curriculum standard

apprenticeship

NOVA SCOTIA
APPRENTICESHIP
AGENCY

TRUCK AND TRANSPORT MECHANIC

2017

Level 1 Based on the CCDA Harmonization Recommendations and the Interprovincial Program Guide

(pg. 12 for Program Structure)

NOVA SCOTIA

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The Joint Planning Committee (JPC) recognizes this Interprovincial Program Guide as the national curriculum for the occupation of Heavy Duty Equipment Technician.

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In addition to the representatives above, various federal, provincial and territorial representatives contributed to the development of this document including Ken Jordan representing the host province of New Brunswick.

Table of Contents

Introduction

Jurisdictions have long recognized the benefit of pooling resources in the development and maintenance of apprenticeship training standards. A successful example of this is the Interprovincial Standards (Red Seal) program itself. Essential to the establishment of standards is the development of suitable training systems and programs which enable tradespeople to acquire certification based on these standards. While certification is the responsibility of Apprenticeship administrators throughout Canada, the development and delivery of technical training is the responsibility of jurisdictions.

In 1999, work to develop common training for apprenticeship programs within the Atlantic Provinces began. To date, 22 Curriculum Standards have been developed through the Atlantic Standards Partnership (ASP) project to assist programming staff and instructors in the design and delivery of technical training. Similarly, the Canadian Council of Directors of Apprenticeship (CCDA) embarked on a process for the development of national Interprovincial Program Guides (IPGs) for the Boilermaker, Carpenter and Sprinkler System Installer trades. At its January 2005 strategic planning session, the CCDA identified developing common training standards as one of key activities in moving towards a more cohesive apprenticeship system.

With the support of Human Resources and Social Development Canada (HRSDC), several provinces and territories have partnered to build on the ASP and the CCDA processes to further develop IPGs to be used across the country. This partnership will create efficiencies in time and resources and promote consistency in training and apprentice mobility.

User Guide

According to the Canadian Apprenticeship Forum, the Interprovincial Program Guide (IPG) is: "a list of validated technical training outcomes, based upon those sub-tasks identified as common core in the National Occupational Analysis, and validated by industry in the provinces and territories as incorporating the essential tasks, knowledge and skills associated with a given trade."

Learning outcomes contained in the IPG represent the minimum common core content for the development of jurisdictional training standards and outlines. IPGs are developed based on the National Occupational Analyses and extensive industry consultation. The IPG is intended to assist program development staff in the design of jurisdictional plans of training. Each jurisdiction has the flexibility to add additional content.

The IPG was deliberately constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. It details units of training, unit outcomes and objectives. It does not impose a delivery model or teaching format.

Jurisdictions and/or training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The IPG does not dictate study materials, textbooks or learning activities to be used in delivery.

The IPG document includes a recommended leveling structure to facilitate mobility for apprentices moving from one jurisdiction to another. Because of difference in jurisdictional regulations and program durations, levels are offered as suggestions only.

Structure

The content of the IPG is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery. Prerequisites have not been detailed. Jurisdictions are free to deliver units one at a time or concurrently provided all outcomes are met.

The IPG does not indicate the amount of time to be spent on a particular unit. The length of time required to deliver an outcome successfully will depend upon the learning activities and teaching methods used. Jurisdictions are encouraged to use practical demonstration and opportunities for hands-on learning whenever possible.

The unit outcomes are the specific performances that must be evaluated. Wording of outcomes, "Demonstrate knowledge of…", acknowledges the broad spectrum of ways in which knowledge can be shown. It is at the discretion of each jurisdiction to determine the manner in which outcomes are evaluated; theoretically, practically or a combination of both.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided. Content may be added or extended in jurisdictional training plans.

IPG Glossary of Terms

These definitions are intended as a guide to how language is used in the IPGs.

ADJUST	To put in good working order; regulate; bring to a proper state or position.
APPLICATION	The use to which something is put and/or the circumstance in which you would use it.
CHARACTERISTIC	A feature that helps to identify, tell apart, or describe recognizably; a distinguishing mark or trait.
COMPONENT	A part that can be separated from or attached to a system; a segment or unit.
DEFINE	To state the meaning of (a word, phrase, etc.).
DESCRIBE	To give a verbal account of; tell about in detail.
DIAGNOSE	To analyze or identify a problem or malfunction.
EXPLAIN	To make plain or clear; illustrate; rationalize.
IDENTIFY	To point out or name objectives or types.
INTERPRET	To translate information from observation, charts, tables, graphs, and written material.
MAINTAIN	To keep in a condition of good repair or efficiency.
METHOD	A means or manner of doing something that has procedures attached to it.
OPERATE	How an object works; to control or direct the functioning of.
PROCEDURE	A prescribed series of steps taken to accomplish an end.

PURPOSE	The reason for which something exists or is done, made or used.
SERVICE	Routine inspection and replacement of worn or deteriorating parts. An act or business function provided to a customer in the course of one's profession. (e.g., haircut).
TEST	v. To subject to a procedure that ascertains effectiveness, value, proper function, or other quality. n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.

Essential Skills Profiles

Essential Skills are the skills needed for work, learning and life. They provide the foundation for learning all the other skills that enable people to evolve within their jobs and adapt to workplace change.

Over the past several years, the Government of Canada has conducted research examining the skills people use at work. From this research, Essential Skills Profiles have been developed for various occupations.

For more information regarding Essential Skills and to access Essential Skills Profiles for specific occupations, visit Human Resources and Social Development Canada's Essential Skills website at:

http://srv108.services.gc.ca/english/general/home_e.shtml

Profile Chart

OCCUPATIONAL SKILLS			
CHT-100 Safety	CHT-105 Tools and Equipment	CHT-110 Hoisting and Lifting	CHT-115 Communication and Documentation
CHT-125 Start, Move and Park Vehicle	CHT-130 Fasteners, Tubings, Hoses and Fittings	CHT-135 Lubrication and Fluids Servicing	CHT-140 Gaskets and Seals
CHT-145 Bearings	CHT-150 Metallurgy	CHT-155 Cutting and Heating	CHT-160 MIG Welding
CHT-200 SMAW Welding	CHT-120 Preventive Maintenance	HET-380 Fire Suppression Units	
ENGINES AND ENGINE SUPPORT SYSTEMS			
CHT-165 Engine Principles	CHT-167 Cooling Systems	CHT-170 Lubrication Systems	CHT-220 Non-Diesel Fuel Systems
CHT-225 Diesel Fuel Supply Systems	CHT-400 Diesel Fuel Injection Systems	CHT-405 Electronically-Controlled Diesel Fuel Systems	CHT-230 Intake and Exhaust Systems
CHT-425 Diesel Engine Overhaul	CHT-420 Base Engine Diagnostics	CHT-415 Engine Brakes and Retarders	CHT-410 Emission Control Systems
HYDRAULIC AND PNEUMATIC SYSTEMS			
CHT-183 Introduction to Hydraulics	CHT-185 Hydraulic Fittings, Piping, Tubing and Hoses	CHT-187 Reservoirs, Coolers and Filters	HET-300 Hydraulic Pumps and Motors
HET-305 Hydraulic Cylinders	HET-310 Control Valves	HET-315 Accumulators	HET-325 Hydraulic Systems Diagnostics and Testing
HET-385 Pneumatic Systems			

Profile Chart *(continued)*

DRIVE TRAIN			
CHT-205 Drive Lines	CHT-215 Engine Clutches	CHT-255 Automatic/Power Shift Transmissions	CHT-260 Torque Converters
CHT-210 Drive Axle Assemblies	HET-355 Final Drives	HET-340 Manual Transmissions and Power Take-offs	HET-350 Hydrostatic Drives
HET-345 Transfer Cases			
STEERING, SUSPENSION AND BRAKES			
CHT-193 Vehicle Hydraulic Brake Systems	CHT-163 Wheels, Tires and Rims	CHT-195 Basic Air Brakes	HET-335 Track-Type Undercarriage
HET-360 Power Assisted Steering Systems	HET-330 Front and Rear Suspensions	HET-370 Tracked Steering Systems	HET-365 Articulated Steering Systems
HET-320 Equipment Hydraulic Brake Systems			
ELECTRICAL AND ELECTRONIC SYSTEMS			
CHT-173 Electrical and Electronic Principles	CHT-175 Batteries	CHT-235 Starting Systems	CHT-240 Starting Aids
CHT-245 Charging Systems	CHT-250 Electronic Ignition Systems	CHT-177 Conventional Lighting Circuits	CHT-430 Gauges
CHT-180 Wiring Harnesses and Accessories	CHT-435 Vehicle Management Systems		
STRUCTURAL COMPONENTS, CLIMATE CONTROL, ACCESSORIES AND ATTACHMENTS			
CHT-265 Air Conditioning Systems	CHT-270 Heating and Ventilation Systems	HET-393 Winches, Wire Ropes and Accessories	HET-375 Cabs and Protective Structures
HET-390 Blades, Buckets and Cutting Edges	HET-395 Material Handling Equipment		

Nova Scotia Program Structure

CHT = Units common to Heavy Duty Equipment Technician & Truck and Transport Mechanic
HET = Units specific to Heavy Duty Equipment Technician

