

# Dakota County Technical College

## ASEP 2111: Engines

### 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 covers the operation, diagnosis, removal, assembly, reconditioning, and installation of General Motors gas engines. Oil and coolant leak diagnosis and repair will also be covered. Prerequisites: ASE1102

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

**C. OUTLINE OF MAJOR CONTENT AREAS**

## **D. LEARNING OUTCOMES (General)**

1. Adjust valves (mechanical or hydraulic lifters)
2. Assemble the engine using gaskets, seals, and formed-in-place (tube applied) sealants, thread sealers, etc. according to manufacturer's specifications
3. Check valve face-to-seat contact and valve seat concentricity (run out); determine necessary action
4. Comply with personal and environmental safety practices
5. Diagnose engine noises and vibrations; determine necessary action
6. Diagnose the cause of excessive oil consumption, unusual engine exhaust color, order, and sound; determine necessary action
7. Disassemble engine block; clean and prepare components for inspection and reassembly
8. Establish camshaft(s) timing and cam sensor indexing according to manufacturer's specifications and procedures
9. Identify and interpret engine concern; determine necessary action
10. Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition
11. Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action
12. Inspect and measure cylinder walls for damage, wear, and ridges; determine necessary action
13. Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selection of bearings)
14. Inspect and measure pistons; determine necessary action
15. Inspect and replace engine cooling and heater system hoses
16. Inspect and replace timing belts (chains), overhead camdrive sprockets, and tensioners; check belt/chain tension; adjust as necessary
17. Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time
18. Inspect auxiliary oil coolers; determine necessary action
19. Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action
20. Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear); determine necessary action
21. Inspect camshaft for run out, journal wear and lobe wear
22. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action
23. Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action
24. Inspect hydraulic or mechanical lifters; determine necessary action
25. Inspect internal and external threads; restore as needed (includes installing thread inserts)
26. Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action
27. Inspect or replace crankshaft vibration damper (harmonic balancer)
28. Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action
29. Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action
30. Inspect valve springs for squareness and free height comparison; determine necessary action
31. Inspect valves and valve seats; determine necessary action
32. Inspect, and test fans (electrical or mechanical), fan clutch, fan shroud
33. Inspect, measure, and install piston rings
34. Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment
35. Inspect, test, and replace oil temperature and pressure switches and sensors

35. Inspect, test, and replace oil temperature and pressure switches and sensors
36. Inspect, test, and replace thermostat and housing
37. Inspect, test, remove, and replace water pump
38. Install cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures
39. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals)
40. Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action
41. Perform cylinder compression tests; determine necessary action
42. Perform cylinder leakage tests; determine necessary action
43. Perform cylinder power balance tests; determine necessary action
44. Perform engine vacuum tests; determine necessary action
45. Perform oil and filter change
46. Perform oil pressure tests; determine necessary action
47. Remove and reinstall engine in a late model front-wheel drive vehicle (OBDI or newer); reconnect all attaching components and restore the vehicle to running condition
48. Remove and reinstall engine in a late model rear-wheel drive vehicle (OBDI or newer); reconnect all attaching components and restore the vehicle to running condition
49. Remove and replace piston pin
50. Remove and replace radiator
51. Remove cylinder head(s); visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition
52. Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks, and valve grooves; determine necessary action
53. Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins
54. Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required
55. inspect crankshaft for end play, straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure journal wear; check crankshaft sensor reluctor ring (where applicable); determine necessary action

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

None

#### **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

#### **G. SPECIAL INFORMATION**

None noted