Automotive Service Technician
Level 3

06-2024

Apprenticeship Manitoba

Automotive Service Technician

Unit: C1 Ignition Systems

Level: Three
Duration: 28 hours
Theory: 14 hours
Practical: 14 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills about ignition systems when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of ignition systems, and procedures to adjust, diagnose, repair and replace them.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with ignition systems.	**10%**
2. Identify hazards and describe safe work practices pertaining to ignition systems. a. Personal b. Shop/facility c. Vehicle d. Environmental	**15%**
3. Identify tools and equipment relating to ignition systems and describe their applications and procedures for use.	**10%**
4. Describe types of ignition systems, their components and operation. a. Types • Distributor • Distributorless • Coil on plug b. Ignition circuits • Primary • Secondary	**25%**
5. Demonstrate and perform the procedures to diagnose and repair ignition systems and their components. a. Maintenance and inspection b. Adjustment procedures • Ignition timing c. Component repair and/or replacement	**40%**

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Apprenticeship Manitoba

Automotive Service Technician

Unit: C2 Gasoline Fuel Systems

Level: Three

Duration: 28 hours

Theory: 14 hours

Practical: 14 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills about gasoline fuel systems when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of gasoline fuel systems and their components. The unit also covers the procedures used to adjust, diagnose, repair and replace gasoline fuel systems and their components.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with gasoline fuel systems.	**10%**
2. Identify hazards and describe safe work practices pertaining to gasoline fuel systems. a. Personal b. Shop/facility c. Vehicle d. Environmental • Handling, disposal and storage of fuels e. Flammability	**10%**
3. Identify tools and equipment relating to gasoline fuel systems and describe their applications and procedures for use.	**5%**
4. Describe types of gasoline fuels and their properties.	**5%**
5. Describe types of gasoline fuel systems, their components and operation. a. Fuel delivery systems • Mechanical • Electrical b. Injection systems • Direct • Multi-port • Throttle body • Dual injection systems c. Fasteners, tubing, hoses, gaskets, seals and sealants d. Other	**30%**

6. Demonstrate and perform the procedures to diagnose and repair gasoline fuel systems. **40%**

a. Maintenance and inspection
   - Pressure testing
   - Volume testing
   - Contamination
   - Leak down testing
   - Intake valve cleaning

b. Adjustment procedures

c. Component repair and/or replacement

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Apprenticeship Manitoba

Automotive Service Technician

Unit: C3 Gasoline Emission Control Systems

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills about gasoline emission control systems when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of emission control systems and their components. The unit also covers the procedures used to adjust, diagnose, repair and replace emission control systems and their components.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with gasoline emission control systems.	**10%**
2. Identify hazards and describe safe work practices pertaining to gasoline emission control systems. a. Personal b. Shop/facility c. Vehicle d. Environmental	**5%**
3. Identify tools and equipment relating to gasoline emission control systems and describe their applications and procedures for use.	**5%**
4. Describe types of emission gases and their effects on the environment. a. CO b. CO_2 c. NOx d. HC e. O_2	**15%**
5. Describe gasoline emission control systems, their components and operation. a. Exhaust gas recirculation (EGR) b. Evaporative emission control systems (EVAP) c. Secondary air injection d. Exhaust system e. Positive crankcase ventilation (PCV) f. Induction system g. Variable cam-timing (VCT)	**30%**

h. Other emerging systems
i. Fasteners, tubing, hoses, gaskets, seals and sealants