Nova Scotia Course No.	Nova Scotia Course Name	Nova Scotia Prerequisites	Interprovincial Program Guide (IPG) Content To Be Covered	
			IPG Units	Page #
Level 1 (8 Weeks) Common with Heavy Duty Equipment Technician				
MENT-1801	Integrated Milestone Workplace Mentoring I	None	MENT-1801 Workplace Mentoring I *(NS unit of instruction)*	
IMPA-0801	Fundamental Shop Skills	None	CHT-100 Safety	
			CHT-140 Gaskets, Seals and Sealing Compounds	
			CHT-145 Bearings	
			CHT-115 Communication & Documentation	
			CHT-105 Tools and Equipment	
			CHT-130 Fasteners, Tubings, Hoses and Fittings	
			CHT-110 Hoisting and Lifting	
			CHT-125 Start, Move and Park Vehicle	
IMPA-1803	Basic Electrical & Electronic Principles	IMPA-0801	CHT-173 Electrical & Electronic Principles	
			CHT-175 Batteries	
			CHT-177 Conventional Lighting Circuits	
			CHT-180 Wiring Harnesses and Accessories	
IMPA-1804	Hydraulics 1	IMPA-0801	CHT-183 Introduction to Hydraulics	
			CHT-185 Hydraulic Fittings, Piping, Tubing and Hoses	
			CHT-187 Reservoirs, Coolers and Filters	
IMPA-1805	Lubricants, Lubrication & Cooling	IMPA-0801	CHT-135 Lubrication and Fluids Servicing	
			CHT-167 Cooling Systems	
			CHT-170 Engine Lubrication Systems	
IMPA-1806	Braking Systems	IMPA-0801, 1804	CHT-190 Vehicle Hydraulic Brake Systems	
			HET-320 Equipment Hydraulic Braking Systems	
			CHT-195 Basic Air Brake Systems	
IMPA-1807	Engine Principles	IMPA-0801	CHT-165 Engine Principles	
MPOA-1800	Basic Welding	IMPA-0801	CHT-150 Metallurgy	
			CHT-155 Cutting and Heating	
			CHT-160 MIG Welding	
			CHT-200 SMAW Welding	
IMPA-1823	Wheel Assemblies and Preventive Maintenance	IMPA-0801	CHT-163 Tires, Rims and Wheels	
			CHT-120 Preventive Maintenance	

Nova Scotia Course No.	Nova Scotia Course Name	Nova Scotia Prerequisites	Interprovincial Program Guide (IPG) Content To Be Covered	
			IPG Units	Page #
Level 2 (7 Weeks) Common with Heavy Duty Equipment Technician				
IMPA-1808	Drive Lines	IMPA-0801	CHT-210 Drive Axle Assemblies	
			CHT-205 Drive Lines	
IMPA-1809	Ignition Systems	IMPA-1803	CHT-250 Electronic Ignition Systems	
IMPA-1810	Fuel Systems 1	IMPA-0801	CHT-220 Non-Diesel Fuel Systems	
			CHT-225 Diesel Fuel Supply Systems	
IMPA-1811	Intake & Exhaust Systems	IMPA-0801	CHT-230 Intake and Exhaust Systems	
IMPA-1812	Clutches & Manual Transmissions	IMPA-0801	CHT-215 Engine Clutches	
			HET-340 Manual Transmissions and Power Take-Offs	
			TTM-330 Manual Transmissions	
			TTM-335 Power Take-Offs	
			HET-345 Transfer Cases	
			TTM-340 Transfer Cases	
IMPA-1813	Starting & Charging Systems	IMPA-1803	CHT-235 Starting Systems	
			CHT-240 Starting Aids	
			CHT-245 Charging Systems	
IMPA-1820	HVAC Systems	IMPA-0801, 1803, 1804	CHT-265 Air Conditioning Systems	
			CHT-270 Heating & Ventilation Sys	
Level 3 (6 Weeks)				
TTMA-1801	Frame & Suspension Systems	IMPA-0801	TTM-305 Front Axles and Suspension Systems	
			TTM-310 Rear Axles and Suspension Systems	
			TTM-320 Frames and Chassis	
			TTM-365, Trailers	
			TTM-360, Trailer Coupling Devices	
TTMA-1802	Wheels, Steering and Alignment	TTMA-1801	CHT-163 Tires, Rims and Wheels	
			TTM-315 Wheel and Axle Alignment	
			TTM-325 Steering Systems	
TTMA-1803	Gasoline Fuel Injection Systems	IMPA-1807	TTM-300 Gasoline Fuel Injection Systems	
TTMA-1807	Automatic Transmissions and Torque Converters	IMPA-1803, 1808	CHT-260, Torque Converters	
			CHT-255 Automatic/ Power Shift Transmissions	
TTMA-1806	Dual Air and ABS Brake Systems	IMPA-1803	TTM-350 Anti-lock Brake Systems and Traction Control Systems	
			TTM-345 Dual Air Brake Systems	
TTMA-1808	Cab Components	IMPA-0801	TTM-355 Cab Components	

Nova Scotia Course No.	Nova Scotia Course Name	Nova Scotia Prerequisites	Interprovincial Program Guide (IPG) Content To Be Covered	
			IPG Units	Page #
Level 4 (5 Weeks)				
MENT-1802	Integrated Milestone Workplace Mentoring II	MENT-1801	MENT-1802 Workplace Mentoring II *(NS unit of instruction)*	
TTMA-1809	Vehicle Inspection	IMPA-1803, 1805, TTMA-1801, 1802	CHT-120 Preventive Maintenance	
			TTMA-1001 Pre-delivery Inspection (*NS Specific*)	
			TTMA-1002 Government Safety Inspection (*NS Specific*)	
TTMA -1816	Fuel Systems 2	IMPA-1804, 1810	CHT-405 Electronically-Controlled Diesel Fuel Injection Systems	
			CHT-400 Diesel Fuel Injection Systems	
TTMA -1817	Electronic Control & Monitoring Systems	IMPA-1803, 1816	CHT-410 Emission Control Systems	
			CHT-415 Engine Brakes & Retarders	
			CHT-430 Gauges	
			CHT-435, Vehicle Management Sys	
TTMA -1818	Engine Diagnosis	IMPA-1807	CHT-425 Diesel Engine Overhaul	
			CHT-420 Base Engine Diagnostics	
TTMA-1819	Program Review	Entire Program	TTMA-1819 Program Review (*NS Specific*)	
Nova Scotia Truck and Transport Technician Apprenticeship Program: All Courses are Required.				

LEVEL 1

MENT-1801 Workplace Mentoring I

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Identify and explain strategies for learning workplace skills.
- Demonstrate strategies to assist in learning skills in the workplace.

Objectives and Content:

1. Describe the importance of your own experiences.

2. Identify the partners involved in apprenticeship.

3. Describe the shared responsibilities for workplace learning.

4. Determine your own learning preferences and explain how these relate to learning new skills.

5. Describe the importance of different types of skills in the workplace.

6. Describe the importance of essential skills in the trade.

7. Identify different ways of learning.

8. Identify your learning preferences.

9. Identify different learning needs and strategies to meet learning needs.

10. Identify techniques for effective communication.

11. Identify strategies to assist in learning a skill.

Resource:

- Recommended resource to use in the delivery of this unit: www.apprenticeship.nscc.ca/mentoring/apprentice.htm

CHT-100 Safety

Learning Outcomes:

- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to safety.
- Demonstrate knowledge of safety equipment, their applications and procedures for use.

Objectives and Content:

1. Identify types of personal protective clothing and equipment and describe their applications.

2. Describe the care and maintenance of personal protective equipment (PPE).

3. Identify workplace hazards and describe safe work practices.
   - i) personal
   - ii) shop/facility
     - fire
     - explosion
     - gases
     - electrical
     - housekeeping
     - awareness of surroundings
   - iii) environmental awareness
   - iv) vehicle/equipment
     - restraint systems
     - high voltage systems
     - high pressure systems
       - hydraulic
       - fuel
       - air
     - fire suppression systems
     - HVAC systems

4. Identify and explain workplace safety and health regulations.
   - i) federal
     - material safety data sheets (MSDS)

- workplace hazardous material information system (WHMIS)

ii) provincial/territorial

- occupational health and safety (OHS)

CHT-140 Gaskets, Seals and Sealing Compounds

Learning Outcomes:

- Demonstrate knowledge of gaskets, seals and sealing compounds, their applications and procedures for use.

Objectives and Content:

1. Define terminology associated with gaskets, seals and sealing compounds.

2. Identify hazards and describe safe work practices pertaining gaskets, seals and sealing compounds.

3. Identify specialty tools and equipment used to remove and install gaskets, seals and sealing compounds and describe their applications and procedures for use.

4. Identify types of gaskets and seals and describe their applications.

5. Identify types of sealing compounds and describe their applications.
   i) room temperature vulcanizing
   ii) anaerobic

6. Describe the procedures used to remove, fabricate and install gaskets.

7. Describe the procedures used to remove and install seals.

8. Describe the procedures used to apply sealing compounds.

CHT-145 Bearings

Learning Outcomes:

- Demonstrate knowledge of bearings and their applications.
- Demonstrate knowledge of the procedures to remove and install bearings.

Objectives and Content:

1. Define terminology associated with bearings.

2. Identify hazards and describe safe work practices pertaining to bearings.

3. Identify specialty tools and equipment used to remove and install bearings and describe their applications and procedures for use.

4. Identify types of bearings and describe their applications.
   i) friction
   ii) anti-friction

5. Describe bearing failure and its causes.

6. Describe the procedures used to remove and install bearings.

7. Describe the procedures used to lubricate and adjust bearings.

CHT-115 Communication and Documentation

Learning Outcomes:

- Demonstrate knowledge of effective communication practices.
- Demonstrate knowledge of trade related documentation.
- Demonstrate knowledge of vehicle identification codes.

Objectives and Content:

1. Describe the importance of effective communication.
   - i) customers
   - ii) co-workers
   - iii) related professionals
   - iv) journeyperson/apprentice

2. Locate and interpret identification codes found on the vehicle and vehicle components.

3. Identify and interpret types of service related documents.
   - i) work orders
   - ii) schematics and service information
   - iii) technical service bulletins (TSB)
   - iv) preventive maintenance schedules
   - v) parts lists
   - vi) time estimates

CHT-105 Tools and Equipment

Learning Outcomes:

- Demonstrate knowledge of hand and power tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of measuring tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of diagnostic tools, their applications and maintenance.
- Demonstrate knowledge of shop equipment, their applications, maintenance and procedures for use.

Objectives and Content:

1. Identify types of hand tools and describe their applications and procedures for use.

2. Describe the procedures used to store and maintain hand tools.

3. Identify types of power tools and describe their applications and procedures for use.
   i) electric
   ii) pneumatic
   iii) hydraulic

4. Describe the procedures used to store and maintain power tools.

5. Identify types of measuring tools and describe their applications and procedures for use.
   i) imperial
   ii) metric

6. Identify types of diagnostic tools and describe their applications.

7. Describe the procedures used to store and maintain measuring and diagnostic tools.

8. Identify types of shop equipment and describe their applications and procedures for use.

9. Describe the procedures used to store and maintain shop equipment.

CHT-130 Fasteners, Tubings, Hoses and Fittings

Learning Outcomes:

- Demonstrate knowledge of fasteners, tubings, hoses and fittings, their applications and procedures for use.

