Plan of Training

TRUCK AND TRANSPORT MECHANIC

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Education
Institutional and Industrial Education Division

March 2009

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Approved by:

Chairperson, Provincial Apprenticeship and Certification Board

Date: Sept 23/09

The Joint Planning Committee (JPC) recognizes this Interprovincial Program Guide as the national curriculum for the occupation of Truck and Transport Mechanic.

Preface

This Apprenticeship Standard is based on the 2007 edition of the National Occupational Analysis for the Truck and Transport Mechanic trade.

This document describes the curriculum content for the Truck and Transport Mechanic apprenticeship training program and outlines each of the technical training units necessary for the completion of apprenticeship.

Acknowledgements

Advisory committees, industry representatives, instructors and apprenticeship staff provided valuable input to the development of this Apprenticeship Curriculum Standard. Without their dedication to quality apprenticeship training, this document could not have been produced.

We offer you a sincere thank you.

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A. Conditions Governing Apprenticeship Training

1.0 General

The following general conditions apply to all apprenticeship training programs approved by the Provincial Apprenticeship and Certification Board (PACB) in accordance with the *Apprenticeship Training and Certification Act (1999)*. If an occupation requires additional conditions, these will be noted in the specific Plan of Training for the occupation. In no case should there be a conflict between these conditions and the additional requirements specified in certain Plan of Training.

2.0 Entrance Requirements

2.1 Entry into the occupation as an apprentice requires:

Indenturing into the occupation by an employer who agrees to provide the appropriate training and work experiences as outlined in the Plan of Training.

2.2 Notwithstanding the above, each candidate must have successfully completed a high school program or equivalent, and in addition may be required to have completed certain academic subjects as specified in particular Plan of Training. Mature students, at the discretion of the Director of Institutional and Industrial Education, may be registered. A mature student is defined as one who has reached the age of 19 and who can demonstrate the ability and the interest to complete the requirements for certification.

2.3 At the discretion of the Director of Institutional and Industrial Education, credit toward the apprenticeship program may be awarded to an apprentice for previous work experience and/or training as validated through prior learning assessment.

2.4 An Application for Apprenticeship form must be duly completed.

3.0 Probationary Period

The probationary period for each Memorandum of Understanding will be six months. Within that period the memorandum may be terminated by either party upon giving the other party and the PACB one week notice in writing.

4.0 Termination of a Memorandum of Understanding

After the probationary period referred to in Section 3.0, the Memorandum of Understanding may be terminated by the PACB by mutual consent of the parties involved, or cancelled by the PACB for proper and sufficient cause in the opinion of the PACB.

5.0 Apprenticeship Progression Schedule and Wage Rates

5.1 Progression Schedule

7200 Hour Programs	**Requirements for Progression**	**Progress To**
First Year Apprentice	Completion of entry level (Block 1) courses, plus relevant work experience totaling a minimum of 1800 hours *	Second Year
Second Year Apprentice	Completion of advanced level (Block 2) courses, plus relevant work experience totaling a minimum of 3600 hours	Third Year
Third Year Apprentice	Completion of advanced level (Block 3) courses, plus relevant work experience totaling a minimum of 5400 hours	Fourth Year
Fourth Year Apprentice	Completion of advanced level (Block 4) courses and (Blocks 5 & 6) *if applicable,* plus sign-off of workplace skills required for certification totaling a minimum of 7200 hours**	Write Certification Examination

5400 Hour Programs	Requirements for Progression	Progress To
First Year Apprentice	Completion of entry level (Block 1) courses, plus relevant work experience totaling a minimum of 1800 hours *	Second Year
Second Year Apprentice	Completion of advanced level (Block 2) courses, plus relevant work experience totaling a minimum of 3600 hours	Third Year
Third Year Apprentice	Completion of advanced level (Block 3) courses, plus sign-off of workplace skills required for certification totaling a minimum of 5400 hours	Write Certification Examination

4800 Hour Programs	Requirements for Progression	Progress To
First Year Apprentice	Completion of entry level courses (Block 1) courses, plus relevant work experience totaling a minimum of 1600 hours *	Second Year
Second Year Apprentice	Completion of advanced level (Block 2) courses, plus relevant work experience totaling a minimum of 3200 hours	Third Year
Third Year Apprentice	Completion of advanced level (Block 3) courses, plus sign-off of workplace skills required for certification totaling a minimum of 4800 hours	Write Certification Examination

* All direct entry apprentices must meet the **Requirements for Progression** either through Prior Learning Assessment and Recognition or course completion before advancing to the next year.

** Apprentices in a 7200 hour program which incorporates more than four blocks of training are considered fourth year apprentices pending completion of 100% course credits and workplace skills requirements.

5.2 For the duration of each Apprenticeship Training Period, the apprentice who is not covered by a collective agreement, shall be paid a progressively increased schedule of wages.

Program Duration	Wage Rates		Comments
7200 Hours	1st Year	60%	These wage rates are percentages of the prevailing journeyperson's wage rate in the place of employment of the apprentice. No apprentice shall be paid less than the wage rate established by the Labour Standards Act (1988), as now in force or as hereafter amended, or by other Order, as amended from time to time replacing the first mentioned Order.
	2nd Year	70%	
	3rd Year	80%	
	4th Year	90%	
5400 Hours and 4800 Hours	1st Year	60%	
	2nd Year	75%	
	3rd Year	90%	
4000 Hours			(Hairstylist Program) - The apprentice shall be paid no less than the minimum wage for hours worked and a commission agreed upon between the apprentice and the employer.

6.0 Tools

Apprentices shall be required to obtain hand tools as and when specified by the PACB.

7.0 Periodic Examinations and Evaluation

7.1 Every apprentice shall submit to such occupational tests and examinations as the PACB shall direct. If after such occupational tests and examinations the apprentice is found to be making unsatisfactory progress, his/her rate of wage shall not be advanced as provided in Section 5 until his/her progress is satisfactory to the Director of Institutional and Industrial Education and his/her date of completion shall be deferred accordingly. Persistent failure to pass required tests shall be a cause for revocation of his/her Memorandum of Understanding.

7.2 Upon receipt of reports of accelerated progress of the apprentice, the PACB may shorten the term of apprenticeship and advance the date of completion accordingly.

7.3 For each and every course, a formal assessment is required for which 70% is the pass mark. At the discretion of the instructor, the summative mark may be for completion of a theory examination or a combination of the theory examination and an assigned practical project.

8.0 Granting of Certificates of Apprenticeship

Upon the successful completion of apprenticeship, the PACB shall issue a Certificate of Apprenticeship

9.0 Hours of Work

Any hours employed in the performance of duties related to the designated occupation will be credited towards the completion of the term of apprenticeship. Appropriate documentation of these hours must be provided.

10.0 Copies of the Registration for Apprenticeship

The Director of Institutional and Industrial Education shall provide copies of the Registration for Apprenticeship form to all signatories to the document.

11.0 Ratio of Apprentices to Journeypersons

The ratio of apprentices to journeypersons shall not exceed two apprentices to every one journeyperson employed, with the condition that one of these be a final year apprentice.

12.0 Relationship to a Collective Bargaining Agreement

Collective agreements take precedence over the conditions outlined in the Plan of Training.

13.0 Amendments to a Plan of Apprenticeship Training

A plan of training may be amended at any time by the PACB.

14.0 Employment, Re-Employment and Training Requirements

14.1 The Plan of Training requires apprentices to regularly attend their place of employment.

14.2 The Plan of Training requires apprentices to regularly attend training programs for that occupation as prescribed by the PACB.

14.3 Failure to comply with Sections 14.1 and/or 14.2 will result in cancellation of the Memorandum of Understanding. Apprentices may have their MOUs reinstated by the PACB but would be subject to a commitment to complete the entire program as outlined in the General Conditions of Apprenticeship. An apprentice will be required to pay a reinstatement fee. Permanent cancellation in the said occupation is the result of non-compliance.

14.4 Cancellation of the Memorandum of Understanding to challenge journeyperson examinations, if unsuccessful, would require an apprentice to serve a time penalty of two (2) years before reinstatement as an apprentice or registering as a Trade Qualifier.

14.5 Under the Plan of Training the employer is required to keep each apprentice employed as long as work is available, and if the apprentice is laid off due to lack of work, to give first opportunity to be hired before another is hired.

14.6 The employer will permit each apprentice to regularly attend training programs as prescribed by the PACB.

14.7 Apprentices who cannot acquire all the workplace skills at their place of employment will have to be evaluated in a simulated work environment at a training institution and have sign-off done by instructors to meet the requirements for certification.

15.0 Appeals to Decisions Based on Conditions Governing Apprenticeship Training

Persons wishing to appeal any decisions based on the above conditions must do so in writing to the Minister of Education within 30 days of the decision.

B. Requirements for Red Seal Certification

1. Evidence the required work experiences outlined in this Plan of Training have been obtained. This evidence must be in a format clearly outlining the experiences and must be signed by an appropriate person or persons attesting that these experiences have been obtained to the level required.

2. Successful completion of all required courses in program.

3. A combination of training from an approved training program and suitable work experience totalling 7200 hours.

   OR

   A total of 9000 hours of suitable work experience in the occupation accompanied by sign-off of required work competencies.

4. Completion of a National Red Seal examination, to be set at a place and time determined by the Institutional and Industrial Education Division.

5. Payment of the appropriate examination fee.

C. Roles and Responsibilities of Stakeholders in the Apprenticeship Process

The apprenticeship process involves a number of stakeholders playing significant roles in the training of apprentices. This section outlines these roles and the responsibilities resulting from them.

The Apprentice:

- completes all required technical training courses as approved by the PACB.
- finds appropriate employment.
- completes all required work experiences in combination with the required hours.
- ensures work experiences are well documented.
- approaches apprenticeship training with an attitude and commitment that fosters the qualities necessary for a successful career as a qualified journeyperson.
- obtains the required hand tools as specified by the PACB for each period of training of the apprenticeship program.

The Employer:

- provides high quality work experiences in an environment conducive to learning.
- remunerates apprentices as set out in the Plan of Training or Collective Agreements.
- provides feedback to training institutions, Institutional and Industrial Education Division and apprentices in an effort to establish a process of continuous quality improvement.
- where appropriate, releases apprentices for the purpose of returning to a training institution to complete the necessary technical courses.

- ensures work experiences of the apprentice are documented.

The Training Institution:

- provides a high quality learning environment.
- provides the necessary student support services that will enhance an apprentice's ability to be successful.
- participates with other stakeholders in the continual updating of programs.

The Institutional and Industrial Education Division:

- establishes and maintains program advisory committees under the direction of the PACB.
- promotes apprenticeship training as a viable career option to prospective apprentices and other appropriate persons involved, such as career guidance counsellors, teachers, parents, etc.
- establishes and maintains a protocol with training institutions, employers and other appropriate stakeholders to ensure the quality of apprenticeship training programs.
- ensures all apprentices are appropriately registered and records are maintained as required.
- schedules all necessary technical training periods for apprentices to complete requirements for certification.
- administers provincial/interprovincial examinations.

