



BAKER COLLEGE
STUDENT LEARNING OUTCOMES

AST 2710A Heating, Ventilation, and Air Conditioning
4 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Demonstrate general A/C system diagnosis and repair techniques.
 - a. Identify and interpret heating and air conditioning problems; determine needed action. (P1)
 - b. Research vehicle service information including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins. (P-1)
 - c. Performance test A/C system; identify problems. (P-1)
 - d. Identify abnormal operating noises in the A/C system; determine needed action. (P-2)
 - e. Identify refrigerant type; select and connect proper gauge set/test equipment; record temperature and pressure readings. (P-1)
 - f. Leak test A/C system; determine needed action. (P-1)
 - g. Inspect condition of refrigerant oil removed from A/C system; determine needed action. (P2)
 - h. Determine recommended oil and oil capacity for system application. (P-1)
 - i. Using a scan tool, observe and record related HVAC data and trouble codes. (P-3)

2. Demonstrate refrigeration system component diagnosis and repair techniques.
 - a. Inspect, remove, and/or replace A/C compressor drive belts, pulleys, tensioners and visually inspect A/C components for signs of leaks; determine needed action. (P-1)
 - b. Inspect, test, service and/or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap; adjust as needed. (P-2)
 - c. Remove, inspect, reinstall, and/or replace A/C compressor and mountings; determine recommended oil type and quantity. (P-2)
 - d. Identify hybrid vehicle A/C system electrical circuits and service/safety precautions. (P-2)
 - e. Determine need for an additional A/C system filter; perform needed action. (P-3)

- f. Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform needed action. (P-2)
 - g. Inspect for proper A/C condenser airflow; determine needed action. (P-1)
 - h. Remove, inspect, and replace receiver/drier or accumulator/drier; determine recommended oil type and quantity. (P-2)
 - i. Remove, inspect, and install expansion valve or orifice (expansion) tube. (P-1)
 - j. Inspect evaporator housing water drain; perform needed action. (P-1)
 - k. Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and/or control module) to interrupt system operation; determine needed action. (P-2)
 - l. Determine procedure to remove and reinstall evaporator; determine required oil type and quantity. (P-2)
 - m. Remove, inspect, reinstall, and/or replace condenser; determine required oil type and quantity. (P-2)
3. Demonstrate heating, ventilation and engine cooling systems diagnosis and repair techniques.
- a. Inspect engine cooling and heater systems hoses and pipes; perform needed action. (P-1)
 - b. Inspect and test heater control valve(s); perform needed action. (P-2)
 - c. Diagnose temperature control problems in the HVAC system; determine needed action. (P-2)
 - d. Determine procedure to remove, inspect, reinstall, and/or replace heater core. (P-2)
4. Demonstrate operating systems and related controls diagnosis and repair techniques.
- a. Inspect and test HVAC system blower motors, resistors, switches, relays, wiring, and protection devices; determine needed action. (P-1)
 - b. Diagnose A/C compressor clutch control systems; determine needed action. (P-2)
 - c. Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine needed action. (P-2)
 - d. Inspect and test HVAC system control panel assembly; determine needed action. (P-3)
 - e. Inspect and test HVAC system control cables, motors, and linkages; perform needed action. (P-3)
 - f. Inspect HVAC system ducts, doors, hoses, cabin filters, and outlets; perform needed action. (P-1)
 - g. Identify the source of HVAC system odors. (P-2)
 - h. Check operation of automatic or semi-automatic HVAC control systems; determine needed action. (P-2)

5. Demonstrate refrigerant recovery, recycling, and handling procedures.
 - a. Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards. (P-1)
 - b. Identify A/C system refrigerant; test for sealants; recover, evacuate, and charge A/C system; add refrigerant oil as required. (P-1)
 - c. Recycle, label, and store refrigerant. (P-1)

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

These SLOs are not approved for experiential credit.

Effective: Summer 2018