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to fasteners, tubings, hoses and fittings.

2. Identify specialty tools and equipment used to remove and install fasteners, tubings, hoses and fittings and describe their applications and procedures for use.

3. Identify types of fasteners and describe their applications and procedures for use.

4. Identify types of tubings and hoses and describe their applications and procedures for use.

5. Identify types of fittings and describe their applications and procedures for use.

CHT-110 Hoisting and Lifting

Learning Outcomes:

- Demonstrate knowledge of hoisting and lifting equipment, their applications and procedures for use.

Objectives and Content:

1. Define terminology associated with hoisting and lifting.

2. Identify hazards and describe safe work practices pertaining to hoisting and lifting.

3. Identify and interpret codes and regulations pertaining to hoisting and lifting.

4. Identify types of hoisting and lifting equipment and describe their applications, limitations and procedures for use.
   i) vehicle
   ii) component/equipment

5. Identify types of hoisting and lifting equipment accessories and describe their applications and procedures for use.

6. Describe the procedures used to inspect, store and maintain hoisting and lifting equipment and accessories.

7. Describe the procedures used to determine lift points and perform lifts.

8. Identify hand signals used to perform hoisting and lifting operations.

CHT-125 Start, Move and Park Vehicle

Learning Outcomes:

- Demonstrate knowledge of the procedures used to start-up, operate and shut-down equipment/vehicle.
- Demonstrate knowledge of the procedures used to prepare equipment/vehicle to be towed or pushed.
- Demonstrate knowledge of equipment/vehicle lock-out procedures.

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to starting, moving and parking vehicles.

2. Describe the procedures used to start-up and shut down equipment/vehicles.

3. Describe the procedures used to operate equipment/vehicles.

4. Describe the procedures used to prepare equipment/vehicles to be towed or pushed.

5. Describe the procedures used to lock-out equipment/vehicles prior to servicing.

CHT-173 Electrical and Electronic Principles

Learning Outcomes:

- Demonstrate knowledge of electrical and electronic principles.
- Demonstrate knowledge of the principles of magnetism.
- Demonstrate knowledge of electrical and electronic testing devices and their procedures for use.

Objectives and Content:

1. Define terminology associated with electricity, electronics and magnetism.

2. Identify hazards and describe safe work practices pertaining to electricity, electronics and magnetism.

3. Explain the principles of electricity and electronics.

4. Explain the principles of magnetism.

5. Describe Ohm's law and its applications.

6. Describe the procedures used to perform electrical-related calculations using Ohm's law.

7. Identify types of circuits and describe their characteristics and applications.
   i) electrical
   ii) electronic
      - programmable logic controls (PLCs)
      - non-programmable logic controls

8. Identify electrical components and describe their purpose and operation.

9. Identify electronic components and describe their purpose and operation.
   i) diodes
   ii) transistors
   iii) capacitors
   iv) resistors

10. Identify testing devices used to test circuits and describe their applications and procedures for use.

11. Identify and interpret information found on schematics.

12. Describe electrical malfunctions and their causes.

13. Describe the procedures used to test circuits.

CHT-175 Batteries

Learning Outcomes:

- Demonstrate knowledge of batteries and their operating principles.
- Demonstrate knowledge of the procedures used to service and test batteries.

Objectives and Content:

1. Define terminology associated with batteries.

2. Identify hazards and describe safe work practices pertaining to batteries.
   i) personal
   ii) shop/facility
   iii) vehicle

3. Identify equipment used to test and recharge batteries and describe their applications and procedures for use.

4. Identify types of batteries and describe their applications, construction and operating principles.

5. Describe the procedures used to remove and install batteries.

6. Describe the procedures used to activate, maintain and store batteries.
   i) maintenance free
   ii) dry charge
   iii) gel

7. Describe the procedures used to start engines with a battery booster.

8. Identify battery problems and describe the procedures used to diagnose and correct them.

CHT-177 Conventional Lighting Circuits

Learning Outcomes:

- Demonstrate knowledge of conventional lighting circuits, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair conventional lighting circuits.

Objectives and Content:

1. Define terminology associated with conventional lighting circuits.

2. Identify hazards and describe safe work practices pertaining to conventional lighting circuits.

3. Identify specialty tools and equipment used to service and repair conventional lighting circuits and describe their applications and procedures for use.

4. Identify types of conventional lighting circuits and describe their components, purpose and operation.
   i) high voltage
   ii) low voltage

5. Interpret electrical symbols and wiring diagrams relating to conventional lighting circuits.

6. Describe the procedures used to inspect and maintain conventional lighting circuits and their components.

7. Identify conventional lighting circuit problems and their causes.

8. Describe the procedures used to diagnose conventional lighting circuits.

9. Describe the procedures used to remove and install conventional lighting circuit components.

10. Describe the procedures to repair conventional lighting circuits and components.

CHT-180 Wiring Harnesses and Accessories

Learning Outcomes:

- Demonstrate knowledge of wiring harnesses and accessories, their purpose and operation.
- Demonstrate knowledge of the procedures used to service and repair wiring harnesses and accessories.

Objectives and Content:

1. Define terminology associated with wiring harnesses and accessories.

2. Identify hazards and describe safe work practices pertaining to wiring harnesses and accessories.

3. Identify specialty tools and equipment used to service and repair wiring harnesses and accessories and describe their applications and procedures for use.

4. Identify types of wiring harnesses and their components and describe their purpose and operation.

5. Identify types of wiring accessories and their components and describe their purpose and operation.

6. Interpret electrical symbols and wiring diagrams relating to wiring harnesses and accessories.

7. Describe the procedures used to inspect and maintain wiring harnesses and accessories and their components.

8. Identify wiring harness and accessory component problems and their causes.

9. Describe the procedures used to diagnose wiring harnesses and accessories.

10. Describe the procedures used to remove and install wiring harnesses and accessories and their components.

11. Describe the procedures used to repair wiring harnesses and accessories and their components.

CHT-183 Introduction to Hydraulics

Learning Outcomes:

- Demonstrate knowledge of the principles of hydraulics.
- Demonstrate knowledge of hydraulic components, their purpose and operation.
- Demonstrate knowledge of the procedures used to remove, install, service and maintain hydraulic components.

Objectives and Content:

1. Define terminology associated with hydraulics.

2. Identify hazards and describe safe work practices pertaining to hydraulics.

3. Explain the principles and theories of hydraulics.
   i) Pascal's law
   ii) Bernoulli's principle

4. Describe units of measure as they relate to hydraulics.

5. Identify hydraulic-related formulae and describe their applications.

6. Identify and interpret hydraulic-related symbols and abbreviations found on schematics.

7. Describe the properties of hydraulic fluids.

8. Identify tools and equipment used to remove, install, service and maintain hydraulic components and describe their applications and procedures for use.

9. Identify hydraulic components and describe their purpose, applications and operation.
   i) pumps
      - positive displacement
      - non-positive displacement
      - fixed displacement
      - variable displacement
   ii) actuators

- linear
- rotary

iii) pressure control valves
iv) directional control valves
v) flow control valves
vi) accumulators

10. Describe the procedures used to remove and install hydraulic components.

11. Describe the procedures used to service and maintain hydraulic components.

CHT-185 Hydraulic Fittings, Piping, Tubing and Hoses

Learning Outcomes:

- Demonstrate knowledge of hydraulic fittings, piping, tubing and hoses, their characteristics and applications.
- Demonstrate knowledge of the procedures used to maintain hydraulic fittings, piping, tubing and hoses.
- Demonstrate knowledge of the procedures used to remove and install hydraulic fittings, piping, tubing and hoses.

Objectives and Content:

1. Define terminology associated with hydraulic fittings, piping, tubing and hoses.

2. Identify hazards and describe safe work practices pertaining to hydraulic fittings, piping, tubing and hoses.

3. Identify specialty tools and equipment used to remove and install hydraulic fittings, piping, tubing and hoses and describe their applications and procedures for use.

4. Identify types of hydraulic fittings and describe their characteristics and applications.

5. Identify types of hydraulic piping and tubing and describe their characteristics and applications.

6. Identify types of hydraulic hoses and describe their characteristics and applications.

7. Describe the procedures used to inspect and maintain hydraulic fittings, piping, tubing and hoses.

8. Describe the procedures used to remove and install hydraulic fittings, piping, tubing and hoses.

CHT-187 Reservoirs, Coolers and Filters

Learning Outcomes:

- Demonstrate knowledge of reservoirs, coolers and filters, their applications and operation.
- Demonstrate knowledge of the procedures used to service and repair reservoirs, coolers and filters.

Objectives and Content:

1. Define terminology associated with reservoirs, coolers and filters.

2. Identify hazards and describe safe work practices pertaining to reservoirs, coolers and filters.

3. Identify specialty tools and equipment used to service and repair reservoirs, coolers and filters and describe their applications and procedures for use.

4. Identify types of reservoirs and describe their characteristics and applications.
   i) vented
   ii) pressurized

5. Identify reservoir components and describe their purpose and operation.

6. Identify types of coolers and filters and describe their characteristics and applications.

7. Identify cooler and filter components and describe their purpose and operation.

8. Describe the procedures used to inspect and maintain reservoirs, coolers and filters and their components.

9. Identify reservoir, cooler and filter problems and describe their causes.

10. Describe the procedures used to diagnose reservoirs, coolers and filters and their components.

11. Describe the procedures used to remove and install reservoirs, coolers and filters and their components.

12. Describe the procedures used to repair reservoirs and coolers and their components.

CHT-135 Lubrication and Fluids Servicing

Learning Outcomes:

- Demonstrate knowledge of lubricants and fluids, their characteristics and applications.
- Demonstrate knowledge of the procedures to lubricate vehicle/equipment components.
- Demonstrate knowledge of the procedures for lubrication and fluid servicing.

Objectives and Content:

1. Define terminology associated with lubrication and fluids servicing.

2. Identify hazards and describe safe work practices pertaining to lubrication and fluid servicing.
   i) personal
   ii) equipment
   iii) environmental

3. Identify specialty tools and equipment used for lubrication and fluid servicing and describe their applications and procedures for use.