The Provincial Apprenticeship and Certification Board:

- sets policies to ensure the provisions of the *Apprenticeship and Certification Act (1999)* are implemented.
- ensures advisory and examination committees are established and maintained.
- accredits institutions to deliver apprenticeship training programs.
- designates occupations for apprenticeship training and/or certification.

D. Glossary of Terms

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

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.

E. Program Outcomes

Upon completion of the Apprenticeship Program, apprentices will have the knowledge and skills required to perform the following tasks:

Task 1	Maintains tools and equipment.
Task 2	Organizes work.
Task 3	Performs routine trade activities.
Task 4	Diagnoses engine and supporting systems.
Task 5	Services engine and supporting systems.
Task 6	Diagnoses air systems and brakes.
Task 7	Services air systems and brakes.
Task 8	Diagnoses electrical systems.
Task 9	Services electrical systems.
Task 10	Diagnoses electronic systems.
Task 11	Services electronic systems.
Task 12	Diagnoses drive train.
Task 13	Services drive train.
Task 14	Diagnoses steering system, chassis/frames, suspension, wheels, hubs and tires.
Task 15	Services steering system, chassis/frames, suspension, wheels, hubs and tires.
Task 16	Diagnoses cab components.
Task 17	Services cab components.
Task 18	Diagnoses trailer components.
Task 19	Services trailer components.
Task 20	Services climate control systems.
Task 21	Services climate control systems.
Task 22	Diagnoses hydraulic systems.
Task 23	Services hydraulic systems.

F. Program Structure

For each and every course, a formal assessment is required for which 70% is the pass mark. At the discretion of the instructor, the summative mark may be for completion of a theory examination or a combination of the theory examination and an assigned practical project.

The order of course delivery within each block can be determined by the educational agency, as long as pre-requisite conditions are satisfied.

Entry Level – Block 1			
NL Course No.	**Course Name**	**Hours**	**Pre-Requisite**
TS1510	Occupational Health and Safety	6	
TS1520	WHMIS	6	
TS1530	Standard First Aid	14	
SV1101	Safety	30	
SV1110	Ozone Depleting Substances	7	
SV1166	Tools and Equipment	30	SV1101
SV1800	Hoisting and Lifting	15	SV1101
SV1151	Service Information Systems	25	MC1050
SV1810	Preventive Maintenance	5	
SV1201	Start, Move and Park Vehicle	5	
SV1181	Fasteners, Tubings, Hoses, and Fittings	30	SV1166
SV1190	Lubrication and Fluids Servicing	30	SV1166 TS1520
SV1121	Gaskets and Seals	5	SV1166 TS1520
SV1820	Bearings	6	SV1166 TS1520
SV1830	Metallurgy	5	

Entry Level – Block 1			
NL Course No.	**Course Name**	**Hours**	**Pre-Requisite**
SV1301	Cutting, Heating and Welding	30	SV1101 SV1830
SV1211	Tires, Rims and Wheels	25	SV1166
SV1303	Engine Principles	45	SV1151
SV1310	Cooling Systems	30	SV1121
SV1131	Electrical and Electronic Principles	55	MA1060
SV1370	Batteries	15	TS1530 TS1520 SV1166
SV1491	Conventional Lighting Circuits	15	SV1131 SV1370 SV1151
SV1501	Wiring Harnesses and Accessories	15	SV1131 SV1370 SV1151
SV1141	Introduction to Hydraulics	30	
SV2381	Hydraulic Fittings, Piping, Tubing and Hoses	25	SV1190 SV1141
SV2391	Reservoirs, Coolers and Filters	15	SV2381
WD2330	MIG Welding	30	TS1510 TS1520 TS1530 SV1166
SV1261	Vehicle Hydraulic Brake Systems	60	SV1190 SV2381
SV1271	Basic Air Brake Systems	60	SV1261
SV1281	Drive Lines	25	SV1190 SV1151
SV1365	Non-Diesel Fuel Systems	25	SV1151 SV1166

Entry Level – Block 1			
NL Course No.	**Course Name**	**Hours**	**Pre-Requisite**
SV1361	Diesel Fuel Supply Systems	25	SV1166 TS1520
SV1331	Intake and Exhaust Systems	25	SV1166 SV1303
SV1451	Steering Systems	30	SV1190
SV1401	Gauges	11	SV1501
AP1100	Introduction to Apprenticeship	15	
MA1060	Basic Math	60	
CM2150	Workplace Communications	45	
MR1220	Customer Service	30	
SP2330	Quality Assurance/Quality Control	30	
MC1050	Introduction to Computers	30	
SD1700	Workplace Skills	30	
SD1710	Job Search Techniques	15	
SD1720	Entrepreneurial Awareness	15	
Total Hours Block 1		**1080**	

Required Work Experience

Block 2			
NL Course No.	**Course Name**	**Hours**	**Pre-Requisite**
SV2310	Electric Brakes	15	Entry level (Block I)
SV1291	Drive Axle Assemblies	45	Entry level (Block I)
SV1380	Starting Systems	30	Entry level (Block I)
SV1386	Starting Aids	15	Entry level (Block I) SV1380
SV1391	Charging Systems	30	Entry level (Block I)
SV2661	Electronic Ignition Systems	30	Entry level (Block I)
SV2400	Hydraulic Pumps and Motors	30	Entry level (Block I)
SV2670	Air Conditioning Systems	30	Entry level (Block I)
SV1840	Heating and Ventilation Systems	15	Entry level (Block I)
Total Hours Block 2		**240**	

Required Work Experience

Block 3			
NL Course No.	**Course Name**	**Hours**	**Pre-Requisite**
SV1441	Front Axles and Suspension Systems	45	Block II
SV1461	Rear Axles and Suspensions Systems	60	Block II
SV1245	Wheel and Axle Alignment	25	Block II SV1441 SV1461
SV2691	Frames and Chassis	25	Block II
SV1480	Dual Air Brake Systems	45	Block II
SV2781	Trailer Coupling Devices	20	Block II
SV2728	Trailers	20	Block II
Total Hours Block 3		**240**	

Required Work Experience

Block 4			
NL Course No.	**Course Name**	**Hours**	**Pre-Requisite**
WD2320	SMAW Welding	30	Block III
SV2651	Electronically-Controlled Diesel Fuel Injection Systems	45	Block III
SV2771	Emission Control Systems	20	Block III
SV2571	Engine Brakes and Retarders	20	Block III
SV2365	Automatic/Power Shift Transmissions	35	Block III
SV2350	Torque Converters	30	Block III
SV2265	Vehicle Management Systems	60	Block III
Total Hours Block 4		**240**	

Required Work Experience

Block 5			
NL Course No.	**Course Name**	**Hours**	**Pre-Requisite**
SV1321	Engine Lubrication Systems	15	Block IV
SV2605	Diesel Engine Overhaul	120	Block IV
SV2591	Turbo Chargers, Blowers and Intercoolers	25	Block IV
SV2266	Diesel Fuel Injection Systems	45	Block IV
SV2611	Base Engine Diagnostics	20	Block IV
SV2560	Preventive Maintenance Inspections	15	Block IV
Total Hours Block 5		**240**	

Required Work Experience

Block 6			
NL Course No.	**Course Name**	**Hours**	**Pre-Requisite**
SV2761	Gasoline Fuel Injection Systems	30	Block V
SV2721	Manual Transmissions	65	Block V
SV2725	Power Take-offs	30	Block V
SV2741	Transfer Cases	15	Block V
SV2726	Anti-lock Braking and Traction Control Systems	50	Block V
SV2727	Cab Components	20	Block V
SV2729	Engine Clutches	15	Block V
Total Hours Block 6		**225**	

***A student who can meet the Mathematics requirement through an ACUPLACER® test may be exempted from Mathematics 1060. Please check with your training institution.**

Total Course Credit Hours	**2265**

Entry Level – Block 1

TS1510 Occupational Health and Safety

Description:

This course is designed to give participants the knowledge and skills necessary to interpret the Occupational Health and Safety Act, laws and regulations; understand the designated responsibilities within the laws and regulations; the right to refuse dangerous work; and the importance of reporting accidents.

Pre-Requisites: None

Course Outcomes:

Upon successful completion of this unit, the apprentice will be able to:

- prevent accidents and illnesses
- improve health and safety conditions in the workplace

Theory:

1. Interpret the Occupational Health and Safety Act laws and regulations.
   i. explain the scope of the act
      - application of the act
      - Federal/Provincial jurisdictions
      - Canada Labour Code
      - rules and regulations
      - private home application
      - conformity of the Crown by the Act

2. Explain responsibilities under the Act and Regulations.
   i. duties of employer, owner, contractors, sub-contractors, employees, and suppliers

3. Explain the purpose of joint health and safety committees.
   i. formation of committee
   ii. functions of committee
   iii. legislated rights
   iv. health and safety representation

v. reporting endangerment to health
vi. appropriate remedial action
vii. investigation of endangerment
viii. committee recommendation
ix. employer's responsibility in taking remedial action

4. Examine right to refuse dangerous work.
   i. reasonable grounds for refusal
   ii. reporting endangerment to health
   iii. appropriate remedial action
   iv. investigation of endangerment
   v. committee recommendation
   vi. employer's responsibility to take appropriate remedial action
   vii. action taken when employee does not have reasonable grounds for refusing dangerous work
   viii. employee's rights
   ix. assigning another employee to perform duties
   x. temporary reassignment of employee to perform other duties
   xi. collective agreement influences
   xii. wages and benefits

5. State examples of work situations where one might refuse work.

6. Describe discriminatory action.
   i. definition
   ii. filing a complaint procedure
   iii. allocated period of time a complaint can be filed with the Commission
   iv. duties of an arbitrator under the Labour Relations Act
   v. order in writing inclusion
   vi. report to commission Allocated period of time to request Arbitrator to deal with the matter of the request
   vii. notice of application
   viii. failure to comply with the terms of an order
   ix. order filed in the court

7. Explain duties of commission officers.
   i. powers and duties of officers
   ii. procedure for examinations and inspections
   iii. orders given by officers orally or in writing
   iv. specifications of an order given by an officer to owner of the place of

employment, employer, contractor, sub-contractor, employee, or supplier
v. service of an order
vi. prohibition of persons towards an officer in the exercise of his/her power or duties
vii. rescinding of an order
viii. posting a copy of the order
ix. illegal removal of an order

8. Interpret appeals of others.
   i. allocated period of time for appeal of an order
   ii. person who may appeal order
   iii. action taken by Commission when person involved does not comply with the order
   iv. enforcement of the order
   v. notice of application
   vi. rules of court

9. Explain the process for reporting of accidents.
   i. application of act
   ii. report procedure
   iii. reporting notification of injury
   iv. reporting accidental explosion or exposure
   v. posting of act and regulations

Practical:

1. Conduct an interview with someone in your occupation on two or more aspects of the act and report results.

2. Conduct a safety inspection of shop area.

TS1520 Workplace Hazardous Materials Information System (WHMIS)

Description:

This course is designed to give participants the knowledge and skills necessary to define WHMIS, examine hazard identification and ingredient disclosure, explain labeling and other forms of warning, and introduce material safety data sheets (MSDS).

