleration and brake efficiency
- Tractive resistance
- Climbing resistance
- Reaction time
- Axle shaft and its drive systems
- Suspension systems

* Steering system

- Wheel angle and its variation
- Complete steering system ratio

* Brake system

- Brake force ratio (mechanical, hydraulic)
- Power and power assisted brake force
- Brake force on vehicle and driven wheels
- Brake testing

Duration - 40 hours in Semester six

Automobile Technology - I

- 1).Introduction
 - * Introduction to automobile
 - * Vehicle systems
 - * Vehicle Identification
- 2).Engine systems I
 - * Internal and External combustion Engines
 - * Single and multi cylinder Engines
 - * Engine balancing
 - * Engine Construction and components
 - * Engine lubrication
 - * Engine cooling
 - * Ignition systems
 - * Fuel systems
 - * Induction and Exhaust systems
 - * Variable valve timing [valvetronic]
- 3).Electrical systems
 - * Starting systems
 - * Charging systems
 - * Electrical power supply system
 - * Electrical Circuits and wiring diagram

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Duration – 60 hours in Semester three

Automobile Technology - II

- 1). Chassis systems
 - * Suspension systems
 - * Testing of suspension and shock absorbers
 - * Suspension linkage and kinematics
 - * Testing and adjusting of alignment
 - * Wheels
 - * Wheel balancing
 - * Tyres
 - * Front axle and Steering systems
 - * Rear axle systems
- 2). Transmission systems
 - * Clutches
 - * Multi speed gear box
 - * Manually shifted transmission
 - * Automatic transmission
 - * Continuously variable transmission [CVT]
 - * Electronic transmission control
 - * Final drive units
 - * Differential systems
 - * All wheel drive and transfer boxes
- 3). Vehicle Safety systems
 - * Brake systems
 - * Vehicle stabilization systems
 - * Traction control systems
- 4). Passenger compartment ventilation, Heating and Air conditioning systems
 - * Auxiliary heating system
 - * Cabin filters and ventilation systems
 - * Air conditioning systems

Duration – 60 hours in Semester four

Automobile Technology - III

1).Engine systems- II

- * Fuel management in spark ignition engines
- * Fuel management in compression ignition engines
- * Fuels used in automobile engines
- * Super charging systems
- * Engine testing and characteristics of engine
- * Engine management systems
- * Emission control and air pollution
- * Emission testing on engine dynamometer

2). Modification of Vehicles

- * Modification procedure
- * Legal requirements

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Duration – 60 hours in Semester five

Automobile Technology - IV

- 1). Occupants safety systems
 - * Active and passive safety in motor vehicles
 - * Seat belt and seat belt tightening systems
 - * Air bags
 - * Rollover protection systems
- 2). Vehicle bodies
 - * Road vehicle systematic classification
 - * Vehicle Identification
 - * Different body types
 - * Body design and main dimensions
 - * Body structure and materials
 - * Body surface and finishing materials
 - * Body safety techniques
 - * Aerodynamics and Aero acoustics
 - * Automotive windshields and window glass
 - * Automotive glazing
 - * Tinted glazing
 - * Coated glazing
 - * Windshield and rear window cleaning systems
- 3). Lighting systems
 - * Regulations and equipments
 - * Functions
 - * Main head lamps
 - * Auxiliary driving lamps and daytime running lamps
 - * Signal and hazard warning lamps
 - * Stop , side marker , license plate , reverse, and fog lamps
 - * Motor vehicle bulbs
 - * Head lamp leveling control
 - * Head lamp cleaning systems
- 4). Vehicle locking systems
 - * Function, structure and operating principle
 - * Mechanical locking systems
 - * Electrical locking systems
 - * Central locking systems
 - * Immobilizer systems

Duration – 60 hours in Semester six

Alternative Drive Technology

- 1). Electric drives
 - * Power supply systems
 - * Batteries
 - * Drive trains
- 2). Hybrid drives
 - * Drive configurations
 - * Hybrid drive design
- 3). Fuel cells

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Basic Training- I

1). Computer Skills

(18 @ 04 weeks) 72 hours

* Introduction to computers

- What is a computer?
- Hardware, Software & Live ware.
- Basic Input, Output and Storage devices.
- Common operating Systems.
- Getting started with windows environment.
- Managing PC.