4. Identify types of lubricants and fluids and describe their applications.

5. Identify the properties and characteristics of lubricants and fluids.

6. Identify types of filters and describe their characteristics and applications.

7. Describe the procedures used to check lubricant and fluid levels and condition.

8 Describe the procedures used to sample fluids.

9. Describe the procedures used to change fluids and filters.

10. Describe the procedures used to lubricate vehicle/equipment components.

11. Identify types of automatic lubrication systems and describe their purpose and operation.

12. Describe the procedures used to service and maintain automatic lubrication systems.

13. Describe the procedures used to handle, store and dispose of lubricants and fluids.

CHT-167 Cooling Systems

Learning Outcomes:

- Demonstrate knowledge of engine cooling systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair cooling systems.

Objectives and Content:

1. Define terminology associated with cooling systems.

2. Identify hazards and describe safe work practices pertaining to cooling systems and their components.

3. Identify specialty tools and equipment used to service and repair cooling systems and describe their applications and procedures for use.

4. Identify types of cooling systems and describe their applications and operation.
   i) liquid-cooled
   ii) air-cooled

5. Identify cooling system components and describe their purpose and operation.

6. Identify types of cooling system fluids and describe their characteristics and applications.

7. Describe the procedures used to handle and dispose of cooling system fluids.

8. Identify cooling system fluid tests and describe their associated procedures.

9. Describe the procedures used to service cooling systems.

10. Describe the procedures used to inspect and maintain cooling systems and components.

11. Identify cooling system problems and their causes.

12. Describe the procedures used to diagnose cooling systems and components.

13. Describe the procedures used to remove and install cooling system components.

14. Describe the procedures used to repair cooling systems and components.

CHT-170 Engine Lubrication Systems

Learning Outcomes:

- Demonstrate knowledge of engine lubrication systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair engine lubrication systems.

Objectives and Content:

1. Define terminology associated with engine lubrication systems.

2. Identify hazards and describe safe work practices pertaining to engine lubrication systems.

3. Identify types of engine lubrication systems and describe their applications and operation.

4. Identify engine lubrication system components and describe their purpose and operation.

5. Describe the procedures used to inspect and maintain engine lubrication systems and components.

6. Identify engine lubrication system failures and their causes.

7. Describe the procedures used to diagnose engine lubrication systems and components.

8. Describe the procedures used to remove and install engine lubrication system components.

9. Describe the procedures used to disassemble and assemble engine lubrication system components.

10. Describe the procedures used to repair engine lubrication systems and components.

CHT-190 Vehicle Hydraulic Brake Systems

Learning Outcomes:

- Demonstrate knowledge of vehicle hydraulic brake systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair vehicle hydraulic brake systems.

Objectives and Content:

1. Define terminology associated with vehicle hydraulic brake systems.

2. Identify hazards and describe safe work practices pertaining to vehicle hydraulic brake systems.

3. Identify specialty tools and equipment used to service and repair vehicle hydraulic brake systems and describe their applications and procedures for use.

4. Identify types of vehicle hydraulic brake systems and describe their applications and operation.
   i) drum
   ii) disc

5. Identify vehicle hydraulic brake system components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain vehicle hydraulic brake systems and their components.

7. Identify vehicle hydraulic brake system problems and their causes.

8. Describe the procedures used to diagnose vehicle hydraulic brake systems.

9. Describe the procedures used to remove and install vehicle hydraulic brake system components.

10. Describe the procedures used to repair and adjust vehicle hydraulic brake systems and their components.

HET-320 Equipment Hydraulic Brake Systems

Learning Outcomes:

- Demonstrate knowledge of equipment hydraulic brake systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair equipment hydraulic brake systems.

Objectives and Content:

1. Define terminology associated with equipment hydraulic brake systems.

2. Identify hazards and describe safe work practices pertaining to equipment hydraulic brake systems.

3. Identify specialty tools and equipment used to service and repair equipment hydraulic brake systems and describe their applications and procedures for use.

4. Identify types of equipment hydraulic brake systems and describe their applications and operation.
   i) drum
   ii) disc
   iii) multi-disc

5. Identify equipment hydraulic brake system components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain equipment hydraulic brake systems and their components.

7. Identify equipment hydraulic brake system problems and their causes.

8. Describe the procedures used to diagnose equipment hydraulic brake systems.

9. Describe the procedures used to remove and install equipment hydraulic brake systems components.

10. Describe the procedures used to adjust and repair equipment hydraulic brake systems and their components.

CHT-195 Basic Air Brake Systems

Learning Outcomes:

- Demonstrate knowledge of basic air brake systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair basic air brake systems.

Objectives and Content:

1. Define terminology associated with basic air brake systems.

2. Identify hazards and describe safe work practices pertaining to basic air brake systems.

3. Identify specialty tools and equipment used to service and repair basic air brake systems and describe their applications and procedures for use.

4. Identify types of basic air brake systems and describe their applications and operation.
   i) air
   ii) air over hydraulic

5. Identify basic air brake system components and describe their purpose and operation.
   i) compressors
   ii) reservoirs
   iii) governors
   iv) hoses, lines and fittings
   v) air dryers
   vi) foundation brakes
   vii) brake chambers
   viii) valves
   ix) indicators and warning devices

6. Describe the procedures used to inspect and maintain basic air brake systems and components.

7. Identify basic air brake system problems and their causes.

8. Describe the procedures used to diagnose basic air brake systems.

9. Describe the procedures used to remove and install basic air brake system components.

10. Describe the procedures used to repair and adjust basic air brake system components.

CHT-165 Engine Principles

Learning Outcomes:

- Demonstrate knowledge of engine operating principles.
- Demonstrate knowledge of major engine components, their purpose and operation.

Objectives and Content:

1. Define terminology associated with engine principles.

2. Explain the principles and theories of engine operation.

3. Identify types and classifications of engines and describe their applications.

4. Identify major engine components and describe their purpose and operation.

CHT-150 Metallurgy

Learning Outcomes:

- Demonstrate knowledge of metals and their characteristics.
- Demonstrate knowledge of material testing procedures.

Objectives and Content:

1. Define terminology associated with metallurgy.

2. Identify types of metals and describe their properties.
   i) ferrous
   ii) non-ferrous

3. Identify common metal tests and describe their associated procedures.

CHT-155 Cutting and Heating

Learning Outcomes:

- Demonstrate knowledge of cutting and heating equipment and accessories.
- Demonstrate knowledge of the procedures used to cut and heat using oxy-fuel equipment.

Objectives and Content:

1. Define terminology associated with oxy-fuel cutting and heating.

2. Identify hazards and describe safe work practices pertaining to oxy-fuel cutting and heating.
   i) personal
   ii) shop/facility
      - awareness of surroundings
   iii) equipment/vehicle
   iv) ventilation
   v) cutting and heating equipment

3. Identify and interpret codes and regulations pertaining to oxy-fuel cutting and heating.

4. Identify cutting and heating equipment and accessories and describe their applications.
   i) oxy-fuel
   ii) plasma-arc

5. Describe the procedures used to set-up, adjust and shut-down oxy-fuel equipment.

6. Describe the procedures used to inspect and maintain oxy-fuel equipment.

7. Describe the procedures used to transport and store oxy-fuel equipment.

8. Describe the procedures used to cut and heat material using oxy-fuel equipment.

9. Describe the procedures used to solder, braze and fuse using oxy-fuel equipment.

CHT-160 Metal Inert Gas (MIG) Welding

Learning Outcomes:

- Demonstrate knowledge of MIG welding equipment and accessories.
- Demonstrate knowledge of the procedures used to weld using MIG welding equipment.

Objectives and Content:

1. Define terminology associated with MIG welding.

2. Identify hazards and describe safe work practices pertaining to MIG welding.
   i) personal
   ii) shop/facility
      - awareness of surroundings
   iii) equipment/vehicle
   iv) ventilation
   v) MIG equipment

3. Describe MIG welding processes and their applications.
   i) Gas Metal Arc Welding (GMAW)
   ii) Flux-Cored Arc Welding (FCAW)

4. Identify MIG welding equipment, consumables and accessories and describe their applications.

5. Describe the procedures used to set-up, adjust and shut-down MIG welding equipment.

6. Describe the procedures used to inspect and maintain MIG welding equipment.

7. Identify the types of welds performed using MIG welding equipment.
   i) joints
   ii) positions

8. Describe the procedures used to weld using MIG welding equipment.

9. Describe weld defects, their causes and prevention.

CHT-200 Shielded Metal Arc Welding (SMAW)

Learning Outcomes:

- Demonstrate knowledge of SMAW equipment and accessories.
- Demonstrate knowledge of the procedures used to weld using SMAW equipment.

Objectives and Content:

1. Define terminology associated with SMAW.

2. Identify hazards and describe safe work practices pertaining to SMAW.
   i) personal
   ii) shop/facility
      - awareness of surroundings
   iii) equipment/vehicle
   iv) ventilation
   v) SMAW equipment

3. Identify and interpret codes and regulations pertaining to SMAW.

4. Describe the SMAW process and its application.

5. Identify SMAW equipment, consumables and accessories and describe their applications and storage requirements.

6. Describe the procedures used to set-up, adjust and shut-down SMAW equipment.

7. Describe the procedures used to inspect and maintain SMAW equipment.

8. Identify the types of welds performed using SMAW equipment.
   i) joints
   ii) positions

9. Describe the procedures used to weld using SMAW equipment.

10. Describe weld defects, their causes and prevention.

CHT-163 Tires, Rims and Wheels

Learning Outcomes:

- Demonstrate knowledge of tires, rims and wheels, their characteristics and applications.
- Demonstrate knowledge of the procedures used to service and repair tires, rims and wheels.

Objectives and Content:

1. Define terminology associated with tires, rims and wheels.

2. Identify hazards and describe safe work practices pertaining to tires, rims and wheels.

3. Identify codes and regulations pertaining to tires, rims and wheels.
   i) jurisdictional requirements

4. Identify specialty tools and equipment used to service and repair tires, rims and wheels and describe their applications and procedures for use.