Pre-Requisites: None

Course Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- interpret and apply the Workplace Hazardous Materials Information System WHMIS) Regulation under the Occupational Health & Safety Act.

Required Knowledge and Skills:

1. Define WHMIS safety.
    i. rational and key elements
    ii. history and development of WHMIS
    iii. WHMIS legislation
    iv. WHMIS implementation
    v. Definitions of legal and technical terms

2. Examine hazard identification and ingredient disclosure.
    i. prohibited, restricted and controlled products
    ii. classification and the application of WHMIS information requirements
    iii. responsibilities for classification
        - the supplier
        - the employer
        - the worker-classification: rules and criteria
        - information on classification
        - classes, divisions and subdivisions in WHMIS
        - general rules for classification
        - class A – compresses gases

- class B – flammable and combustible materials
- class C – oxidizing material
- class D – poisonous and infectious material
- class E – corrosive material
- class F – dangerously reactive material

iv. products excluded from the application of WHMIS legislation
- consumer products
- explosives
- cosmetics, drugs, foods and devices
- pest control products
- radioactive prescribed substances
- wood or products make of wood
- manufactured articles
- tobacco or products of tobacco
- hazardous wastes
- products handled or transported pursuant to the Transportation of Dangerous Goods (TDG) Act

v. comparison of classification systems – WHMIS and TDG

vi. general comparison of classification categories

vii. detailed comparison of classified criteria

3. Explain labeling and other forms of warning.
   i. definition of WHMIS label
      - supplier label
      - workplace label
      - other means of identification
   ii. responsibilities for labels
      - supplier responsibility
      - employer responsibility
      - worker responsibility
   iii. introduce label content, design and location
      - supplier labels
      - workplace labels
      - other means of identification

4. Introduce material safety data sheets (MSDS).
   i. definition of a material safety data sheet
   ii. purpose of the data sheet
   iii. responsibility for the production and availability of data sheets
      - supplier responsibility

- employer responsibility
- workers responsibility

Practical:

Practical skills enhance the apprentices' ability to meet the objectives of this course. The learning objectives outlined below are mandatory in Newfoundland and Labrador, but are provided as suggestions for Nova Scotia, Prince Edward Island and New Brunswick.

1. Locate WHMIS label and interpret the information displayed.

2. Locate a MSDS sheet for a product used in the workplace and determine what personal protective equipment and other precautions are required when handling this product.

SUGGESTED RESOURCES:

1. WHMIS Regulation.

2. Sample MSDS sheets.

TS1530 Standard First Aid

Description:

This course is designed to give the apprentice the ability to recognize situations requiring emergency action and to make appropriate decisions concerning first aid.

Complete a **St. John Ambulance or Canadian Red Cross** Standard First Aid Certificate course.

Pre-Requisites: None

SV1101 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.

Pre-Requisites: None

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

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)

Practical:

1. Locate fire alarms, fire extinguishers, exits.

2. Locate and operate shop ventilation systems.

3. Prepare a floor plan showing fire exit routes.

SV1110 Ozone Depleting Substances

Learning Outcomes:

- Upon successful completion of this course, the apprentice will be able to legally handle ozone depleting substances (refrigerants) used in motor vehicles.

Pre-Requisites: None

Objectives and Content:

1. Handle ozone depleting substances (refrigerants) used in motor vehicles as per regulations.

SV1166 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.

Pre-Requisite: SV1101 - Safety

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.

Practical:

1. Use hand tools.

2. Store and maintain hand tools.

3. Use Power tools.
   i. electric
   ii. pneumatic
   iii. hydraulic

4. Store and maintain power tools.

5. Bench work projects to include the use of common hand tools for;
   i. metal cutting
   ii. filing
   iii. measuring
   iv. drilling
   v. tapping
   vi. threading
   vii. broken stud removal
   viii. sharpen a twist drill

6. Wash components with pressure washer equipment.

SV1800 Hoisting and Lifting

Learning Outcomes:

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

Pre-Requisite: SV1101 - Safety

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.

Practical:

1. Raise a vehicle, blocking it using safety stands and cross blocking.

2. Perform a lift using applicable lifting equipment accessories.

SV1151 Service Information Systems

Learning Outcomes:

Upon successful completion of this unit, the apprentice will be able to select and use different types of service manuals for heavy equipment and truck and transport.

Pre-Requisite: MC1050 – Introduction to Computers

Objectives and Content:

1. Use operator's manual.
    i. methods of using
    ii. interpretation of sections

2. Use maintenance and lubrication manual.
    i. methods of using
    ii. interpretation of sections

3. Use service manual.
    i. methods of using
    ii. interpretation of sections

4. Use parts manual.
    i. methods of using
    ii. interpretation of sections

5. Use special bulletins.
    i. methods of using
    ii. purpose
    iii. interpretation
    iv. introduction to computers
        - computerized parts information
        - computerized service and repair information

6. Use computerized information systems.
    i. work order
    ii. warranty claims
    iii. time ticket

iv. tracking procedures
v. computerized Info System
vi. electronic service

Practical:

1. Find serial number of a vehicle on the following items:
   i. chassis
   ii. motor
   iii. transmission

2. With the appropriate manual, find the type and amount of hydraulic oil recommended on a vehicle.
   i. with the appropriate manual find the step by step removal procedure of the engine and transmission of a vehicle.
   ii. with the appropriate manual, make a parts list of a cylinder head.

SV1810 Preventive Maintenance

Learning Outcomes:

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

Pre-Requisites: None

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.

SV1201 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.

Pre-Requisites: None

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.

Practical:

1. Start, move and park various types of vehicles.

SV1181 Fasteners, Tubings, Hoses and Fittings

Learning Outcomes:

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

Pre-Requisite: SV1166 – Tools and Equipment

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.

Practical:

1. Select and use specialty tools and equipment.

2. Cut, bend and connect copper and steel tubing.

3. Flare copper and steel tubing.
   i. International Standards Organization (ISO)
   ii. inverted flare

SV1190 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.

Pre-Requisites: SV1166 – Tools and Equipment
TS1520 - WHMIS

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.

Practical:

1. Check fluid level on vehicles/equipment components.

2. Change engine oil and filter on a vehicle/equipment.

3. Perform a complete lubrication service on a vehicle/equipment.

SV1121 Gaskets and Seals

Learning Outcomes:

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

Pre-Requisites: SV1166 – Tools and Equipment
SV-1520 - WHMIS

Objectives and Content:

1. Define terminology associated with gaskets and seals.

2. Identify hazards and describe safe work practices pertaining to gaskets and seals.

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

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

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

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

7. Identify types of sealing compounds.
   i. room temperature vulcanizing (RTV)
   ii. anaerobic

SV1820 Bearings

Learning Outcomes:

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

Pre-Requisites: SV1166 – Tools and Equipment
TS1520 – WHMIS

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.

SV1830 Metallurgy

Learning Outcomes:

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

Pre-Requisites: None

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.

SV1301 Cutting, Heating and Welding

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.

Pre-Requisites: SV1101 – Safety
SV1830 – Metallurgy

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.

Practical:

1. Assemble, test, light, adjust and shut down oxy-fuel welding and cutting equipment.

2. Perform flame cutting with oxy-fuel equipment.

3. Perform solder, braze and fuse welding using oxy-fuel equipment.

SV1211 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.

Pre-Requisite: SV1166 – Tools and Equipment

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.

Practical:

1. Use specialty tools and equipment used to service and repair tires, rims and wheels.

2. Inspect and maintain tires, rims and wheels.

3. Remove and install tires, rims and wheels.

SV1303 Engine Principles

Learning Outcomes:

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

Pre-Requisite: SV1151 – Service Information Systems

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.

SV1310 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.

Pre-Requisite: SV1121– Gaskets and Seals

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.

Practical:

1. Use specialty tools and equipment used to service and repair cooling system.
2. Drain, flush, refill and pressure test a cooling system.
3. Remove, service, and install a thermostat.
4. Remove, service, and install a radiator/pressure cap.
5. Remove, repair and install a water pump.
6. Check antifreeze strength in a cooling system.

SV1131 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.

Pre-Requisite: MA1060 – Basic Math

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.

Practical:

1. Apply electrical principles using Ohms Law to calculate volts, ohms and amperes.

2. Use testing devices to test circuits/components of series, parallel and series parallel circuits.

3. Read schematics and wiring diagrams.

SV1370 Batteries

Learning Outcomes:

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

Pre-Requisites: TS1530 – Standard First Aid
TS1520 – WHMIS
SV1166 – Tools and Equipment

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.

Practical:

1. Remove and install a battery.

2. Service and test a battery.

3. Charge batteries.

4. Connect booster cables at the battery to jump start an engine for a 12 and 24 volt system.

SV1491 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.

Pre-Requisites: SV1131 – Electrical and Electronic Principles
SV1370 – Batteries
SV1151 – Service Information Systems

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.

Practical:

1. Use specialty tools and equipment to service and repair conventional lighting circuits.

2. Remove, check and reinstall lighting system components.

3. Remove, check and reinstall a gauge and a sending unit.

SV1501 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.

Pre-Requisites: SV1131 – Electrical and Electronic Principles
SV1370 - Batteries
SV1151 – Service Information Systems

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.

Practical:

1. Use specialty tools and equipment to service and repair wiring harnesses and accessories.

2. Diagnose problems relating to wiring harness and accessories.

3. Replace or repair wiring harness.

SV1141 Introduction to Hydraulics

Learning Outcomes:

- Demonstrate knowledge of the principles of hydraulics.
- Demonstrate knowledge of hydraulic components, their purpose and operation.

Pre-Requisites: None

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 hydraulic components and describe their purpose, applications and operation.
   i. pumps
      - positive displacement
      - non-positive displacement
   ii. actuators
      - linear
      - rotary
   iii. pressure control valves
   iv. directional control valves

v. flow control valves
vi. reservoirs
vii. fittings, piping, tubing and hoses
viii. coolers
ix. filters
x. accumulators

Practical:

1. Apply hydraulic principles and theories for a simple hydraulic circuit.

SV2381 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.

Pre-Requisites: SV1190 – Lubrication and Fluids Servicing
SV1141 – Introduction to Hydraulics

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.

Practical:

1. Use specialty tools and equipment used to remove and install hydraulic fittings, piping, tubing and hoses.

2. Remove and install hydraulic hose.

3. Install a crimped type fitting to a hydraulic hose.

4. Install a reusable type fitting to a hydraulic hose.

SV2391 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.

Pre-Requisite: SV2381 – Hydraulic Fittings, Piping, Tubing and Hoses

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.

Practical:

1. Drain hydraulic fluids and refill reservoir.

2. Remove, service, and install hydraulic filters.

3. Check condition and service hydraulic oil cooler.

WD2330 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.