* Using ms office system

- Word processing using MS Word
- Data processing with Ms Excel
- MS PowerPoint

* Internet & email.

- What is Internet?.
- Different between WWW & Internet.
- How to create Internet connection.
- Internet facilities.
- Search engines.
- Basic introduction to E Commerce.
- Introduction to E Mail.
- Security in Internet.
- New trends in WWW & Internet.

* Computer Hardware

- Computer history.
- Input, Output & Storage devices.
- Introduction to Main board (Mother Board) Design concepts.
- Computer Memory.
- Computer Processor.
- VGA.
- Other peripherals in Computer. (Soundcards ,TV Cards Etc)
- How to assemble a computer.
- Trouble shoots.
- New trends.

* Computer Networks.

- Introduction to computer networks.
- Why we use networks.
- Main devices use in networks.
- Network topologies.
- Network types.
- How to create a simple network using Windows.
- Basic functions in networks.

* Computer Security

- Over view of computer Viruses.
- Virus guards.
- Preventing Viruses.

2). Fitting Skills

(18 @ 16 weeks) 288 hours

* Work shop safety

* Marking , Measuring , Filing , Cutting , Drilling , Leveling and Fitting Practices

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Duration – 360 hours in Semester One

Basic Training – II

- 1). Turning Skills
- 2). Welding Skills
- 3). Electrical Skills
- 4). Electronic Skills

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Duration - 360 hours in Semester two

Introductory Trade Training - I

- 1). Engine construction and components
- 2). Fuel Injection Systems [Diesel]
- 3). Fuel Injection Systems [Gasoline]
- 4). Engine Control Systems [ignition]
- 5). Auto Electrical Systems

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Duration – 360 hours in Semester three

Introductory Trade Training - II

- * Chassis systems
- * Vehicle frame and body systems
- * Transmission systems
- * Vehicle safety systems
- * Auto air conditioning systems

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Duration – 360 hours in Semester four

Industrial Training - I

- * Engine re-building and testing
- * Vehicle performance testing
- * Fault diagnosis [engine analyzing, emission

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Duration – 360 hours in Semester five

Industrial Training- II

- * Transmission units re-building
- * Vehicle alignment testing
- * Suspension system repair and testing
- * Brake systems testing
- * Theoretical maintenance
- * Vehicle's road worthiness testing

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Duration – 360 hours in Semester six

Business Systems

- * Administration and communication systems
- * Electronic and information processing systems
- * Financial performance
- * Different type of financial accounts
- * Financial data for budgeting
- * Technological developments
- * Marketing techniques
- * Sales techniques

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Duration – 60 hours in Semester seven

Financial Systems

- * Flow of funds
- * Balance sheets
- * Profit and loss statements
- * Cash flow statements
- * Key ratios and performance evaluations
- * Costing of products and services
- * Budgets and forecast

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Duration – 60 hours in Semester seven

Management skills & Human Resource Development

1. Management Skills

- * Team work
- * Leadership principles
- * Working with team environment
- * Management of communication methods
- * Setting and evaluating targets
- * Quality and productivity
- * Customer relationship management
- * Stages of managing a project

2. Human Resource Development

- * Motivational theories to improve performance
- * Training and development activities
- * Recruitment and selection methods

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Duration – 40 hours in Semester seven