6. Demonstrate and perform the procedures to diagnose and repair gasoline emission control systems and their components. 35%

a. Maintenance and inspection
   - Smoke testing
   - Air pressure testing
   - Catalytic converter efficiency
   - EGR cleaning

b. Adjustment procedures
c. Component repair and/or replacement

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Apprenticeship Manitoba

Automotive Service Technician

Unit: C4 Gasoline Intake and Exhaust Systems

Level: Three
Duration: 14 hours
Theory: 7 hours
Practical: 7 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills about gasoline intake and exhaust systems when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of intake and exhaust systems and their components. The unit also covers the procedures used to adjust, diagnose, repair and replace intake and exhaust systems and their components.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with gasoline intake and exhaust systems.	**10%**
2. Identify hazards and describe safe work practices pertaining to gasoline intake and exhaust systems. a. Personal b. Shop/facility c. Vehicle d. Environmental	**15%**
3. Identify tools and equipment relating to gasoline intake and exhaust systems and describe their applications and procedures for use.	**10%**
4. Describe types of gasoline intake and exhaust systems, their components and operation. a. Forced air • Turbocharged • Supercharged b. Naturally aspirated (NA) • Intake manifold designs c. Fasteners, tubing and hoses d. Gaskets, seals and sealants	**35%**
5. Demonstrate and perform the procedures to diagnose and repair gasoline intake and exhaust systems and their components. a. Maintenance and inspection • Leaks • Blockages • Noise, vibration and harshness (NVH)	**30%**

b. Adjustment procedures
c. Component repair and/or replacement

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Apprenticeship Manitoba

Automotive Service Technician

Unit: C5 Vehicle Management and Networking Systems

Level: Three

Duration: 49 hours

Theory: 28 Hours

Practical: 21 Hours

Overview:

This unit is designed to provide the apprentice with the knowledge about vehicle management and networking systems when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of vehicle management and networking systems, and their components. The unit also covers the procedures used to adjust, diagnose, repair and replace vehicle management and networking systems, and their components.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with vehicle management and networking systems.	**10%**
2. Identify hazards and describe safe work practices pertaining to vehicle management and networking systems. a. Personal b. Shop/facility c. Vehicle d. Environmental	**5%**
3. Identify tools and equipment used to diagnose vehicle management and network systems and electronic circuitry, and describe their applications and procedures for use. a. Multimeter b. Oscilloscope c. Probes d. Break out boxes e. Electronic service (scan) tools f. Other	**10%**
4. Describe on-board diagnostic (OBD) systems, their components and operation. a. Inputs and outputs b. Modules c. OBD II • Read diagnostic trouble codes (DTC) • Monitor data • Drive cycles and monitors d. Other emerging technologies	**10%**

5. Explain basic computer operation and vehicle management and networking systems, and their purpose and applications. **30%**

a. Network protocols
b. Networking of modules
   - Wiring designs
   - Wireless
   - Multiplexing
c. Inputs and outputs
d. Relationships with other systems

6. Demonstrate and perform the procedures to diagnose and repair vehicle management and networking systems. **35%**

a. Maintenance and inspection
   - Manufacturers' flowcharts and schematics
   - Test system circuitry and components (input/output component verification)
   - Interpret test results
   - Verify vehicle communication systems
b. Adjustment procedures
   - Reprogram and update component software
c. Component repair and/or replacement

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Apprenticeship Manitoba

Automotive Service Technician

Unit: C6 Electrical Systems and Options

Level: Three

Duration: 21 hours

Theory: 14 Hours

Practical: 7 Hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills about electrical systems and options when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of electrical systems and options, and their components and operation. The unit also covers the procedures used to adjust, diagnose, repair and replace electrical systems and options, and their related components.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with electrical systems and options.	**10%**
2. Identify hazards and describe safe work practices pertaining to electrical systems and options. a. Personal b. Shop/facility c. Vehicle d. Environmental	**10%**
3. Identify tools and equipment relating to electrical systems and options, and describe their applications and procedures for use.	**10%**
4. Review types of electrical systems and their components and operation. a. Semiconductors • Diodes • Transistors • Light emitting diodes (LEDs) • Integrated circuits b. Resistors c. Other electrical and electronic components	**5%**
5. Describe types of electrical options, their components and operation. a. Theft deterrent systems b. Audio/video systems (backup cameras, wireless connectivity) c. Navigation systems d. Remote starter systems	**30%**

e. Heated components (seats, steering wheels and defroster grids)
f. Cooled components (seats)
g. Keyless entry system
h. Power components (windows, sunroofs, moonroofs, doors, mirrors, seats and locks)
i. Accessories
j. Other emerging technologies