Pre-Requisites: TS1510 – Occupational Health and Safety
TS1520 – WHMIS
TS1530 – Standard First Aid
SV1166 – Tools and 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.

Practical:

1. Set up and shut down MIG welding equipment.

2. Weld using MIG welding equipment.

SV1261 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.

Pre-Requisites: SV1190 – Lubrication and Fluids Servicing
SV2381 – Hydraulic Fittings, Piping, Tubing and Hoses

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.

Practical:

1. Disassemble, inspect, repair and assemble a master cylinder.

2. Disassemble, inspect, repair and assemble drum brakes.

3. Disassemble, inspect, repair and assemble disc brakes.

4. Machine a brake drum and brake rotor**.**

SV1271 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.

Pre-Requisite: SV1261– Vehicle Hydraulic 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.

Practical:

1. Remove and install basic air brake system components.

2. Use specialty tools and equipment to service and repair basic air brake systems.

3. Disassemble, inspect, repair and assemble air compressors.

4. Disassemble inspect, repair and assemble air valves.

5. Disassemble, inspect, repair and assemble drum and disc air brakes.

SV1281 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.

Pre-Requisites: SV1190 – Lubrication and Fluids Servicing
SV1151 – Service Information Systems

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.

Practical:

1. Use specialty tools and equipment used to service and repair drive lines.
2. Remove and replace drive shaft, check phasing, alignment and shaft angle.
3. Remove service and install a universal joint.
4. Remove and install center support bearing.

SV1365 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.

Pre-Requisites: SV1151 – Service Information Systems
SV1166 – Tools and Equipment

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.

Practical:

1. Use specialty tools and equipment used to service and repair non-diesel fuel systems.

2. Check pump performance.
   i. pressure
   ii. vacuum
   iii. delivery

3. Check a liquefied petroleum gas (LPG) system for leaks.

SV1361 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.

Pre-Requisites: SV1166 – Tools and Equipment
TS1520 – WHMIS

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.

Practical:

1. Use specialty tools and equipment to service and repair diesel fuel supply systems.

2. Inspect and maintain diesel fuel supply systems and components.

3. Check transfer pump performance.
   i. pressure
   ii. vacuum
   iii. delivery

4. Change fuel filters, bleed system and start engine.

SV1331 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.

Pre-Requisites: SV1166 – Tools and Equipment
SV1303 – Engine Principles

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.

Practical:

1. Service air cleaner assemblies.

2. Inspect and maintain intake and exhaust systems and components.

3. Remove, inspect and replace exhaust system components.

4. Check intake restrictions using manometers.

5. Check exhaust restrictions using backpressure gauge.

SV1451 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.

Pre-Requisite: SV1190 – Lubrication and Fluids Servicing

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.

Practical:

1. Use specialty tools and equipment used to service and repair steering systems.
2. Inspect and maintain steering systems and their components.
3. Disassemble and reassemble steering columns.
4. Disassemble and assemble steering linkage.
5. Disassemble, assemble and adjust a power steering gear.
6. Disassemble and assemble power steering pumps.
7. Adjust steering linkage.
8. Pressure and flow test a power steering pump.

SV1401 Gauges

Learning Outcomes:

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

Pre-Requisite: SV1501 – Wiring Harnesses and Accessories

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. Diagnose gauge circuits and their components.

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

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

Practical:

1. Use specialty tools and equipment used to service and repair gauges.

2. Remove, check and reinstall gauges and sending units.

AP1100 Introduction to Apprenticeship

Description:

This course is designed to give participants the knowledge base and skills necessary to understand and successfully navigate the apprenticeship/red seal program.

Course Outcomes:

Upon successful completion of this course, the apprentice will be able to:

- Identify the requirements for registering in an Apprenticeship Program.
- Describe the registration process.
- Explain the steps to complete the Apprenticeship Program.
- Articulate the roles of the Apprentice, Journeyperson, Training Institutions, Industry and Governing Bodies in the Apprentice Program.
- Explain the significance of the Red Seal Program.

Pre-Requisites: None

Objective and Content:

1. Define apprenticeship.
    i. define Apprenticeship and Red Seal Certification
    ii. discuss the definition of Apprenticeship and Red Seal Certification
    iii. distinguish between Red Seal and Provincial Certification

2. Explore how apprenticeship is governed and administered.
    i. explain who is responsible for administrating apprenticeship
        - Department of Education
        - Provincial Apprenticeship and Certification Board

3. Explore the roles and responsibilities of those involved in the apprenticeship process.
    i. apprentice
    ii. employer/journeyperson
    iii. Industrial Training Division

- explain when and where to take the in-class portion of advance training
- discuss class calls

iv. Training Institutions
- various delivery methods

v. Provincial Apprenticeship and Certification Board

4. List and explain the steps in the apprenticeship process.
   i. explain the registration process
   ii. describe apprenticeship as an agreement between employee, employer and Provincial government
   iii. review a Memorandum of Understanding
   iv. legal document
   v. review an application of apprenticeship
      - original high school certificate or equivalent
      - original transcript from the applicant's training institution
   vi. describe the roles of Institutional and Industrial Education Division of the Department of Education in apprenticeship
   vii. explain the role of the Program Development Officer
      - define probation period
      - discusses what constitutes a cancellation of apprenticeship
      - explain the consequences of an apprenticeship cancellation
      - discuss the purpose of the Record of Occupational Progress (Log Book)
      - explore how to maintain your log book
      - discuss who is responsible for tracking and signing-off on trade skills
      - explain how and where to record hours worked
      - identify the importance of updating your file with the Program Development Officer
   viii. differentiate between provincial and interprovincial exams

5. Describe the training and education requirements.
   i. discuss the factors affecting on-the-job and in class portions of your training
   ii. define in school and on the job training
      - review a Plan of Training
      - identify the percentage of on-the-job and in class training time
      - current labour market implications on completing an apprenticeship program

6. Explain Plans of Training.
    i. identify what is included in the Plan of Training
        - entrance requirements
        - duration of in-school and on-the-job training
        - course content
        - entry level or advanced level
    ii. explain how a Journeyperson Certificate is achieved
        - discuss Certificate of Qualification.
        - discuss Certificate of Apprenticeship.
        - discuss Red Seal endorsement

7. Discuss the Red Seal Program.
    i. define designated trade
    ii. explore the National Occupational Analysis for your trade
    iii. explain Interprovincial Standards Red Seal Program and how it work.
        - labor mobility
        - qualification recognition
    iv. discuss the range of careers possible in your chosen trade

8. Explain apprenticeship progression schedule and wage rates.
    i. review a Record of Occupational Progress (Log Book)
    ii. hours per program
    iii. requirements for progression
    iv. wage rates per year of apprenticeship

9. Identify the examinations and evaluation process used in Apprenticeship.
    i. discuss occupational tests and examinations as directed by the Provincial Apprenticeship and Certification Board
        - theory
        - practical
    ii. explain formal assessment and the pass mark of 70%

10. Examine some of the financial incentives available to apprentices.
    i. Employment Insurance (E.I.) Benefits
    ii. government sponsored student loans
    iii. apprenticeship incentive Federal and Provincial
    iv. scholarships

11. Continuing training outside the Province of Newfoundland Labrador.
    i. training in other provinces and territories
        - procedure for registration and recognition of hours and skills in other provinces
    ii. options for dual certification
        - transfer of credits

12. Review and define the following terms:
    i. Apprenticeship Program Accreditation
    ii. Cancellation of Apprenticeship
    iii. Certificate of Apprenticeship
    iv. Certificate of Qualification
    v. Certification Renewal
    vi. Criteria for Eligibility
    vii. Journeyperson
    viii. Practical Examination
    ix. Prior Learning
    x. Record of Occupational Progress (Logbook)
    xi. Red Seal Certification
    xii. Registered Apprentice
    xiii. Theoretical Examination
    xiv. National Occupational Analysis (NOA)
    xv. Class Call
    xvi. Dual certification

Practical:

1. Review the Provincial Apprenticeship web site: www.gov.nl.ca/app.
    i. identify the requirements for registering as an apprentice
    ii. and the registration process
    iii. explain the steps to complete an apprenticeship program
    iv. identify who is responsible for tracking and signing-off on trade skills.
    v. identify the nearest Industrial Training Office to your community
    vi. identify the current incentives available to apprentices

2. Review a plan of training on the Provincial Apprenticeship web site.
    i. identify the hours for your trade (in-school and on-the-job)
    ii. explain the roles and responsibilities of the following stakeholders in the apprenticeship process: employer, apprentice, training institution and the Industrial Training Division

3. Visit the Red Seal Web site http://www.red-seal.ca, review the National Occupational Analyses for your trade.
   i. review the scope of work for your occupation and identify the industry sectors and job types requiring your trade
   ii. identify the trends of your trade
   iii. provide a list of personal protective equipment required for your trade

MA1060 Basic Math

Description:

This course in Basic Math requires knowledge of general mathematical concepts and processes to enable trades persons to function in the institutional setting by developing numeracy skills required for technical courses. This math course should also provide a foundation for experiential learning through knowledge of math relating to on-the-job skills and practices. A detailed course outline is available from Institutional and Industrial Education, Standards and Curriculum Division to training institutions upon request.

Course Outcomes:

- To develop numeracy skills and knowledge required for institutional and on-the-job learning.
- To develop the capability to apply mathematical concepts in the performance of trade practices.
- To develop an appreciation for mathematics as a critical element of the learning environment.
- To use mathematical principles accurately for the purposes of problem solving, job and materials estimation, measurement, calculation, system conversion, diagram interpretation and scale conversions, formulae calculations, and geometric applications.

Pre-Requisites: None

Course Objectives (Knowledge):

1. Define and calculate using whole number operations.

2. Define and demonstrate use of correct orders of operations.

3. Demonstrate examples of operations with fractions and mixed numbers.

4. Demonstrate examples of operations with decimals.

5. Demonstrate examples of operations with percentages.

6. Employ percent/decimal/fraction conversion and comparison.

7. Define and calculate with ratios and proportions.

8. Use the Imperial Measurement system in relevant trade applications.

9. Use the Metric Measurement system in relevant trade applications.

10. Perform Imperial/Metric conversions.

11. Define and demonstrate the formulation of variables.

12. Demonstrate and define the various properties of angles and make relevant calculations.

Major Tasks/Sub-tasks (Skills):

Note: To emphasize or further develop specific knowledge objectives, students may be asked to complete practical demonstrations which confirm proper application of mathematical theory to job skills.

CM2150 Workplace Communications

Description:

This course is designed to introduce students to the principles of effective communication including letters, memos, short report writing, oral presentations and interpersonal communications.

Course Outcomes:

Upon completion of the course, students will be able to:

- Understand and apply communication skills as outlined in the Employability Skills 2000, Conference Board of Canada.
- Understand the importance of well-developed writing skills in business and in career development.
- Understand the purpose of the various types of business correspondence.
- Examine the principles of effective business writing.
- Examine the standard formats for letters and memos.
- Write effective letters and memos.
- Examine the fundamentals of informal reports and the report writing procedure.
- Produce and orally present an informal report.
- Examine effective listening skills and body language in communication.