Supervisory Management

1. Maintain activities to meet requirements
 - * Maintaining healthy ,safe and productive working conditions
 - * Make recommendations for improvement of work activities
2. Efficient use of resources
 - * Make recommendations for use of resources
 - * Contribute to control of resources
3. Manage Yourself
 - * Develop your own skills to improve your performance
 - * Time management
4. Create healthy Working Relationships
 - * Gain trust and support of colleagues and team members
 - * Gain trust and support of your managers
 - * Minimize conflicts in your team
5. Management Information for Decision Making
 - * Gather required information
 - * Inform and advise others
 - * Hold meetings
6. Recruitment & Selection of Personnel
 - * Recruitment & selection procedures
 - * Interviewing
7. Development of Teams and Individuals
 - * Identification of development needs
 - * Plan the development of teams and individuals
 - * Training arrangements
 - * Assessment of people against development objectives
8. Respond to Poor Performance in the Team
 - * Help team members who have problems affecting performance
 - * Feed back
 - * Implementation of disciplinary and grievance procedures

Duration – 40 hours in Semester seven

Workshop Management

- * Organization of automobile work shop
- * Workshop & Service complex layout
- * Control system and control equipments
- * Reception and customer handling
- * Coordination among reception , service and parts departments
- * Administration and Documentation
- * Warranty procedures
- * Specialized services

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Duration – 40 hours in Semester Seven

Parts and Stores Management

- * Organization of stores
- * Administration and documentation
- * Stores Layout and store keeping systems

- * Principle of stock control systems
- * Minimum & Maximum order levels, buffer stock
- * Fast moving and slow moving items
- * Parts information and communication
- * Supply , issue , dispatch and delivery procedures
- * Material handling

- * Handling and storage of hazardous items
- * Material Safety Data Sheets (MSDS)
- * Stores environment and health procedures

- * Prevention of theft & pilferage
- * Stock balance and stock taking procedure
- * Parts supplying and distributing channels
- * Warranty procedures for parts

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Duration – 40 hours in Semester eight

Legal Aspects

1. General

- * Definition of law
- * Types of law
- * Legal terms
- * Court structure
- * Agency
- * Law of Contract
- * Law of tort

2. Applicable law enactments for motor industry [in Sri-Lanka]

- * Motor traffic act
- * Environmental protection act
- * Factories ordinance
- * Contract of employment act
- * Termination of employment
- * Employees provident fund
- * Employees trust fund
- * Wages board act
- * Shop and office act
- * Compensation ordinance
- * Industrial disputes act

3. Business law

- * Repair and service act
- * Sale of goods act
- * Supply of goods act
- * Consumer credit and hire purchase
- * Licensing and insurance
- * Lien
- * Theft act
- * Unfair contract terms
- * Trade occupation
- * Patents and trade names

4. Storage and use of Dangerous Substances

- * Regulations governing storage , receipts and supply of petroleum spirits
- * Safety requirements
- * Petroleum storage license
- * Storage and use of other flammable liquids

Duration – 40 hours in Semester Eight

Insurance Policies and Vehicle Assessment

1. Identification of a vehicle-
 - * Classes of Vehicles
 - * Makes & Models
 - * Chassis no
 - * Engine no
2. Basic models, Options, & Extra fittings-
 - * Options and performance
 - * Extra fittings and Modifications
3. Importation & sale of vehicles-
 - * Import license ,taxation
 - * Local agents
 - * Other dealers
4. Legal requirements & RMV-
 - * Insurance
 - * Custom documents
 - * Weighing & Measuring
 - * Registration and Revenue license
 - * Fitness certificate
 - * Annual renewals
 - * Transferring ownership
 - * Driving license and classes
5. Financing –
 - * Bank loans, mortgages, financing and leasing
6. Automobile Insurance-
 - * Scope of covers
 - * Terms and condition of the policy
 - * Indemnity
 - * Causes for accidents and effect on insurance
7. Vehicle maintenance & repair costing-
 - * Importance of proper costing
 - * Basic elements to be considered
 - * Specialized services and out sourcing
 - * Materials and accounting
 - * Replacements
 - * Repair vs. Replacement