6. Demonstrate and perform the procedures to diagnose and repair electrical systems and options. 35%

a. Maintenance and inspection
   - Manufacturers' flowcharts and schematics
   - Test system circuitry and components
   - Interpret test results
b. Adjustment procedures
c. Component repair and/or replacement

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Apprenticeship Manitoba

Automotive Service Technician

Unit: C7 Advanced Driver Assistance Systems

Level: Three

Duration: 35 hours

Theory: 21 Hours

Practical: 14 Hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills about advanced driver assistance systems when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers types of advanced driver assistance systems, and their components and operation. The unit also covers the procedures used to adjust, diagnose, repair and replace advanced driver assistance systems, and their related components.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with advanced driver assistance systems (ADAS).	**10%**
2. Identify hazards and describe safe work practices pertaining to ADAS. a. Personal b. Shop/facility c. Vehicle d. Environmental	**10%**
3. Identify tools and equipment relating to ADAS, and describe their applications and procedures for use.	**5%**
4. Describe types of ADAS, their components and operation. a. Blind spot monitoring systems b. Driver alertness detection systems c. Forward collision warning (FCW) systems d. Adaptive cruise control (ACC) systems e. Lane departure warning (LDW) systems f. Lane centering and lane changing assistance systems g. Traffic signage recognition (TSR) systems h. Night vision systems i. Parking assistance and detection systems j. Autonomous driving systems k. Other emerging technologies	**20%**

5. Describe the role of ADAS and its relationship to vehicle systems, their components and operation. **20%**

a. Electrical systems
   - Multiplexing
   - Networking

b. Steering systems
   - Electric steering gears
   - Steering position sensors
   - LDW, lane centering, and lane changing systems

c. Suspension systems
   - Electronic shock absorbers
   - Adaptive air suspension

d. Braking systems
   - ABS
   - Traction Control

6. Demonstrate and perform the procedures to diagnose and repair ADAS. **35%**

a. Maintenance and inspection
   - Manufacturers' flowcharts and schematics
   - Test system circuitry and components (cameras, sensors)
   - Interpret test results

b. Adjustment procedures
   - Component and sensor calibration and re-learn

c. Component repair and/or replacement
   - Verify repair and road test

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Apprenticeship Manitoba

Automotive Service Technician

Unit: C8 Welding

Level: Three

Duration: 14 hours

Theory: 4 Hours

Practical: 10 Hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills about welding when working with today's automotive vehicles and light trucks. Beginning with terminology and safe work practices, the unit covers principles and types of welding for the Automotive Service Technician trade.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with welding. a. Metallurgy b. Oxy-fuel welding, heating, and cutting c. Gas metal arc welding (GMAW) metal inert gas (MIG) welding d. Shielded metal arc welding (SMAW)/Stick/arc welding e. Gas tungsten arc welding (GTAW)/Tungsten inert gas (TIG) welding	**5%**
2. Identify hazards and describe safe work practices pertaining to welding. a. Personal b. Shop/facility c. Vehicle d. Environmental	**5%**
3. Explain principles and types of welding, and describe their applications and procedures for use. a. Fusion welding b. Brazing/soldering c. Heating/cutting d. Inspection, maintenance and storage procedures	**15%**
4. Identify equipment, consumables and accessories, and describe their application and storage requirements. a. Oxy-fuel welding, heating and cutting b. GMAW MIG • Welding unit types • Rod/wire selection • Gas/flux types used • Metal types used	**20%**

5. Demonstrate and perform the following processes using oxy-fuel equipment. 25%

a. Cutting
b. Heating
c. Welding and/or brazing

6. Demonstrate and perform basic types of welds using GMAW MIG equipment. 30%

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