Pre-Requisites: None

Objectives and Content:

1. Apply rules and principles for writing clear, concise, complete sentences which adhere to the conventions of grammar, punctuation, and mechanics.

2. Explain the rules of subject-verb agreement.

3. Define and describe the major characteristics of an effective paragraph.

4. Examine the Value of Business Writing Skills.
    i. describe the importance of effective writing skills in business
    ii. describe the value of well-developed writing skills to career success as referenced in the Employability Skills

5. Examine principles of Effective Business Writing.
    i. discuss the rationale and techniques for fostering goodwill in business communication, regardless of the circumstances
    ii. review the importance of revising and proofreading
    iii. differentiate between letter and memo applications in the workplace and review samples
    iv. identify the parts of a business letter and memo
    v. review the standard formats for business letters and memos
    vi. examine samples of well-written and poorly written letters and memos
    vii. examine guidelines for writing sample letters and memos which convey: acknowledgment, routine request, routine response, complaint, refusal, persuasive request and letters of appeal

6. Examine the fundamentals of Informal Business Reports.
    i. identify the purpose of the informal report
    ii. identify the parts and formats of an informal report
    iii. identify methods of information gathering
    iv. describe the methods of referencing documents
    v. review the importance of proof reading and editing

7. Examine types of presentations.
    i. review and discuss components of an effective presentation
    ii. review and discuss delivery techniques
    iii. review and discuss preparation & use of audio/visual aids
    iv. discuss and participate in confidence building exercises used to prepare for giving presentations

8. Interpersonal Communications.
    i. examine and apply listening techniques
    ii. discuss the importance of body language

Practical:

1. Write well-developed, coherent, unified paragraphs which illustrate the following: A variety of sentence arrangements; conciseness and clarity; and adherence to correct and appropriate sentence structure, grammar, punctuation, and mechanics.

2. Write sample letters and memos which convey: acknowledgment, routine request, routine response, complaint, refusal, persuasive request and letters of appeal.

3. Gather pertinent information, organize information into an appropriate outline and write an informal report with documented resources.
   i. edit, proofread, and revise the draft to create an effective informal report and present orally using visual aids
   ii. participate in confidence building exercises

4. Present an effective presentation.

5. Evaluate presentations.

MR1220 Customer Service

Description:

This course focuses on the role of providing quality customer service. It is important to have a positive attitude and the necessary skills to effectively listen and interpret customer concerns about a product, resolve customer problems, and determine customer wants and needs. Students will be able to use the skills and knowledge gained in this course to effectively provide a consistently high level of service to the customer.

Course Outcomes:

Upon successful completion of this course, students will be able to:

- Define customer service.
- Explain why service is important.
- Describe the relationship between "service" and "sales."
- Demonstrate an understanding of the importance of a positive attitude.
- Demonstrate methods of resolving customer complaints.

Pre-Requisites: None

Objectives and Content:

1. Define quality service.
    i. identify and discuss elements of customer service
    ii. explain the difference between service vs. sales or selling
    iii. explain why quality service is important
    iv. identify the various types of customers & challenges they may present
    v. describe customer loyalty
    vi. examine barriers to quality customer service

2. Explain how to determine customer's wants and needs.
    i. identify customer needs
    ii. explain the difference between customer wants and needs
    iii. identify ways to ensure repeat business

3. Demonstrate an understanding of the importance of having a positive attitude.
    i. identify & discuss the characteristics of a positive attitude
    ii. explain why it is important to have a positive attitude
    iii. explain how a positive attitude can improve a customer's satisfaction
    iv. define perception and explain how perception can alter us and customers
    v. describe methods of dealing with perception

4. Communicating effectively with customers.
    i. describe the main elements in the communication process
    ii. identify some barriers to effective communication
    iii. explain why body language is important
    iv. define active listening and state why it is important
    v. identify and discuss the steps of the listening process
    vi. identify and discuss questioning techniques

5. Demonstrate using the telephone effectively.
    i. explain why telephone skills are important
    ii. describe the qualities of a professional telephone interaction

6. Demonstrate an understanding of the importance of asserting oneself.
    i. define assertiveness
    ii. discuss assertive techniques
    iii. explain the use of assertiveness when dealing with multiple customers

7. Demonstrate techniques for interacting with challenging customers in addressing complaints and resolving conflict.
    i. examine and discuss ways to control feelings
    ii. examine and discuss ways to interact with an upset customer
    iii. examine and discuss ways to resolve conflict/customer criticism
    iv. examine and discuss ways to prevent unnecessary conflict with customers

Practical:

1. Participate in activities to demonstrate knowledge of the course objectives.

SP2330 Quality Assurance/Quality Control

Description:

This course is designed to give students an understanding of the concepts and requirements of QA/QC such as, interpreting standards, controlling the acceptance of raw materials, controlling quality variables and documenting the process. It includes information on quality concepts, codes and standards, documentation, communications, human resources, company structure and policy, teamwork and responsibilities.

Course Outcomes:

Upon completion of this course, students will be able to:

- Develop the skills and knowledge required to apply quality assurance/quality control procedures as related to the trade.
- Develop an awareness of quality principles and processes.
- Apply quality assurance/quality control procedures in a shop project.

Pre-Requisites: None

Objectives & Content:

1. Describe the reasons for quality assurance and quality plans.

2. Explain the relationship between quality assurance and quality control.

3. Describe quality control procedures as applied to the production and checking of specifications and processes in applicable occupations.

4. Describe quality control procedures as applied to the acceptance and checking of raw materials.

5. Explain the role of communications in a quality environment.

6. Explain why it is important for all employees to understand the structure of the company and its production processes.

7. Explain how human resource effectiveness is maximized in a quality managed organization.

8. Explain the role of company policy in quality management.

9. Explain the purpose of codes and standards in various occupations.

10. Explain the concepts of quality.
    i. cost of quality
    ii. measurement of quality
    iii. elements of quality
    iv. elements of the quality audit
    v. quality standards
    vi. role expectations and responsibilities

11. Explain the structure of quality assurance and quality control.
    i. describe organizational charts
    ii. identify the elements of quality assurance system such as ISO, CSA, WHMIS, Sanitation Safety Code (SSC)
    iii. explain the purpose of the quality assurance manual
    iv. describe quality assurance procedures

12. Examine quality assurance/quality control documentation.
    i. describe methods of recording reports in industry
    ii. describe procedures of traceability (manual and computer-based recording)
    iii. identify needs for quality control procedures

Practical:

1. Apply quality control to a project
   i. follow QA/QC procedures for drawings, plans and specifications in applicable occupations
   ii. calibrate measuring instruments and devices in applicable occupations.
   iii. interpret required standards
   iv. follow QA/QC procedures for accepting raw materials
   v. carry out the project
   vi. control the quality elements (variables)
   vii. complete QA/QC reports

MC1050 Introduction to Computers

Description:

This course is designed to give the student an introduction to computer systems. Particular emphasis is given to word processing, spreadsheet, e-mail and the Internet and security issues.

Course Outcomes:

Upon completion of this course, students will have a basic understanding of:

- Computer systems and their operation
- Popular software packages, their applications
- Security issues of computers

Pre-Requisites: None

Objectives & Content:

1. Identify the major components of microcomputer system hardware and software system.

2. Describe the functions of the microprocessor.
    i. describe and give examples of I/O DEVICES
    ii. describe primary storage (RAM, ROM, Cache)
    iii. define bit, byte, code and the prefixes k.m. and g.
    iv. describe secondary storage (diskettes and hard disks, CD ROMS, Zip drives etc)
    v. describe how to care for a computer and its accessories

3. Describe microcomputer software.
    i. define software
    ii. describe types of operational and application software
    iii. define file and give the rules for filenames and file extensions

4. Describe windows software.
    i. start and quit a program
    ii. demonstrate how to use the help function
    iii. locate a specific file using the find function
    iv. identify system settings: wall paper, screen saver, screen resolution, background
    v. start a program by using the Run command
    vi. shutting down your computer

5. Identify file management commands.
    i. create folders
    ii. maximize and minimize a window
    iii. describe windows task bar

6. Describe Keyboards.
    i. identify and locate alphabetic and numeric keys
    ii. identify and locate function key & special keys

7. Describe Word Processing.
    i. describe Windows components
    ii. menu bar
    iii. menu indicators
    iv. document window
    v. the status bar
    vi. the help feature
    vii. insertion point movements

8. Describe the procedure used to develop a document.
    i. enter text
    ii. change the display

9. Describe the procedure for opening, saving and exiting documents.
    i. saving a document
    ii. closing a document.
    iii. starting a new document Window
    iv. opening a document
    v. exiting word processor

10. Describe the procedure for editing a document.
    i. adding new text

ii. deleting text
iii. using basic format enhancement (split and join paragraphs, insert text)

11. Describe the main select features.
    i. identify a selection
    ii. moving a selection
    iii. copying a selection
    iv. deleting a selection
    v. saving a selection

12. Explain how to change layout format.
    i. changing layout format: (margins, spacing, alignment, paragraph indent, tabs, line spacing, page numbering)

13. Explain how to change text attributes.
    i. changing text attributes: (bold, underline, font, etc.)

14. Describe the auxiliary tools.
    i. using spell check & thesaurus

15. Describe print features.
    i. selecting the print feature: (i.e. number of copies and current document)
    ii. identifying various options in print screen dialogue box

16. Examine and discuss electronic spreadsheet.
    i. spreadsheet basics
    ii. the worksheet window

17. Describe menus.
    i. menu bar
    ii. control menu
    iii. shortcut menu
    iv. save, retrieve form menus

18. Describe the components of a worksheet.
    i. entering constant values and formulas
    ii. using the recalculation feature

19. Describe use ranges.

i. typing a range for a function
ii. pointing to a range for a function
iii. selecting a range for toolbar and menu commands

20. Describe how to print a worksheet.
i. printing to the screen
ii. printing to the printer
iii. printing a selected range

21. Describe how to edit a worksheet.
i. replacing cell contents
ii. inserting & deleting rows and columns
iii. changing cell formats
iv. changing cell alignments
v. changing column width
vi. copying and moving cells

22. State major security issues in using computers.
i. pass words
ii. accessing accounts
iii. viruses and how they can be avoided
iv. identity theft and ways to protect personal information
v. demonstrate how to view directory structure and folder content
vi. organize files and folders
vii. copy, delete, and move files and folders

23. Describe how to use electronic mail.
i. e-mail etiquette
ii. e-mail accounts
iii. e-mail messages
iv. e-mail message with attachments
v. e-mail attachments
vi. print e-mail messages
vii. deleting e-mail messages

24. Explain the internet and its uses.
i. the world wide web(www)
ii. accessing web sites
iii. internet web browsers
iv. internet search engines

v. searching techniques
vi. posting documents on-line

Practical:

1. Create a document using word processing.

2. Complete word processing exercises to demonstrate proficiency in word processing.

3. Prepare and send e-mails with attachments.

4. Retrieve documents and e-mail attachments and print copies.

5. Develop & print a spread sheet.

6. Post a document on-line.

SD1700 Workplace Skills

Description:

This course involves participating in meetings, information on formal meetings, unions, workers' compensation, employment insurance regulations, workers' rights and human rights.