5. Identify types of tires and describe their characteristics and applications.
   i) on-road
      - radial
      - bias-ply
      - tube
      - tubeless
   ii) off-road
      - loaded
      - non-loaded

6. Identify types of rims and wheels and describe their characteristics and applications.

7. Identify tire, rim and wheel components and accessories and describe their purpose.

8. Describe the procedures used to inspect and maintain tires, rims and wheels.

9. Describe the procedures used to remove and install tires, rims and wheels.

10. Describe the procedures used to repair tires, rims and wheels.

11. Describe the procedures used to balance wheels.

CHT-120 Preventive Maintenance

Learning Outcomes:

- Demonstrate knowledge of preventive maintenance and its purpose.
- Demonstrate knowledge of the procedures used to perform preventive maintenance.

Objectives and Content:

1. Define terminology associated with preventive maintenance.

2. Describe preventive maintenance programs.
   i) scheduled lubrication
   ii) scheduled servicing
   iii) scheduled cleaning
   iv) inspections (including pre-delivery)
   v) completing documentation
   vi) legal responsibilities

3. Describe the procedures used to perform preventive maintenance.

LEVEL 2

CHT-210 Drive Axle Assemblies

Learning Outcomes:

- Demonstrate knowledge of drive axle assemblies, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair drive axle assemblies.

Objectives and Content:

1. Define terminology associated with drive axle assemblies.

2. Identify hazards and describe safe work practices pertaining to drive axle assemblies.

3. Identify specialty tools and equipment used to service and repair drive axle assemblies and describe their applications and procedures for use.

4. Identify types of drive axle assemblies and describe their applications and operation.
   i) locking
   ii) non-locking
   iii) single reduction
   iv) double reduction
   v) planetary two-speed
   vi) planetary double reduction
   vii) double reduction two-speed
   viii) power divider

5. Identify drive axle assembly components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain drive axle assemblies and their components.

7. Identify drive axle assembly problems and their causes.

8. Describe the procedures used to diagnose drive axle assemblies.

9. Describe the procedures used to remove and install drive axle assemblies and their components.

10. Describe the procedures used to repair and adjust drive axle assemblies.

CHT-205 Drive Lines

Learning Outcomes:

- Demonstrate knowledge of drive lines, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair drive lines.

Objectives and Content:

1. Define terminology associated with drive lines.

2. Identify hazards and describe safe work practices pertaining to drive lines.

3. Identify specialty tools and equipment used to service and repair drive lines and describe their applications and procedures for use.

4. Identify drive line configurations and describe their characteristics and operation.

5. Identify drive line components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain drive line components.

7. Identify drive line problems and their causes.

8. Describe the procedures used to diagnose drive lines.

9. Describe the procedures used to remove and install drive line components.

10. Describe the procedures used to repair and adjust drive line components.

CHT-250 Electronic Ignition Systems

Learning Outcomes:

- Demonstrate knowledge of electronic ignition systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair electronic ignition systems.

Objectives and Content:

1. Define terminology associated with electronic ignition systems.

2. Identify hazards and describe safe work practices pertaining to electronic ignition systems.

3. Identify specialty tools and equipment used to service and repair electronic ignition systems and describe their applications and procedures for use.

4. Identify types of electronic ignition systems and describe their operating principles.

5. Identify electronic ignition system components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain electronic ignition systems and components.

7. Identify electronic ignition system problems and their causes.

8. Describe the procedures used to diagnose electronic ignition systems and components.

9. Describe the procedures used to remove and install electronic ignition system components.

10. Describe the procedures used to repair and adjust electronic ignition systems and components.

CHT-220 Non-Diesel Fuel Systems

Learning Outcomes:

- Demonstrate knowledge of non-diesel fuel systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair non-diesel fuel systems.

Objectives and Content:

1. Define terminology associated with non-diesel fuel systems.

2. Identify hazards and describe safe work practices pertaining to non-diesel fuel systems.

3. Identify the properties and characteristics of non-diesel fuels and describe the handling and storage procedures.
   i) gasoline
   ii) liquefied petroleum gas (LPG)
   iii) compressed natural gas (CNG)

4. Identify specialty tools and equipment used to service and repair non-diesel fuel systems and describe their applications and procedures for use.

5. Identify non-diesel fuel system components and describe their purpose and operation.
   i) tanks
   ii) filters
   iii) converters
   iv) carburetors
   v) valves
   vi) gauges
   vii) fuel lines and fittings
   viii) pumps

6. Describe the procedures used to inspect and maintain non-diesel fuel systems and components.

7. Identify non-diesel fuel system problems and their causes.

8. Describe the procedures used to diagnose non-diesel fuel systems and components.

9. Describe the procedures used to remove and install non-diesel fuel system components.

10. Describe the procedures used to disassemble and assemble non-diesel fuel system components.

11. Describe the procedures used to repair and adjust non-diesel fuel systems and components.

CHT-225 Diesel Fuel Supply Systems

Learning Outcomes:

- Demonstrate knowledge of diesel fuel supply systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair diesel fuel supply systems.

Objectives and Content:

1. Define terminology associated with diesel fuel supply systems.

2. Identify hazards and describe safe work practices pertaining to diesel fuel supply systems.

3. Identify the properties and characteristics of diesel fuels and describe their handling and storage procedures.

4. Identify specialty tools and equipment used to service and repair diesel fuel supply systems and describe their applications and procedures for use.

5. Identify diesel fuel supply system components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain diesel fuel supply systems and components.

7. Identify diesel fuel supply system problems and their causes.

8. Describe the procedures used to diagnose diesel fuel supply system and components.

9. Describe the procedures used to remove and install diesel fuel supply system components.

10. Describe the procedures used to disassemble and assemble diesel fuel supply system components.

11. Describe the procedures used to repair and adjust diesel fuel supply systems and components.

CHT-230 Intake and Exhaust Systems

Learning Outcomes:

- Demonstrate knowledge of intake and exhaust systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair intake and exhaust systems.

Objectives and Content:

1. Define terminology associated with intake and exhaust systems.

2. Identify hazards and describe safe work practices pertaining to intake and exhaust systems.

3. Identify specialty tools and equipment used to service and repair intake and exhaust systems and describe their applications and procedures for use.

4. Identify types of air filtration systems and describe their applications and operation.

5. Identify intake system components and describe their purpose and operation.

6. Identify exhaust system components and describe their purpose and operation.

7. Describe the procedures used to inspect and maintain intake and exhaust systems and components.

8. Identify intake and exhaust system problems and their causes.

9. Describe the procedures used to diagnose intake and exhaust systems and components.

10. Describe the procedures used to remove and install intake and exhaust system components.

11. Describe the procedures used to repair intake and exhaust systems and components.

CHT-215 Engine Clutches

Learning Outcomes:

- Demonstrate knowledge of engine clutches, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair engine clutches.

Objectives and Content:

1. Define terminology associated with engine clutches.

2. Identify hazards and describe safe work practices pertaining to engine clutches.

3. Identify specialty tools and equipment used to service and repair engine clutches and describe their applications and procedures for use.

4. Identify types of engine clutches and describe their characteristics and operation.
   i) single plate
   ii) double plate
   iii) over-center

5. Identify types of engine clutch actuating mechanisms and describe their principles of operation.
   i) mechanical
   ii) hydraulic
   iii) pneumatic

6. Identify engine clutch components and describe their purpose and operation.
   i) pressure plate assemblies
   ii) release bearings
   iii) pilot bearings
   iv) brakes
   v) flywheels
   vi) housings

7. Describe the procedures used to inspect and maintain engine clutch components.

8. Identify engine clutch related problems and their causes.

9. Describe the procedures used to diagnose engine clutches.

10. Describe the procedures used to remove and install engine clutches and their components.

11. Describe the procedures to repair and adjust engine clutches and their components.

HET-340 Manual Transmissions and Power Take-Offs

Learning Outcomes:

- Demonstrate knowledge of manual transmissions and power take-offs, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair manual transmissions and power take-offs.

Objectives and Content:

1. Define terminology associated with manual transmissions and power take-offs.

2. Identify hazards and describe safe work practices pertaining to manual transmissions and power take-offs.

3. Identify specialty tools and equipment used to service and repair manual transmissions and power take-offs and describe their applications and procedures for use.

4. Identify the types of manual transmissions and describe their applications and operation.
   i) single counter-shaft
      - synchronized
      - non-synchronized

5. Identify manual transmission components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain manual transmissions and their components.

7. Identify manual transmission problems and their causes.

8. Describe the procedures used to diagnose manual transmissions.

9. Describe the procedures used to remove and install manual transmissions and their components.

10. Describe the procedures used to disassemble and assemble manual transmissions and their components.

11. Describe the procedures used to repair manual transmissions and their components.

12. Identify types of power take-offs and describe their components, purpose and operation.

13. Describe the procedures used to inspect and maintain power take-offs and their components.

14. Identify power take-off problems and their causes.

15. Describe the procedures used to diagnose power take-offs and their components.

16. Describe the procedures used to remove and install power take-offs and their components.

17. Describe the procedures used to adjust and repair power take-offs and their components.

TTM-330 Manual Transmissions

Learning Outcomes:

- Demonstrate knowledge of manual transmissions, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair manual transmissions.

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to servicing and repairing manual transmissions.

2. Identify specialty tools and equipment used to service and repair manual transmissions and describe their applications and procedures for use.

3. Identify types of manual transmissions and describe their applications and operation.
   i) conventional manual shift
   ii) electronic
   iii) auto shift

4. Identify manual transmission components and describe their purpose and operation.

5. Describe the procedures used to disassemble and assemble manual transmissions and their components.

6. Describe the procedures used to inspect and maintain manual transmissions and their components.

7. Identify manual transmission problems and their causes.

8. Describe the procedures used to diagnose manual transmissions.

9. Describe the procedures used to remove and install manual transmissions and their components.

10. Describe the procedures used to repair manual transmissions and their components.

TTM-335 Power Take-offs

Learning Outcomes:

- Demonstrate knowledge of power take-offs, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair power take-offs.

Objectives and Content:

1. Define terminology associated with power take-offs.

2. Identify hazards and describe safe work practices pertaining to servicing and repairing power take-offs.

3. Identify specialty tools and equipment used to service and repair power take-offs and describe their applications and procedures for use.