8. Protection-
- * Fire protection
 - * WCI & Personal Accident Insurance
 - * Premises Insurance
 - * Public Liability Insurance
9. Vehicle Accidents and Reporting-
- * Role of Police
 - * Insurance Claims
 - * Third party damages
 - * Insurance company practices

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Duration – 60 hours in Semester eight

Entrepreneurship

- * The nature and importance of entrepreneurship
- * Entrepreneurial process
- * Screening Entrepreneurial opportunities
- * Entrepreneurial mind , creativity , ideas and innovation
- * Identifying resources to support Entrepreneurial activities
- * Intellectual property issues
- * Accessing finance and other resources
- * Business risk and Swot Analyses
- * Business structure and ethics
- * Entrepreneurial strategy , finding and reaching customers , and marketing innovation
- * Feasibility planning
- * Opportunities available for the Entrepreneur
- * Assistance from related Government Institutions

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Duration - 60 hours in Semester eight

Group / Individual Project

1. Purpose of the project

- * The purpose of the project is to provide additional evidence of knowledge and practical skills covered in this diploma program. This evidence may be used to support applications for their occupations and for entry into the higher / continuing education.

2. Criteria for the project

- * The topic may be any related area in Automobile Engineering.
- * The content must include some factors and elements which covers an international perspectives.
- * Size of the text of the project is 4000 – 5000 words which must be word processed and desk top publish materials can be included.
- * Visual aids accompanying with the project may include photographs , graphics and design.
- * Multimedia presentation is also accepted.

3. Project structure and guidelines

- * Title of the project
- * Aim of the project
- * Summary of the project [50 – 100 words]
- * Issues , problems , and proposals [in general and in specific terms]
- * The research conducted [gathering of facts]
[Variety of research , methodology used]
- * Analysis of issues
- * Solutions [proposals]
- * Benefits
- * Conclusions and evaluation
- * Recommendations
- * References and glossary

4. The knowledge and competence involved in preparing a project

- * Logical and creative thinking
- * Researching data and information
- * Organizing data
- * Setting objectives and time scales
- * Analyzing needs
- * Effective writing skills

5. Submission of the project

- * Project proposal
Proposal of the project need to submit in **Semester seven** and must obtained approval by the institute before processing the project.
- * Completed project
Submit the completed project at given time in **Semester eight** to the assigned officer and obtained a receipt .

Duration – 40 hours in Semester eight

Recommended facility Requirements

- * Effective career guidance and counseling service unit
- * Examination unit and Assessor panel
- * Effective curriculum development unit
- * Complete library facility
- * Fully equipped Automobile Laboratory
- * Fully equipped fuel injection Laboratory
- * Mechatronics Laboratory
- * Vehicle body re-finishing facility

Suggested admission methodology

- * Admissions / intakes must be limited to the existing training facilities.
- * Applications must be called in separately, according to the training facilities available at each study program [field]. This will enhance quality and productivity by eliminating frustration among students , and preventing under estimation among study programs .