Course Outcomes:

Upon completion of this course, students will be able to:

- Participate in meetings.
- Define and discuss basic concepts of:
    - unions
    - workers' compensation
    - employment insurance
    - workers' rights
    - human rights
    - workplace diversity
    - gender sensitivity

Pre-Requisites: None

Objectives & Content:

1. Meetings.
    i. identify & discuss meeting format and preparation required for a meeting
    ii. explain the purpose of an agenda
    iii. explain the roles and responsibilities of meeting participants
    iv. explain the purpose of motions and amendments and withdrawals
    v. explain the procedure to delay discussion of motions
    vi. explain the voting process

2. Unions.
    i. state why unions exist
    ii. give a concise description of the history of Canadian labour
    iii. explain how unions function

iv. explain labour's structure
v. describe labour's social objectives
vi. describe the relationship between Canadian labour and the workers
vii. describe the involvement of women in unions

3. Worker's Compensation.
   i. describe the aims, objectives, benefits and regulations of the Workplace Health, Safety and Compensation Commission
   ii. explain the internal review process

4. Employment Insurance.
   i. explain employment insurance regulations
   ii. describe how to apply for employment insurance
   iii. explain the appeal process
   iv. identify the components of a letter of appeal

5. Worker's Rights.
   i. define labour standards
   ii. explain the purpose of the Labour Standards Act
   iii. identify regulations pertaining to:
      - hours of work
      - minimum wages
      - employment of children
      - vacation pay
   iv. explain the purpose of the Occupational Health & Safety Act as it refers to workers' rights

6. Human Rights.
   i. describe what information cannot be included on an employment application
   ii. describe what information cannot be included in an interview
   iii. examine the Human Rights Code and explain the role of the Human Rights Commission
   iv. define harassment in various forms and identify strategies for prevention

7. Workplace Diversity.
   i. define and explore basic concepts and terms related to workplace inclusively including age, race, culture, religion, socio-economic, sexual orientation with an emphasis on gender issues and gender stereotyping.

8. Gender Sensitivity.
    i. explore gender and stereotyping issues in the workplace by identifying strategies for eliminating gender bias

Practical:

1. Prepare an agenda.

2. Participate in a meeting.

3. Analyze a documented case of a human rights complaint with special emphasis on the application, time frame, documentation needed, and legal advice available.

SD1710 Job Search Techniques

Description:

This course is designed to give students an introduction to the critical elements of effective job search techniques.

Course Outcomes:

Upon completion of this course, students will be able to:

- Demonstrate effective use of job search techniques.

Pre-Requisites: None

Objectives & Content:

1. Identify and examine employment trends and opportunities.

2. Identify sources that can lead to employment.

3. Access and review information on the Newfoundland and Labrador Apprenticeship and Certification Web site and the Apprenticeship Employment Gateway.

4. Analyze job ads and discuss the importance of fitting qualifications to job requirements.

5. Identify and discuss employability skills as outlined by the Conference Board of Canada.

6. Discuss the necessity of fully completing application forms**.**

7. Establish the aim/purpose of a resume.

8. Explore characteristics of effective resumes, types of resumes, and principles of resume format.

9. Explore characteristics of an effective cover letter.

10. Identify commonly asked questions in an interview.

11. Explore other employment related correspondence.

12. Explore the job market to identify employability skills expected by an employer.

13. Conduct a self-analysis and compare with general employer expectations.

14. Discuss the value of establishing and maintaining a portfolio.

Practical:

1. Complete sample application forms.

2. Write a resume.

3. Write an effective cover letter.

4. Establish a portfolio.

5. Write out answers to commonly asked questions asked during interviews.

6. Identify three potential employers from the Apprenticeship Employment gateway, Apprenticeship and Certification website.

SD1720 Entrepreneurial Awareness

Description:

This course is designed to introduce the student to the field of entrepreneurship, including the characteristics of the entrepreneur, the pros and cons of self-employment, and some of the steps involved in starting your own business.

Course Outcomes:

Upon completion of this course, the student will be able to:

- Identify the various types of business ownership, the advantages and disadvantages of self-employment and identify the characteristics of an entrepreneur.
- State the purpose and identify the main elements of a business plan.

Pre-Requisites: None

Objectives and Content:

1. Explore self-employment: An alternative to employment.
    i. identify the advantages and disadvantages of self-employment vs. regular employment
    ii. differentiate between an entrepreneur and a small business owner
    iii. evaluate present ideas about business people

2. Identify and discuss various types of business ownership.
    i. explore the characteristics of entrepreneurs
    ii. identify characteristics common to entrepreneurs
    iii. compare one's own personal characteristics with those of entrepreneurs
    iv. examine one's present ideas about business people

3. Identify business opportunities.
    i. distinguish between an opportunity and an idea
    ii. examine existing traditional and innovative business ventures
    iii. identify and summarize the role of various agencies that support business development

4. Review the entrepreneurial process.
    i. explain the entrepreneurial process
    ii. describe the purpose of a business plan

Block 2

SV2310 Electric Brakes

Learning Outcomes:

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

Pre-Requisite: Entry Level (Block I)

Objectives and Content:

1. Define terminology associated with electric brake systems.

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

3. Identify the types and designs of electric brake systems.

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

5. Describe the procedures used to inspect and maintain electric brake systems and their components.

6. Describe the procedures used to diagnose electric brake systems.

Practical:

1. Use specialty tools and equipment used to service and repair electric brake systems.

2. Inspect and maintain electric brake systems and their components.

SV1291 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.

Pre-Requisite: Entry Level (Block I)

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.

Practical:

1. Use specialty tools and equipment used to service and repair drive axle assemblies.

2. Disassemble, inspect, repair and assemble a drive axle assembly.

SV1380 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.

Pre-Requisite: Entry Level (Block I)

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

Practical:

1. Use specialty tools and equipment used to service and repair starting systems.

2. Inspect and maintain starting system components.
    i. electrical
    ii. pneumatic

3. Remove, disassemble, test, repair and assemble a 12 or 24 volt starter.

4. Test a starting circuit for;
    i. voltage drop
    ii. amperage draw

SV1386 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.

Pre-Requisites: Entry Level (Block I)
SV1380 – Starting Systems

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.

Practical:

1. Inspect and maintain starting aids and their components.

SV1391 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.

Pre-Requisite: Entry Level (Block I)

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.

Practical:

1. Use specialty tools and equipment to service and repair charging systems.
2. Inspect and maintain charging system components.
3. Remove, disassemble, test, repair and assemble an alternator.
4. Check alternator output (amperage and voltage).
5. Check and adjust alternator belt tension.

SV2661 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.

Pre-Requisite: Entry Level (Block I)

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.

Practical:

1. Use specialty tools and equipment used to service and repair electronic ignition systems.

2. Inspect and maintain electronic ignition systems and components.

3. Check and test high tension leads.

4. Perform a complete tune-up on a gasoline engine

SV2400 Hydraulic Pumps and Motors

Learning Outcomes:

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

Pre-Requisite: Entry Level (Block I)

Objectives and Content:

1. Define terminology associated with hydraulic pumps and motors.

2. Identify hazards and describe safe work practices pertaining to hydraulic pumps and motors.

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

4. Identify classifications of hydraulic pumps and describe their characteristics, applications and operation.
    i. non-positive displacement
    ii. positive displacement
    iii. fixed displacement
    iv. variable displacement

5. Identify types of hydraulic pumps and describe their characteristics, applications and operation.
    i. gear
    ii. vane
    iii. piston

6. Identify hydraulic pump components and describe their purpose and operation.

7. Describe the procedures used to inspect and maintain hydraulic pumps and their components.

8. Identify hydraulic pump problems and their causes.

9. Describe the procedures used to diagnose hydraulic pumps.

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

11. Describe the procedures used to repair hydraulic pumps and their components.

12. Identify classifications of hydraulic motors and describe their characteristics, applications and operation.
    i. fixed displacement
    ii. variable displacement

13. Identify types of hydraulic motors and describe their characteristics, applications and operation.
    i. gear
    ii. vane
    iii. piston

14. Identify hydraulic motor components and describe their purpose and operation.

15. Describe the procedures used to inspect and maintain hydraulic motors and their components.

16. Identify hydraulic motor problems and their causes.

17. Describe the procedures used to diagnose hydraulic motors.

18. Describe the procedures used to remove and install hydraulic motors and their components.

19. Describe the procedures used to repair and adjust hydraulic motors and their components.

Practical:

1. Use specialty tools and equipment used to service and repair pumps and motors.

2. Remove and install hydraulic pumps and their components.

3. Disassemble, check, repair and reassemble pumps.
   i. gear
   ii. vane
   iii. piston

4. Remove and install hydraulic motors and their components.

5. Disassemble, check, repair and reassemble a hydraulic motor.

SV2670 Air Conditioning Systems

Suggested Duration: 30 hours

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.

Pre-Requisite: Entry Level (Block I)

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. Inspect and maintain air conditioning system and components.

11. Identify air conditioning system problems and their causes.

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

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

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

Practical:

1. Use specialty tools and equipment used to service and repair air conditioning systems.

2. Remove, recover, recycle, and recharge an air conditioning system.

3. Check an air conditioning system for leaks.

SV1840 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.

Pre-Requisite: Entry Level (Block I)

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.

Block 3

SV1441 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.

Pre-Requisite: Block II

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.

Practical:

1. Use specialty tools and equipment used to service and repair front axles and suspension systems.

2. Inspect and maintain front axles and suspension systems and their components.

3. Diagnose front axles and suspension systems and their components.

4. Remove and install front axles and suspension systems and their components.
   i. solid type front axle.
   ii. kingpins and bushings.
   iii. leaf springs

5. Repair and adjust front axles and suspension systems and their components.

SV1461 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.

Pre-Requisite: Block II

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.

Practical:

1. Use specialty tools and equipment used to service and repair rear axles and suspension systems.

2. Inspect and maintain rear axles and suspension systems and their components.

3. Diagnose rear axles and suspension systems and their components.

4. Remove and install rear axles and suspension systems and their components.

SV1245 Wheel and Axle Alignment

Learning Outcomes:

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

Pre-Requisites: Block II
SV1441 - Front Axles and Suspensions Systems
SV1461 - Rear Axles and Suspensions Systems

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.

Practical:

1. Use specialty tools and equipment used to perform wheel and axle alignment.

2. Perform a front wheel alignment.

3. Perform a rear wheel alignment.

SV2691 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.

Pre-Requisite: Block II

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.

SV1480 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.

Pre-Requisite: Block II

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.

