

# Dakota County Technical College

## ASEP 1105: Heating And Air Conditioning

### A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 1

Lab Hours/Week: 2

OJT Hours/Week: \*.\*

Prerequisites: None

Corequisites: None

MnTC Goals: None

This course is a study of the theory, operation, maintenance, diagnosis, and repair of General Motors heating and air conditioning systems. The basic refrigerant cycle will be addressed as well as system components and controls used by GM. Emphasis will be on GM CCOT and VDOT systems. Included will be an examination of manual controls used in conjunction with GM heating and air conditioning systems. Reclaiming and recycling of R-12 and R-134A and retrofitting will also be covered in this unit.

Prerequisites: ASEP1101

**B. COURSE EFFECTIVE DATES:** 03/16/1998 - Present

**C. OUTLINE OF MAJOR CONTENT AREAS**

**D. LEARNING OUTCOMES (General)**

1. Comply with personal and environmental safety practices
2. Identify and interpret heating and air conditioning concern; determine necessary action
3. Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions, and technical service bulletins
4. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals)
5. Performance test A/C system; diagnose A/C system malfunctions using principles of refrigeration
6. Diagnose abnormal operating noises in the A/C system; determine necessary action
7. Identify refrigerant type; conduct a performance test of the A/C system; determine necessary action
8. Leak test A/C system; determine necessary action
9. Inspect the condition of discharged oil; determine necessary action
10. Determine recommended oil for system application
11. Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action
12. Inspect A/C compressor drive belts; determine necessary action
13. Inspect A/C compressor drive belts;
14. Inspect, test, and/or replace A/C compressor clutch components and/or assembly
15. Remove and reinstall A/C compressor and mountings; measure oil quantity; determine necessary action
16. Determine need for an additional A/C system filter; perform necessary action
17. Remove and inspect A/C system mufflers, hoses, lines, fittings, o-rings, seals, and service valves; perform necessary action
18. Inspect A/C condenser for airflow restrictions; perform necessary action
19. Remove and reinstall receiver/drier or accumulator/drier; measure oil quantity; determine necessary action
20. Remove and install expansion valve or orifice (expansion) tube
21. Inspect evaporator housing water drain; perform necessary action
22. Remove and reinstall evaporator; measure oil quantity; determine necessary action
23. Remove and reinstall condenser; measure oil quantity; determine necessary action
24. Diagnose temperature control problems in the heater/ventilation system; determine necessary action
25. Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action
26. Inspect engine cooling and heater system hoses and belts; perform necessary action
27. Inspect, test, and replace thermostat and housing
28. Determine coolant condition and coolant type for vehicle application; drain and recover coolant
29. Flush system; refill system with recommended coolant; bleed system
30. Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action
31. Inspect and test electric cooling fan, fan control system and circuits; determine necessary action
32. Inspect and test heater control valve(s); perform necessary action
33. Remove and reinstall heater core
34. Diagnose malfunctions in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action
35. Inspect and test A/C heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action
36. Test and diagnose A/C compressor clutch control systems; determine necessary action
37. Diagnose malfunctions in the vacuum and mechanical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action

38. Inspect and test A/C heater control panel assembly; determine necessary action
39. Inspect and test A/C heater control cables and linkages; perform necessary action
40. Inspect A/C heater ducts, doors, hoses, cabin filters and outlets; perform necessary action
41. Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action
42. Perform correct use and maintenance of refrigerant handling equipment
43. Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant
44. Recycle refrigerant
45. Label and store refrigerant
46. Test recycled refrigerant for non-condensable gases
47. Evacuate and charge A/C system

**E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

None

**F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

**G. SPECIAL INFORMATION**

None noted