4. Identify types of power take-offs and their components and describe their purpose and operation.
   i) engine driven
      - front crankshaft
      - gear train
   ii) transmission driven
   iii) driveline driven

5. Describe the procedures used to disassemble and assemble power take-offs and their components.

6. Describe the procedures used to inspect and maintain power take-offs and their components.

7. Identify power take-off problems and their causes.

8. Describe the procedures used to diagnose power take-offs and their components.

9. Describe the procedures used to remove and install power take-offs and their components.

10. Describe the procedures used to adjust and repair power take-offs and their components.

HET-345 Transfer Cases

Learning Outcomes:

- Demonstrate knowledge of transfer cases, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair transfer cases.

Objectives and Content:

1. Define terminology associated with transfer cases.

2. Identify hazards and describe safe work practices pertaining to transfer cases.

3. Identify specialty tools and equipment used to service and repair transfer cases and describe their applications and procedures for use.

4. Identify types of transfer cases and describe their applications and operation.

5. Identify transfer case components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain transfer cases and their components.

7. Identify transfer case problems and their causes.

8. Describe the procedures used to diagnose transfer cases.

9. Describe the procedures used to remove and install transfer cases and their components.

10. Describe the procedures used to overhaul and repair transfer cases and their components.

TTM-340 Transfer Cases

Learning Outcomes:

- Demonstrate knowledge of transfer cases, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair transfer cases.

Objectives and Content:

1. Define terminology associated with transfer cases.

2. Identify hazards and describe safe work practices pertaining to transfer cases.

3. Identify specialty tools and equipment used to service and repair transfer cases and describe their applications and procedures for use.

4. Identify types of transfer cases and describe their applications and operation.

5. Identify transfer case components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain transfer cases and their components.

7. Identify transfer case problems and their causes.

8. Describe the procedures used to diagnose transfer cases.

9. Describe the procedures used to remove and install transfer cases and their components.

10. Describe the procedures used to overhaul and repair transfer cases and their components.

CHT-235 Starting Systems

Learning Outcomes:

- Demonstrate knowledge of starting systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair starting systems.

Objectives and Content:

1. Define terminology associated with starting systems.

2. Identify hazards and describe safe work practices pertaining to starting systems.

3. Identify specialty tools and equipment used to service and repair starting systems and describe their applications and procedures for use.

4. Identify types of starting systems and describe their applications and operation.
   i) electrical
   ii) hydraulic
   iii) pneumatic

5. Identify starting system components and describe their applications and operation.

6. Describe the procedures used to inspect and maintain starting system components.
   i) electrical
   ii) pneumatic

7. Identify starting system problems and their causes.
   i) electrical
   ii) pneumatic

8. Describe the procedures used to diagnose starting system components.
   i) electrical
   ii) pneumatic

9. Describe the procedures used to remove and install starting system components.

i) electrical
ii) pneumatic

10. Describe the procedures used to repair starting system components.
    i) electrical
    ii) pneumatic

CHT-240 Starting Aids

Learning Outcomes:

- Demonstrate knowledge of starting aids, their purpose and operation.
- Demonstrate knowledge of the procedures used to service and repair starting aids.

Objectives and Content:

1. Define terminology associated with starting aids.

2. Identify hazards and describe safe work practices pertaining to starting aids.

3. Identify the types of starting aids and describe their purpose and operation.
   i) ether starting systems
   ii) oil heaters
   iii) coolant heaters
   iv) battery warmers
   v) glow plugs
   vi) intake manifold heaters
   vii) decompression mechanisms

4. Describe the procedures used to inspect and maintain starting aids and their components.

5. Identify starting aid problems and their causes.

6. Describe the procedures used to diagnose starting aids and their components.

7. Describe the procedures used to remove and install starting aids and their components.

8. Describe the procedures used to repair starting aids and their components.

CHT-245 Charging Systems

Learning Outcomes:

- Demonstrate knowledge of charging systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair charging systems.

Objectives and Content:

1. Define terminology associated with charging systems.

2. Identify hazards and describe safe work practices pertaining to charging systems.

3. Identify specialty tools and equipment used to service and repair charging systems and describe their applications and procedures for use.

4. Identify charging system components and describe their purpose and operation.

5. Describe the procedures used to inspect and maintain charging system components.

6. Identify charging system problems and their causes.

7. Describe the procedures used to diagnose charging system components.

8. Describe the procedures used to remove and install charging system components.

9. Describe the procedures used to disassemble and assemble charging system components.

10. Describe the procedures used to repair charging system components.

CHT-265 Air Conditioning Systems

Learning Outcomes:

- Demonstrate knowledge of air conditioning systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair air conditioning systems.

Objectives and Content:

1. Define terminology associated with air conditioning systems.

2. Identify hazards and describe safe work practices pertaining to air conditioning systems.

3. Identify codes and regulations pertaining to air conditioning systems.
   i) certification requirements

4. Identify specialty tools and equipment used to service and repair air conditioning systems and describe their applications and procedures for use.

5. Describe the principles of refrigeration.

6. Identify refrigerant types and describe their characteristics and applications.

7. Identify and interpret information found on pressure/temperature charts.

8. Identify air conditioning system components and describe their purpose and operation.

9. Describe the procedures used to inspect and maintain air conditioning system and components.

10. Identify air conditioning system problems and their causes.

11. Describe the procedures used to diagnose air conditioning systems.

12. Describe the procedures used to remove and install air conditioning system components.

13. Describe the procedures used to repair and adjust air conditioning systems and components.

CHT-270 Heating and Ventilation Systems

Learning Outcomes:

- Demonstrate knowledge of heating and ventilation systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair heating and ventilation systems.

Objectives and Content:

1. Define terminology associated with heating and ventilation systems.

2. Identify hazards and describe safe work practices pertaining to heating and ventilation systems.

3. Identify types of heating and ventilation systems and describe their applications and operation.
   i) cab
   ii) auxiliary

4. Identify heating and ventilation system components and describe their purpose and operation.

5. Describe the procedures used to inspect and maintain heating and ventilation systems and components.

6. Identify heating and ventilation system problems and their causes.

7. Describe the procedures used to diagnose heating and ventilation systems.

8. Describe the procedures used to remove and install heating and ventilation system components.

9. Describe the procedures used to repair and adjust heating and ventilation systems and components.

Level 3

TTM-305 Front Axles and Suspension Systems

Learning Outcomes:

- Demonstrate knowledge of front axles and suspension systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair front axles and suspension systems.

Objectives and Content:

1. Define terminology associated with front axles and suspension systems.

2. Identify hazards and describe safe work practices pertaining to front axles and suspension systems.
   i) jacking procedures

3. Identify specialty tools and equipment used to service and repair front axles and suspension systems and describe their applications and procedures for use.

4. Identify types of axles and describe their components, purpose and operation.
   i) independent
   ii) solid axle ("I" beam)
   iii) single axle
   iv) double axle

5. Identify types of front suspensions and describe their components, purpose and operation.

6. Describe the procedures used to inspect and maintain front axles and suspension systems and their components.

7. Identify front axle and suspension system problems and their causes.

8. Describe the procedures used to diagnose front axles and suspension systems and their components.

9. Describe the procedures used to remove and install front axles and suspension systems and their components.

10. Describe the procedures used to repair and adjust front axles and suspension systems and their components.

TTM-310 Rear Axles and Suspension Systems

Learning Outcomes:

- Demonstrate knowledge of rear axles and suspension systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair rear axles and suspension systems.

Objectives and Content:

1. Define terminology associated with rear axles and suspension systems.

2. Identify hazards and describe safe work practices pertaining to rear axles and suspensions.

3. Identify specialty tools and equipment used to service and repair rear axles and suspension systems and describe their applications and procedures for use.

4. Identify types of rear axles and describe their components, purpose and operation.
   i) single axle
   ii) multi-axle

5. Identify types of rear suspensions and describe their components, purpose and operation.

6. Describe the procedures used to inspect and maintain rear axles and suspension systems and their components.

7. Identify rear axles and suspension system problems and their causes.

8. Describe the procedures used to diagnose rear axles and suspension systems and their components.

9. Describe the procedures used to remove and install rear axles and suspension systems and their components.

10. Describe the procedure used to repair and adjust rear axles and suspension systems and their components.

TTM-320 Frames and Chassis

Learning Outcomes:

- Demonstrate knowledge of frames and chassis, their components and characteristics.
- Demonstrate knowledge of the procedures used to service and repair frames and chassis.

Objectives and Content:

1. Define terminology associated with frames and chassis.

2. Identify hazards and describe safe work practices pertaining to frames and chassis.

3. Identify and interpret codes and regulations pertaining to frames and chassis.
   i) jurisdictional requirements

4. Identify specialty tools and equipment used to service and repair frames and chassis and describe their applications and procedures for use.

5. Identify types of truck frames and their components and describe their purpose and characteristics.

6. Describe the procedures used to perform frame alignment.

7. Describe the procedures used to inspect frames and their components for damage.

8. Describe the procedures used to remove and install frame components.

9. Describe the procedures used to reinforce frames.

TTM-365 Trailers

Learning Outcomes:

- Demonstrate knowledge of trailers, their components and accessories.
- Demonstrate knowledge of the procedures used to service and repair trailers.

Objectives and Content:

1. Define terminology associated with trailers.

2. Identify hazards and describe safe work practices pertaining to trailers.

3. Identify specialty tools and equipment used to service and repair trailers and describe their applications and procedures for use.

4. Identify types of trailers and describe their construction.

5. Identify trailer components and accessories and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain trailers, their components and accessories.

7. Identify trailer problems and their causes.

8. Describe the procedures used to diagnose trailers.

9. Describe the procedures used to remove and install trailer components and accessories.

10. Describe the procedures used to repair and adjust trailers, their components and accessories.

TTM-360 Trailer Coupling Devices

Learning Outcomes:

- Demonstrate knowledge of trailer coupling devices, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair trailer coupling devices.

Objectives and Content:

1. Define terminology associated with trailer coupling devices.

2. Identify hazards and describe safe work practices pertaining to trailer coupling devices.

3. Identify specialty tools and equipment used to service and repair trailer coupling devices and describe their applications and procedures for use.