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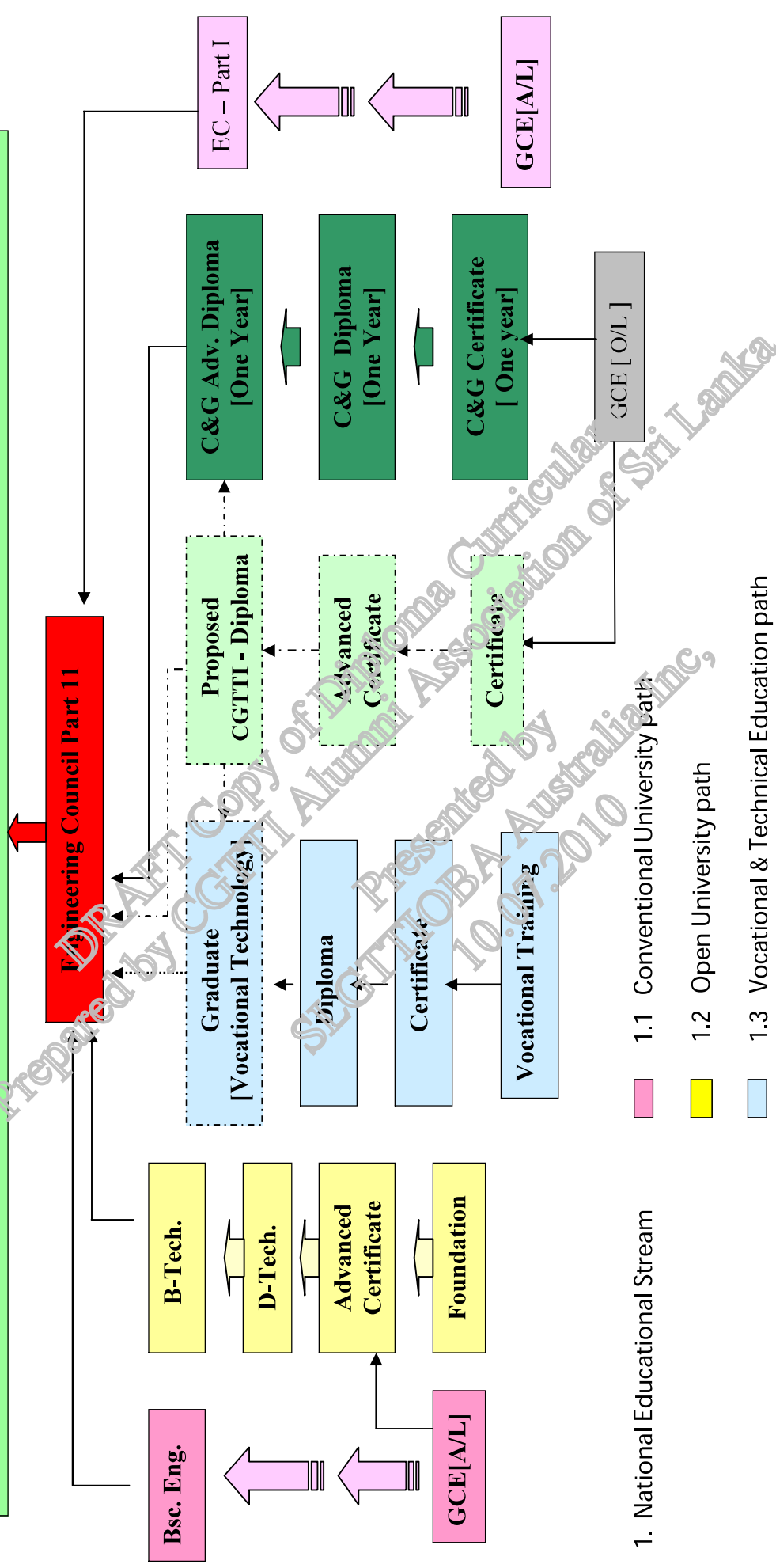
References & Guidelines

1. Study programs of ,
Kingston University of London
University of South Australia
Universities of Applied Science in Germany
Open University of Sri-Lanka
British Institute of Engineering Technology
Institute of the Motor Industry – UK
B'Tech – UK
City & Guilds of London Institute – UK
Miester – Germany
HNDE , NDES , NDT , NCT of Sri-Lanka
Institute of Automotive Engineers Sri-Lanka
2. Guidance of,
NVQ Systems in Sri-Lanka
NVQ Systems in UK
NVQ Systems in Australia
3. Existing Training Facilities and Study Methods in CGTTI
4. Expert advice from local & foreign professionals in the related areas.

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Target Routes

Chartered Mechanical /Automobile Engineer



1. National Educational Stream

1.1 Conventional University path

1.2 Open University path

1.3 Vocational & Technical Education path

1.4 Proposed C.G.T.T.I. path

2.1 City & Guilds path

2.2 Engineering Council path

Annexure - 1

Target Occupational Area

Automobile Engineering & Related Engineering Fields