Practical:

1. Use specialty tools and equipment used to service and repair dual air brake systems.

2. Inspect and maintain dual air brake systems and components.

3. Diagnose dual air brake systems.

4. Remove and install dual air brake system components.

5. Repair and adjust dual air brake components.

SV2781 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.

Pre-Requisite: Block II

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.

Practical:

1. Use specialty tools and equipment used to service and repair trailer coupling devices.

2. Diagnose trailer coupling devices.

3. Remove and install trailer coupling devices.

4. Repair and adjust trailer coupling devices.

5. Inspect and maintain trailer coupling devices.

SV2728 Trailers

Learning Outcomes:

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

Pre-Requisite: Block II

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.

Block 4

WD2320 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.

Pre-Requisite: Block III

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.

Practical:

1. Strike and maintain an arc.

2. Fillet weld flat position.

SV2651 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.

Pre-Requisite: Block III

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.

Practical:

1. Use specialty tools and equipment used to service and repair electronically-controlled diesel fuel injection systems.

2. Diagnose electronically-controlled diesel fuel injection systems and components.

3. Use test equipment to diagnose service electronic engine control system as per manufacturer's specification.

SV2771 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.

Pre-Requisite: Block III

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.

Practical:

1. Use specialty tools and equipment used to service and repair emission control systems.

2. Inspect and maintain emission control system components.

3. Diagnose emission control systems and components.

4. Remove and install emission control system components.

5. Test, replace and adjust emission control system and components.

SV2571 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.

Pre-Requisite: Block III

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.

Practical:

1. Use specialty tools and equipment used to service and repair engine brakes and retarders.

2. Inspect service, adjust and repair engine brakes and retarders and their components.

SV2365 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.

Pre-Requisite: Block III

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.

Practical:

1. Use specialty tools and equipment used to service and repair automatic/power shift transmissions.

2. Inspect and maintain automatic/power shift transmissions and their components.

3. Disassemble, repair and assemble an automatic/powershift transmission.

4. Test and adjust transmission pressure on an automatic/powershift transmission.

SV2350 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.

Pre-Requisite: Block III

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.

Practical:

1. Use specialty tools and equipment used to service and repair torque converters.

2. Inspect and maintain torque converters and their components.

3. Disassemble, inspect, repair and assemble a torque converter.

4. Perform a pressure/stall test to check torque converter performance.

SV2265 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.

Pre-Requisite: Block III

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.

Practical:

1. Demonstrate ability to follow safety precautions associated with computers and electronic components.

2. Use specialized tools and equipment used to diagnose network and electronic circuitry.
    i. digital volt ohmmeter (DVOM)
    ii. scopes
    iii. probes
    iv. break out boxes
    v. scan tools
    vi. laptops

3. Retrieve trouble codes and analyze information received.

4. Diagnose vehicle management systems and describe their associated procedures.
    i. PLCs
    ii. on-board diagnostic (OBD)
    iii. laptop/scan tools

5. Interpret service manuals for wiring diagrams, flow charts and trouble shooting guides.

Block 5

SV1321 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.

Pre-Requisite: Block IV

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.

Practical:

1. Disassemble/assemble, inspect and measure an engine oil pump.

2. Test an oil cooler for leaks.

3. Perform an engine oil pressure test.

SV2605 Diesel Engine Overhaul

Learning Outcomes:

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

Pre-Requisite: Block IV

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.

Practical:

1. Use specialty tools and equipment used for diesel engine removal and overhaul.
2. Remove and install diesel engines.
3. Disassemble and assemble diesel engines and components.
4. Clean and inspect diesel engines and their components.
5. Measure diesel engine components for wear.

SV2591 Turbochargers, Blowers and Intercoolers

Learning Outcomes:

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

Pre-Requisite: Block IV

Objectives and Content:

1. Define terminology associated with Turbochargers, Blowers and Intercoolers.

2. Identify hazards and describe safe work practices pertaining to Turbochargers, Blowers and Intercoolers.

3. Identify the types and designs of Turbochargers, Blowers and Intercoolers.

4. Identify specialty tools and equipment used to service and repair Turbochargers, Blowers and Intercoolers and describe their applications and procedures for use.

5. Use specialty tools and equipment used to service and repair Turbochargers, Blowers and Intercoolers.

6. Describe the procedures used to inspect and maintain Turbochargers, Blowers and Intercoolers, and their components.

7. Describe the procedures used to remove service and install a turbocharger.

8. Describe the procedures used to remove service and install a blower.

9. Describe the procedures used to remove service and install an intercooler.

Practical:

1. Remove, service, and install a turbocharger.

2. Remove, service, and install a blower.

3. Remove, service, and install a blower.

4. Remove, service, and install an intercooler.

SV2266 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.

Pre-Requisite: Block IV

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.

Practical:

1. Use specialty tools and equipment used to service and repair diesel fuel injection systems.

2. Inspect and maintain diesel fuel injection system components.

3. Remove and install diesel fuel injection system components.

4. Remove, install and set injectors on a diesel engine.

5. Use an injector tester to check an injector for the following
   i. opening and closing pressure
   ii. valve seating
   iii. back leakage
   iv. spray pattern

6. Check/adjust low and high idle speed on a diesel engine.

7. Test a fuel system for
   i. pressure
   ii. flow
   iii. leaks

8. Perform a complete tune up on a diesel engine.

9. Check for blowby.

SV2611 Base Engine Diagnostics

Learning Outcomes:

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

Pre-Requisite: Block IV

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.

Practical:

1. Identify specialty tools and equipment used to diagnose base engines.

2. Perform a cylinder compression, exhaust back pressure, crankcase pressure and an air intake pressure test on a diesel engine.

SV2560 Preventive Maintenance Inspections

Learning Outcomes:

- Demonstrate knowledge of preventive maintenance inspections.
- Demonstrate knowledge of the procedures used to perform preventive maintenance inspections.

Pre-Requisite: Block IV

Objectives and Content:

1. Describe the procedures to perform a preventive maintenance inspection.
   i. preventive maintenance programs
   ii. checklists
   iii. reports
   iv. manufacturer's specifications

2. Perform a preventive maintenance inspection.

Block 6

SV2761 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.

Pre-Requisite: Block V

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.

Practical:

1. Use specialty tools and equipment used to service and repair gasoline fuel injection systems

2. Inspect and maintain gasoline fuel injection systems and their components.

3. Diagnose gasoline fuel injection systems.

SV2721 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.

Pre-Requisite: Block V

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.

Practical:

1. Use specialty tools and equipment used to service and repair manual transmissions.

2. Inspect and maintain manual transmissions and their components.

3. Diagnose problems in manual transmissions and determine repairs.

4. Remove and install manual transmissions and their components.

5. Repair manual transmissions and their components.

6. Remove, repair and install manual transmission shift linkage.

SV2725 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.

Pre-Requisite: Block V

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.

Practical:

1. Use specialty tools and equipment used to service and repair power take-offs.

2. Remove and install a power take-off.

SV2741 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.

Pre-Requisite: Block V

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.

Practical:

1. Use specialty tools and equipment used to service and repair transfer cases.
2. Inspect and maintain transfer cases and their components.
3. Diagnose transfer cases.
4. Remove and install transfer cases and their components.
5. Overhaul and repair transfer cases and their components.

SV2726 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.

Pre-Requisite: Block V

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.

Practical:

1. Remove and install ABS and ATC system components.

2. Inspect and maintain ABS and ATC systems and components.

3. Diagnose ABS and ATC systems.

4. Repair ABS and ATC systems and adjust components.

SV2727 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.

Pre-Requisite: Block V

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.

SV2729 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.

Pre-Requisite: Block V

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.

Practical:

1. Use specialty tools and equipment used to service and repair engine clutches.

2. Remove, inspect, repair, and install a clutch assembly.

3. Adjust the clutch assembly on a vehicle/equipment.

APPENDIX A

Profile Chart

OCCUPATIONAL SKILLS			
SV1101 Safety	SV1166 Tools and Equipment	SV1800 Hoisting and Lifting	CM2150 Workplace Communications
SV1201 Start, Move and Park Vehicle	SV1181 Fasteners, Tubings, Hoses and Fittings	SV1190 Lubrication and Fluids Servicing	SV1121 Gaskets and Seals
SV1820 Bearings	SV1830 Metallurgy	SV1301 Cutting, Heating and Welding	WD2330 MIG Welding
WD2320 SMAW Welding	SV1810 Preventive Maintenance		
ENGINE AND SUPPORTING SYSTEMS			
SV1303 Engine Principles	SV1310 Cooling Systems	SV1321 Engine Lubrication Systems	SV1365 Non-Diesel Fuel Systems
SV1361 Diesel Fuel Supply Systems	SV2266 Diesel Fuel Injection Systems	SV2651 Electronically-Controlled Diesel Fuel Injection Systems	SV1331 Intake and Exhaust Systems
SV2605 Diesel Engine Overhaul	SV2611 Base Engine Diagnostics	SV2771 Emission Control Systems	SV2761 Gasoline Fuel Injection Systems
AIR SYSTEMS AND BRAKES			
SV2571 Engine Brakes and Retarders	SV1261 Vehicle Hydraulic Brake Systems	SV1271 Basic Air Brake Systems	SV1480 Dual Air Brake Systems
SV2726 Anti-Lock Braking and Traction Control Systems			
ELECTRICAL AND ELECTRONIC SYSTEMS			
SV1131 Electrical and Electronic Principles	SV1370 Batteries	SV1380 Starting Systems	SV1386 Starting Aids

SV1391 Charging Systems	SV2661 Electronic Ignition Systems	SV1491 Conventional lighting circuits	SV1401 Gauges
SV1501 Wiring Harnesses and Accessories	SV2265 Vehicle Management Systems		

DRIVE TRAIN			
SV1281 Drive Lines	SV2729 Engine Clutches	SV2365 Automatic/Power Shift Transmissions	SV2350 Torque Converters
SV1291 Drive Axle Assemblies	SV2721 Manual Transmissions	SV2725 Power Take-offs	SV2741 Transfer Cases
STEERING, CHASSIS/FRAMES, SUSPENSION, WHEEL, HUBS AND TIRES			
SV1211 Tires, Rims and Wheels	SV1141 Front Axle and Suspension Systems	SV1461 Rear Axle and Suspension Systems	SV1451 Steering Systems
SV1245 Wheel and Axle Alignment	SV2691 Frames and Chassis	SV2781 Trailer Coupling Devices	
CAB			
SV2727 Cab Components			
TRAILERS			
SV2728 Trailers			