4. Identify types of trailer coupling devices and describe their purpose and operation.
   i) fifth wheels
   ii) pintle hook couplers

5. Describe the procedures used to inspect and maintain trailer coupling devices.

6. Identify trailer coupling device problems and their causes.

7. Describe the procedures used to diagnose trailer coupling devices.

8. Describe the procedures used to remove and install trailer coupling devices.

9. Describe the procedures used to repair and adjust trailer coupling devices.

CHT-163 Tires, Rims and Wheels

Learning Outcomes:

- Demonstrate knowledge of tires, rims and wheels, their characteristics and applications.
- Demonstrate knowledge of the procedures used to service and repair tires, rims and wheels.

Objectives and Content:

1. Define terminology associated with tires, rims and wheels.

2. Identify hazards and describe safe work practices pertaining to tires, rims and wheels.

3. Identify codes and regulations pertaining to tires, rims and wheels.
   i) jurisdictional requirements

4. Identify specialty tools and equipment used to service and repair tires, rims and wheels and describe their applications and procedures for use.

5. Identify types of tires and describe their characteristics and applications.
   i) on-road
      - radial
      - bias-ply
      - tube
      - tubeless
   ii) off-road
      - loaded
      - non-loaded

6. Identify types of rims and wheels and describe their characteristics and applications.

7. Identify tire, rim and wheel components and accessories and describe their purpose.

8. Describe the procedures used to inspect and maintain tires, rims and wheels.

9. Describe the procedures used to remove and install tires, rims and wheels.

10. Describe the procedures used to repair tires, rims and wheels.

11. Describe the procedures used to balance wheels.

TTM-315 Wheel and Axle Alignment

Learning Outcomes:

- Demonstrate knowledge of the procedures used to perform wheel and axle alignment.

Objectives and Content:

1. Define terminology associated with wheel and axle alignment.

2. Identify hazards and describe safe work practices pertaining to wheel and axle alignment.

3. Identify specialty tools and equipment used to perform wheel and axle alignment.

4. Identify axle alignment problems and their causes.

5. Describe the procedures used to measure and adjust axle misalignment.

6. Identify trailer alignment problems and their causes.

7. Describe the procedures used to measure and adjust trailer misalignment.

8. Identify wheel alignment problems and their causes.

TTM-325 Steering Systems

Learning Outcomes:

- Demonstrate knowledge of steering systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair steering systems.

Objectives and Content:

1. Define terminology associated with steering systems.

2. Identify hazards and describe safe work practices pertaining to steering systems.

3. Identify specialty tools and equipment used to service and repair steering systems and describe their applications and procedures for use.

4. Identify types of steering systems and describe their applications and operation.

5. Identify steering components and describe their purpose and operation.
   i) steering columns
   ii) steering linkage
   iii) gear boxes
   iv) hydraulic components

6. Describe the procedures used to inspect and maintain steering systems and their components.

7. Identify steering systems problems and their causes.

8. Describe the procedures used to diagnose steering systems.

9. Describe the procedures used to remove and install steering system components.

10. Describe the procedures used to repair and adjust steering system components.

TTM-300 Gasoline Fuel Injection Systems

Learning Outcomes:

- Demonstrate knowledge of gasoline fuel injection systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair gasoline fuel injection systems.

Objectives and Content:

1. Define terminology associated with gasoline fuel injection systems.

2. Identify hazards and describe safe work practices pertaining to gasoline fuel injection systems.

3. Identify specialty tools and equipment used to service and repair gasoline fuel injection systems and describe their applications and procedures for use.

4. Identify types of gasoline fuel injection systems and describe their applications and operation.
   i) throttle body injection
   ii) multi-port injection

5. Identify gasoline fuel injection system components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain gasoline fuel injection systems and their components.

7. Identify gasoline fuel injection system problems and their causes.

8. Describe the procedures used to diagnose gasoline fuel injection systems.

9. Describe the procedures used to remove and install gasoline fuel injection system components.

10. Describe the procedures used to repair and adjust gasoline fuel injection systems.

CHT-260 Torque Converters

Learning Outcomes:

- Demonstrate knowledge of torque converters, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair torque converters.

Objectives and Content:

1. Define terminology associated with torque converters.

2. Identify hazards and describe safe work practices pertaining to torque converters.

3. Identify specialty tools and equipment used to service and repair torque converters and describe their applications and procedures for use.

4. Identify types of torque converters and describe their applications and operation.

5. Identify torque converter components and describe their purpose and operation.
   i) impeller
   ii) turbine
   iii) stators
   iv) split guide rings
   v) flex plate
   vi) lock-up clutches
   vii) charge pump
   viii) oil circuits
   ix) valves
   x) oil coolers

6. Describe the procedures used to inspect and maintain torque converters and their components.

7. Identify torque converter problems and their causes

8. Describe the procedures used to diagnose torque converters.

9. Describe the procedures used to remove and install torque converters and their components.

10. Describe the procedures used to repair and adjust torque converters and their components.

CHT-255 Automatic/Power Shift Transmissions

Learning Outcomes:

- Demonstrate knowledge of automatic/power shift transmissions, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair automatic/power shift transmissions.

Objectives and Content:

1. Define terminology associated with automatic/power shift transmissions.

2. Identify hazards and describe safe work practices pertaining to automatic/power shift transmissions.

3. Identify specialty tools and equipment used to service and repair automatic/power shift transmissions and describe their applications and procedures for use.

4. Identify types of automatic/power shift transmissions and describe their applications and operation.
   i) hydromechanical
   ii) electrohydraulic (electronically controlled)

5. Identify automatic/power shift transmission components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain automatic/power shift transmissions and their components.

7. Identify automatic/power shift transmission problems and their causes.

8. Describe the procedures used to diagnose automatic/power shift transmissions.

9. Describe the procedures used to remove and install automatic/power shift transmissions and their components.

10. Describe the procedures used to repair and adjust automatic/power shift transmissions and their components.

TTM-350 Anti-lock Braking and Traction Control Systems

Learning Outcomes:

- Demonstrate knowledge of anti-lock braking systems, their components and operation.
- Demonstrate knowledge of traction control systems, their components and operation.
- Demonstrate knowledge of the procedures to service and repair anti-lock braking systems.
- Demonstrate knowledge of the procedures to service and repair traction control systems.

Objectives and Content:

1. Define terminology associated with anti-lock braking and traction control systems.

2. Identify hazards and describe safe work practices pertaining to anti-lock brakes and traction control systems.

3. Identify specialty tools and equipment used to service and repair anti-lock brakes and traction control systems and describe their applications and procedures for use.

4. Describe the operation of anti-lock braking (ABS) and traction control (ATC) systems.

5. Identify anti-lock braking system components and describe their purpose and operation.
   - i) tooth wheel (reluctor)
   - ii) wheel speed sensor
   - iii) sensor holder and spring clip
   - iv) electronic control unit
   - v) ABS warning lamp
   - vi) blink code switch
   - vii) valves and solenoids
   - viii) wiring harnesses

6. Identify traction control system components and describe their purpose and operation.
   i) automatic traction control
   ii) valves and solenoids
   iii) ATC indicator lamp
   iv) deep snow/mud switch

7. Describe the procedures used to inspect and maintain ABS and ATC systems and components.

8. Identify ABS and ATC system problems and their causes.

9. Describe the procedures used to diagnose ABS and ATC systems.

10. Describe the procedures used to remove and install ABS and ATC system components.

11. Describe the procedures used to repair ABS and ATC systems and adjust components.

TTM-345 Dual Air Brake Systems

Learning Outcomes:

- Demonstrate knowledge of dual air brake systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair dual air brake systems.

Objectives and Content:

1. Define terminology associated with dual air brake systems.

2. Identify hazards and describe safe work practices pertaining to dual air brake systems.

3. Identify specialty tools and equipment used to service and repair dual air brake systems and describe their applications and procedures for use.

4. Identify types of dual air brake systems and describe their applications and operation.

5. Identify dual air brake system components and describe their purpose and operation.
   i) valves
   ii) trailer systems

6. Describe the procedures used to inspect and maintain dual air brake systems and components.

7. Identify dual air brake system problems and their causes.

8. Describe the procedures used to diagnose dual air brake systems.

9. Describe the procedures used to remove and install dual air brake system components.

10. Describe the procedures used to repair and adjust dual air brake system components.

TTM-355 Cab Components

Learning Outcomes:

- Demonstrate knowledge of cab components, their purpose and operation.
- Demonstrate knowledge of the procedures used to service and repair cab components.

Objectives and Content:

1. Define terminology associated with cab components.

2. Identify hazards and describe safe work practices pertaining to cab components.

3. Identify cab components and describe their purpose and operation.
   - i) interior
     - pedals
     - seats
     - restraints
     - side windows
   - ii) exterior
     - wipers
     - windshields
     - mirrors
     - door handles
     - steps
     - latches and cables

4. Describe the procedures used to inspect and maintain cab components.

5. Describe the procedures used to remove and install cab components.

6. Describe the procedures used to repair and adjust cab components.

Level 4

MENT-1802 Workplace Mentoring II

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Identify and explain strategies for teaching workplace skills.
- Demonstrate strategies to assist in teaching skills in the workplace

Objectives and Content:

1. Describe the impact of your own experiences in teaching skills.
2. Identify the different roles played by a workplace mentor.
3. Describe the six-step approach to teaching skills.
4. Explain the importance of identifying the point of the lesson.
5. Identify how to choose a good time to present a lesson.
6. Explain the importance of linking the lessons.
7. Identify the components of the skill (the context).
8. Describe considerations for demonstrating a skill.
9. Identify types of skill practice.
10. Describe considerations in setting up opportunities for skill practice.
11. Explain the importance of providing feedback.
12. Identify techniques for giving effective feedback.
13. Describe a skill assessment.
14. Identify methods of assessing progress.
15. Explain how to adjust a lesson to different situations.

Resource:

- Recommended resource to use in the delivery of this unit: www.apprenticeship.nscc.ca/mentoring/apprentice.htm

CHT-120 Preventive Maintenance

Learning Outcomes:

- Demonstrate knowledge of preventive maintenance and its purpose.
- Demonstrate knowledge of the procedures used to perform preventive maintenance.