NOA Comparison Table

NOA Sub-task		IPG Unit	
Task 1 - Maintains tools and equipment.			
1.01	Maintains hand tools.	SV1166	Tools and Equipment
1.02	Maintains power tools.	SV1166	Tools and Equipment
1.03	Maintains measuring, testing and diagnostic tools.	SV1166	Tools and Equipment
1.04	Maintains hoisting and lifting equipment.	SV1800	Hoisting and Lifting
1.05	Maintains personal protective equipment (PPE) and safety equipment.	SV1101	Safety
1.06	Maintains staging equipment.	SV1800	Hoisting and Lifting
1.07	Maintains solvent washers and biological parts washers.	SV1166	Tools and Equipment
Task 2 - Organizes work.			
2.01	Uses documentation and reference materials.	CM2150	Workplace Communications
2.02	Communicates with others.	CM2150	Workplace Communications
2.03	Maintains safe work environment.	SV1101	Safety
Task 3 - Performs routine trade activities.			
3.01	Uses computer for diagnostics.	SV2265	Vehicle Management Systems
3.02	Maintains fluids, lubricants and coolants.	SV1190	Lubrication and Fluids Servicing
3.03	Uses fasteners, sealing devices, adhesives and gaskets.	SV1181	Fasteners, Tubings, Hoses and Fittings
		SV1121	Gaskets and Seals
3.04	Service hoses, tubing and fittings.	SV1181	Fasteners, Tubings, Hoses and Fittings
3.05	Services bearings, bushings and seals.	SV1121	Gaskets and Seals
		SV1820	Bearings
3.06	Services filters.	SV1190	Lubrication and Fluids Servicing
		SV1830	Metallurgy
3.07	Uses welding equipment.	SV1301	Cutting, Heating and Welding
		WD2330	Metal Inert Gas (MIG) Welding

NOA Sub-task		IPG Unit	
		WD2320	Shielded Metal Arc Welding (SMAW)
3.08	Uses cutting equipment.	SV1301	Cutting, Heating and Welding
3.09	Verifies vehicle repairs.	SV1201	Start, Move and Park Vehicle
3.10	Conducts road tests.	SV1201	Start, Move and Park Vehicle
Task 4 - Diagnoses engine and supporting systems.			
4.01	Diagnoses base engine.	SV1303	Engine Principles
		SV2611	Base Engine Diagnostics
4.02	Diagnoses cooling system.	SV1310	Cooling Systems
4.03	Diagnoses lubrication system.	SV1321	Engine Lubrication Systems
4.04	Diagnoses fuel delivery system.	SV1365	Non-Diesel Fuel Systems
		SV1361	Diesel Fuel Supply Systems
		SV2266	Diesel Fuel Injection Systems
		SV2651	Electronically-Controlled Diesel Fuel Systems
		SV2761	Gasoline Fuel Injection Systems
4.05	Diagnoses intake and exhaust systems.	SV1331	Intake and Exhaust Systems
4.06	Diagnoses emission systems for diesel engines.	SV2771	Emission Control Systems
4.07	Diagnoses engine management system.	SV2265	Vehicle Management Systems
Task 5 - Services engine and supporting systems.			
5.01	Services base engine.	SV1303	Engine Principles
		SV2605	Diesel Engine Overhauling
5.02	Services cooling system.	SV1310	Cooling Systems
5.03	Services lubrication system.	SV1321	Engine Lubrication Systems
5.04	Services fuel delivery system.	SV1365	Non-Diesel Fuel Systems
		SV1361	Diesel Fuel Supply Systems
		SV2266	Diesel Fuel Injection Systems
		SV2651	Electronically-Controlled Diesel Fuel Systems
		SV2761	Gasoline Fuel Injection Systems
5.05	Services intake and exhaust systems.	SV1331	Intake and Exhaust Systems
5.06	Services emission systems for	SV2771	Emission Control Systems

NOA Sub-task		IPG Unit	
	diesel engines.		
5.07	Services engine management system.	SV2265	Vehicle Management Systems
Task 6 - Diagnoses air systems and brakes.			
6.01	Diagnoses air systems.	SV1271	Basic Air Brake Systems
		SV1480	Dual Air Brake Systems
6.02	Diagnoses brake systems.	SV1261	Vehicle Hydraulic Brake Systems
		SV1271	Basic Air Brake Systems
		SV1480	Dual Air Brake Systems
		SV2726	Anti-lock Braking and Traction Control Systems
6.03	Diagnoses auxiliary braking systems.	SV2571	Engine Brakes and Retarders
Task 7 - Services air systems and brakes.			
7.01	Services air systems.	SV1271	Basic Air Brake Systems
		SV1480	Dual Air Brake Systems
7.02	Services brake systems.	SV1261	Vehicle Hydraulic Brake Systems
		SV1271	Basic Air Brake Systems
		SV1480	Dual Air Brake Systems
		SV2726	Anti-lock Braking and Traction Control Systems
7.03	Services auxiliary braking systems.	SV2571	Engine Brakes and Retarders
Task 8 - Diagnoses electrical systems.			
8.01	Diagnoses batteries.	SV1131	Electrical and Electronic Principles
		SV1370	Batteries
8.02	Diagnoses charging systems.	SV1131	Electrical and Electronic Principles
		SV1391	Charging Systems
8.03	Diagnoses starting systems.	SV1131	Electrical and Electronic Principles
		SV1380	Starting Systems
8.04	Diagnoses electrical components and accessories.	SV1131	Electrical and Electronic Principles
		SV1386	Starting Aids

NOA Sub-task		IPG Unit	
		SV1491	Conventional Lighting Circuits
		SV1401	Gauges
		SV1501	Wiring Harnesses and Accessories
Task 9 - Services electrical systems.			
9.01	Services batteries.	SV1131	Electrical and Electronic Principles
		SV1370	Batteries
9.02	Services charging systems.	SV1131	Electrical and Electronic Principles
		SV1391	Charging Systems
9.03	Services starting systems.	SV1131	Electrical and Electronic Principles
		SV1380	Starting Systems
9.04	Services electrical components and accessories.	SV1131	Electrical and Electronic Principles
		SV1386	Starting Aids
		SV1491	Conventional Lighting Circuits
		SV1401	Gauges
		SV1501	Wiring Harnesses and Accessories
Task 10 - Diagnoses electronic systems.			
10.01	Diagnoses spark ignition systems.	SV2661	Electronic Ignition Systems
10.02	Diagnoses electronic components and accessories.	SV2651	Electronically-Controlled Diesel Fuel Systems
		SV1131	Electrical and Electronic Principles
		SV1501	Wiring Harnesses and Accessories
		SV2727	Cab Components
10.03	Diagnoses vehicle management systems.	SV2265	Vehicle Management Systems
Task 11 - Services electronic systems.			
11.01	Services spark ignition systems.	SV1131	Electrical and Electronic Principles
		SV2661	Electronic Ignition Systems
11.02	Services electronic components and accessories.	SV2651	Electronically-Controlled Diesel Fuel Systems

NOA Sub-task		IPG Unit	
		SV1131	Electrical and Electronic Principles
		SV1501	Wiring Harnesses and Accessories
		SV2727	Cab Components
11.03	Services vehicle management systems.	SV2265	Vehicle Management Systems
Task 12 - Diagnoses drive train.			
12.01	Diagnoses clutches.	SV2729	Engine Clutches
12.02	Diagnoses standard transmissions and transfer cases.	SV2721	Manual Transmissions
		SV2725	Power Take-offs
		SV2741	Transfer Cases
12.03	Diagnoses automatic transmissions.	SV2365	Automatic/Power Shift Transmissions
		SV2350	Torque Converters
12.04	Diagnoses automated transmissions.	SV2721	Manual Transmissions
12.05	Diagnoses driveline systems.	SV1281	Drive Lines
12.06	Diagnoses differentials.	SV1291	Drive Axle Assemblies
Task 13 - Services drive train.			
13.01	Services clutches.	SV2729	Engine Clutches
13.02	Services standard transmissions and transfer cases.	SV2721	Manual Transmissions
		SV2725	Power Take-offs
		SV2741	Transfer Cases
13.03	Services automatic transmissions.	SV2365	Automatic/Power Shift Transmissions
		SV2350	Torque Converters
13.04	Services automated transmissions.	SV2721	Manual Transmissions
13.05	Services driveline systems.	SV1281	Drive Lines
13.06	Services differentials.	SV1291	Drive Axle Assemblies
Task 14 - Diagnoses steering system, chassis/frames, suspension, wheels, hubs and tires.			
14.01	Diagnoses steering systems.	SV1451	Steering Components
14.02	Diagnoses chassis/frames.	SV2691	Frames and Chassis
14.03	Diagnoses suspension.	SV1441	Front Axles and Suspension Systems
		SV1461	Rear Axles and Suspension Systems
14.04	Diagnoses hitches and couplers.	SV2781	Trailer Coupling Devices

NOA Sub-task		IPG Unit	
14.05	Diagnoses tires, wheels and hubs.	SV1211	Tires, Rims and Wheels
Task 15 - Services steering system, chassis/frames, suspension, wheels, hubs and tires.			
15.01	Services steering systems.	SV1451	Steering Components
15.02	Services chassis/frames.	SV2691	Frames and Chassis
15.03	Services suspension.	SV1441	Front Axles and Suspension Systems
		SV1461	Rear Axles and Suspension Systems
15.04	Services hitches and couplers.	SV2781	Trailer Coupling Devices
15.05	Services tires, wheels and hubs.	SV1211	Tires, Rims and Wheels
		SV1245	Wheel and Axle Alignment
Task 16 - Diagnoses cab components.			
16.01	Diagnoses interior components.	SV2727	Cab Components
16. 02	Diagnoses exterior components.	SV2727	Cab Components
Task 17 - Services cab components.			
17.01	Services interior components.	SV2727	Cab Components
17.02	Services exterior components.	SV2727	Cab Components
Task 18 - Diagnoses trailer components.			
18.01	Diagnoses landing gear.	SV2728	Trailers
18.02	Diagnoses trailer body accessories and components.	SV2728	Trailers
Task 19 - Services trailer components.			
19.01	Services landing gear.	SV2728	Trailers
19.02	Services trailer body accessories and components.	SV2728	Trailers
Task 20 - Diagnoses climate control systems.			
20.01	Diagnoses heating and ventilation systems.	SV1840	Heating and Ventilation Systems
20.02	Diagnoses air conditioning systems.	SV2670	Air Conditioning Systems
Task 21 - Services climate control systems.			
21.01	Services heating and ventilation systems.	SV1840	Heating and Ventilation Systems
21.02	Services air conditioning systems.	SV2670	Air Conditioning Systems
Task 22 - Diagnoses hydraulic systems.			
22.01	Diagnoses hydrodynamic systems.	SV2350	Torque Converters
		SV1141	Introduction to Hydraulics
22.02	Diagnoses hydrostatic systems.	SV1141	Introduction to Hydraulics

NOA Sub-task		IPG Unit	
		SV2381	Hydraulic Fittings, Piping, Tubing and Hoses
		SV2391	Reservoirs , Coolers and Filters
		SV2400	Hydraulic Pumps and Motors
Task 23 - Services hydraulic systems.			
23.01	Services hydrodynamic systems.	SV2350	Torque Converters
		SV1141	Introduction to Hydraulics
23.02	Services hydrostatic systems.	SV1141	Introduction to Hydraulics
		SV2381	Hydraulic Fittings, Piping, Tubing and Hoses
		SV2391	Reservoirs , Coolers and Filters
		SV2400	Hydraulic Pumps and Motors