Objectives and Content:

1. Define terminology associated with preventive maintenance.

2. Describe preventive maintenance programs.
   i) scheduled lubrication
   ii) scheduled servicing
   iii) scheduled cleaning
   iv) inspections
   v) completing documentation
   vi) legal responsibilities

3. Describe the procedures used to perform preventive maintenance.

TTMA-1001 Pre-Delivery Inspection

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Demonstrate knowledge of pre-delivery inspections and their purpose.
- Demonstrate knowledge of the procedures used to perform pre-delivery inspections.

Objectives and Content:

1. Identify the purpose of pre-delivery inspections.

2. Describe the procedures used to perform pre-delivery inspections.
   i) inspection instructions
   ii) specifications and tolerances documentation

TTMA-1002 Government Safety Inspection

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Demonstrate knowledge of government safety inspections and their purpose.

Objectives and Content:

3. Identify the purpose of provincial government safety inspections.

4. Identify the responsibilities and liabilities pertaining to government safety inspections.
   i) vehicle owner
   ii) journeyperson
   iii) shop Owner
   iv) government

5. Describe the procedures used to perform government safety inspections.
   i) inspection instructions
   ii) specifications and tolerances
   iii) documentation
      - inspection forms
      - reject stickers
      - inspection stickers

CHT-405 Electronically-Controlled Diesel Fuel Injection Systems

Learning Outcomes:

- Demonstrate knowledge of electronically-controlled diesel fuel injection systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair electronically-controlled diesel fuel injection systems.

Objectives and Content:

1. Define terminology associated with electronically-controlled diesel fuel injection systems.

2. Identify hazards and describe safe work practices pertaining to electronically-controlled diesel fuel injection systems.
   i) high voltage
   ii) high pressure

3. Identify specialty tools and equipment used to service and repair electronically-controlled diesel fuel injection systems and describe their applications and procedures for use.

4. Identify types of electronically-controlled diesel fuel injection systems and describe their applications and operation.

5. Identify electronically-controlled diesel fuel injection system components and describe their purpose and operation.
   i) inputs (sensors)
   ii) outputs
   iii) processors

6. Describe the procedures used to inspect and maintain electronically-controlled diesel fuel injection system components.

7. Identify electronically-controlled diesel fuel injection system problems and their causes.

8. Describe the procedures used to diagnose electronically-controlled diesel fuel injection systems and components.

9. Describe the procedures used to remove and install electronically-controlled diesel fuel injection system components.

10. Describe the procedures used to disassemble and assemble electronically-controlled diesel fuel injection system components.

11. Describe the procedures used to repair and adjust electronically-controlled diesel fuel injection system components.

CHT-400 Diesel Fuel Injection Systems

Learning Outcomes:

- Demonstrate knowledge of diesel fuel injection systems, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair diesel fuel injection systems.

Objectives and Content:

1. Define terminology associated with diesel fuel injection systems.

2. Identify hazards and describe safe work practices pertaining to diesel fuel injection systems.

3. Identify specialty tools and equipment used to service and repair diesel fuel injection systems and describe their applications and procedures for use.

4. Identify types of diesel fuel injection systems and describe their applications and operation.
   i) in-line pump
   ii) distributor pump
   iii) pressure/time
   iv) unit injector

5. Identify diesel fuel injection system components and describe their purpose and operation.

6. Describe the procedures used to inspect and maintain diesel fuel injection system components.

7. Identify diesel fuel injection system problems and their causes.

8. Describe the procedures used to diagnose diesel fuel injection systems and components.

9. Describe the procedures used to remove and install diesel fuel injection system components.

10. Describe the procedures used to disassemble and assemble diesel fuel injection system components.

11. Describe the procedures used to repair and adjust diesel fuel injection system components.

CHT-410 Emission Control Systems

Learning Outcomes:

- Demonstrate knowledge of emission control systems, their components, and operation.
- Demonstrate knowledge of the procedures used to service and repair emission control systems.

Objectives and Content:

1. Define terminology associated with emission control systems.

2. Identify hazards and describe safe work practices pertaining to emission control systems.

3. Identify and interpret codes and regulations pertaining to emission control.

4. Identify specialty tools and equipment used to service and repair emission control systems and describe their applications and procedures for use.

5. Identify types of emission control systems and describe their characteristics and applications.
   i) reducing particulate matter
   ii) reducing NOx
   iii) reducing CO and CO^2
   iv) reducing hydrocarbons

6. Identify emission control system components and describe their purpose and operation.

7. Describe the procedures used to inspect and maintain emission control system components.

8. Identify emission control system problems and their causes.

9. Describe the procedures used to diagnose emission control systems and components.

10. Describe the procedures used to remove and install emission control system components.

11. Describe the procedures used to adjust and repair emission control systems and components.

12. Describe the procedures used to test vehicle emission controls.

CHT-415 Engine Brakes and Retarders

Learning Outcomes:

- Demonstrate knowledge of engine brakes and retarders, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair engine brakes and retarders.

Objectives and Content:

1. Define terminology associated with engine brakes and retarders.

2. Identify hazards and describe safe work practices pertaining to engine brakes and retarders.

3. Identify specialty tools and equipment used to service and repair engine brakes and retarders and describe their applications and procedures for use.

4. Identify types of engine brakes and retarders and describe their applications and operation.
   i) engine brakes
   ii) exhaust brakes
   iii) hydraulic retarders
   iv) electric retarders

5. Identify engine brake and retarder components and describe their purpose and operation.

6. Identify engine brake and retarder problems and their causes.

7. Describe the procedures used to diagnose engine brakes and retarders and their components.

8. Describe the procedures used to remove and install engine brakes and retarders and their components.

9. Describe the procedures used to disassemble and assemble engine brakes and retarders.

10. Describe the procedures used to inspect, adjust and repair engine brakes and retarders and their components.

CHT-430 Gauges

Learning Outcomes:

- Demonstrate knowledge of gauges, their components and operation.
- Demonstrate knowledge of the procedures used to service and repair gauges.

Objectives and Content:

1. Define terminology associated with gauges.

2. Identify hazards and describe safe work practices pertaining to gauges.

3. Identify specialty tools and equipment used to service and repair gauges and describe their applications and procedures for use.

4. Identify types of gauges and their components and describe their purpose and operation.

5. Interpret electrical symbols and wiring diagrams relating to gauges.

6. Describe the procedures used to inspect and maintain gauges and their components.

7. Identify gauge problems and their causes.

8. Describe the procedures used to diagnose gauge circuits and their components.

9. Describe the procedures used to remove and install gauges and their components.

10. Describe the procedures to repair and calibrate gauge components.

CHT-435 Vehicle Management Systems

Learning Outcomes:

- Demonstrate knowledge of vehicle management systems, their components and operation.
- Demonstrate knowledge of reprogramming software.
- Demonstrate knowledge of the procedures used to diagnose and repair vehicle management system components.

Objectives and Content:

1. Explain basic computer operation and its relationship to vehicle management systems.

2. Identify computer diagnostic systems and describe their components and operation.

3. Describe the networking of modules, multi-plexing and programmable logic controls (PLCs).

4. Identify and interpret diagnostic trouble codes (DTC).

5. Identify the parameters of inputs and outputs and describe their relationships.

6. Identify types of specialized tools and equipment used to diagnose network and electronic circuitry and describe their applications and procedures for use.
   i) digital volt ohmmeter (DVOM)
   ii) scopes
   iii) probes
   iv) break out boxes
   v) scan tools
   vi) laptops

7. Identify the methods to diagnose vehicle management systems and describe their associated procedures.
   i) PLCs
   ii) on-board diagnostic (OBD)
   iii) laptop/scan tools

8. Identify methods used to access/transfer and reprogram software and describe their associated procedures.
   i) CD/DVD
   ii) Internet
   iii) scan tool
   iv) electronically erasable programmable read only memory (EEPROM)

9. Describe the procedures used to repair and replace vehicle management system components.

CHT-425 Diesel Engine Overhaul

Learning Outcomes:

- Demonstrate knowledge of the procedures used to overhaul diesel engines.

Objectives and Content:

1. Define terminology associated with diesel engine overhauling.

2. Identify hazards and describe safe work practices pertaining to diesel engine overhauling.

3. Identify specialty tools and equipment used for diesel engine overhauling and describe their applications and procedures for use.

4. Describe the procedures used to remove and install diesel engines.

5. Describe the procedures used to inspect engine mounting components for wear.

6. Describe the procedures used to disassemble and assemble diesel engines and components.

7. Describe the procedures used to clean and inspect diesel engines and their components.

8. Describe the procedures used to measure diesel engine components for wear.

9. Describe the procedures used to repair diesel engine components.

10. Describe the procedures used to commission diesel engines.

CHT-420 Base Engine Diagnostics

Learning Outcomes:

- Demonstrate knowledge of the procedures used to diagnose base engines and their components.

Objectives and Content:

1. Define terminology associated with base engine diagnostics.

2. Identify hazards and describe safe work practices pertaining to base engine diagnostics.

3. Identify specialty tools and equipment used to diagnose base engines and describe their applications and procedures for use.

4. Identify base engine problems and their causes.

5. Identify the methods of base engine diagnostics and describe their applications and associated procedures.

6. Interpret diagnostic test results to determine base engine problems.

TTMA-1819 Program Review

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Upon successful completion of this unit, the apprentice will complete a study plan based on the National Occupational Analysis.

Objectives and Content:

1. Identify areas of the program where knowledge of theory is weakest.

2. Identify areas where workplace experience is lacking or weak.

3. Identify resources necessary to address areas of shortfall.

4. Identify timelines to address areas of weakness.

Suggested Learning Activities:

1. Conduct a mock certification exam to be used for diagnostic purposes.
2. Review the National Occupational Analysis.
3. Review the Apprentice Logbook.
4. Review the Exam Preparation information found at www.nsapprenticeship.ca under Quick Links, Exam Preparation.
5. Conduct a final mock certification exam.

Resources:

These are the recommended resources to use in the delivery of this unit:

- Exam Preparation information, including videos, occupational analyses, exam counseling sheets, practice exams and sample questions, and other study materials and resources, can be found at www.nsapprenticeship.ca under Quick Links, Exam Preparation.
- Apprentice's personal logbook
- Applicable codes and regulations
- Program texts

Evaluation: pass/fail

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