

# EASTERN ARIZONA COLLEGE

## Internal Combustion Engines

Course Design  
2016-2017

### Course Information

**Division** Industrial Technology Education  
**Course Number** AUT 106  
**Title** Internal Combustion Engines  
**Credits** 4  
**Developed by** Brian Coppola  
**Lecture/Lab Ratio** 2 Lecture/4 Lab

### Transfer Status

ASU	NAU	UA
OMT Dept Elective	CTE Departmental Elective	Non Transferable

**Activity Course** No  
**CIP Code** 47.0604  
**Assessment Mode** Pre/Post Test (50 Questions/100 Points)  
**Semester Taught** Upon Request  
**GE Category** None  
**Separate Lab** No  
**Awareness Course** No  
**Intensive Writing Course** No

### Prerequisites

None

### Educational Value

This course is designed to reinforce and apply information, processes, and ideas gained in other courses. The major intent of this course is to enhance the student's ability to work with and diagnose the automotive internal combustion engine.

### Description

This course provides theory, diagnosis, and service common to all automotive internal combustion engines. Course includes engine rebuilding and performance testing. This course prepares students for the ASE certification test on engine repair.

### Supplies

Safety glasses

## **Competencies and Performance Standards**

### **1. Apply proper safety procedures and processes.**

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Acquaint self with shop environment and hazards.
- b. Acquaint self with emergency procedures and policy.
- c. Accept responsibility for personal well-being and practice/follow safety guidelines.
- d. Acquaint self with material safety data sheets and chemicals used in the shop environment.

#### **Performance Standards**

*You will demonstrate your competence:*

- o when learner completes safety assignments and written exam at a satisfactory level

*Your performance will be successful when:*

- o when learner observes and practices safety procedures

### **2. Diagnose mechanical condition on internal combustion engine. (NATEF I A)**

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Determine mechanical condition of internal combustion engine assembly and its internal components.
- b. Interpret engine performance diagnostic test results.
- c. Determine the causes of oil leaks and unusual noises on an internal combustion engine.
- d. Determine the causes of unusual orders and exhaust color coming from an internal combustion engine.

#### **Performance Standards**

*You will demonstrate your competence:*

- o when learner completes NATEF aligned assignment and job sheets listed in the related learning plan (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- o when learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level)

*Your performance will be successful when:*

- o learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- o learner actively participates in the NATEF task requirements listed in the related learning plan
- o learner attends required class and lab sessions and shows up on time

### **3. Perform repair procedures on engine block components/assembly.(NATEF I C)**

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Rebuild short block engine assembly according to manufacture requirements.
- b. Identify worn and/or out-of-specification engine block assembly and components.

**Performance Standards**

*You will demonstrate your competence:*

- when learner completes NATEF aligned assignment and job sheets listed in the related learning plan (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- when learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level)

*Your performance will be successful when:*

- learner is productive, works safely and in a professional manner while working on NATEF task requirements listed in related learning plan
- learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- learner actively participates in the NATEF task requirements listed in the related learning plan
- learner attends required class and lab sessions and shows up on time

**4. Perform repair procedures on cylinder head and valve train components/assembly. (NATEF I B)**

**Learning objectives**

*What you will learn as you master the competency:*

- a. Rebuild cylinder head according to manufacture requirements.
- b. Identify worn and/or out-of-specification cylinder head assembly and components.

**Performance Standards**

*You will demonstrate your competence:*

- when learner completes NATEF aligned assignment and job sheets listed in the related learning plan (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- when learner performs the priority NATEF tasks listed in the related learning plan (The tasks must be completed with limited supervision - entry level)

*Your performance will be successful when:*

- learner is productive, works safely and in a professional manner while working on NATEF task requirements listed in related learning plan
- learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- learner actively participates in the NATEF task requirements listed in the related learning plan
- learner attends required class and lab sessions and shows up on time

**5. Perform engine cooling system service. (NATEF I D)**

**Learning objectives**

*What you will learn as you master the competency:*

- a. Determine PM service schedule related to the vehicle's cooling system.
- b. Demonstrate cooling system service as recommended by vehicle manufacturer.

### **Performance Standards**

*You will demonstrate your competence:*

- when learner completes NATEF aligned assignment and job sheets listed in the related learning plan (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- when learner performs the priority NATEF tasks listed in the related learning plan (The tasks must be completed with limited supervision - entry level)

*Your performance will be successful when:*

- learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan
- learner provides acceptable oral and/or written responses to questions and/or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- learner actively participates in the NATEF task requirements listed in the related learning plan
- learner attends required class and lab sessions and shows up on time

## **6. Perform engine lubrication/preventative maintenance service. (NATEF I D)**

### **Learning objectives**

*What you will learn as you master the competency:*

- a. Determine service schedule related to vehicle's lubrication intervals.
- b. Demonstrate lubrication system service as recommended by vehicle's manufacturer.

### **Performance Standards**

*You will demonstrate your competence:*

- when learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- when learner performs the priority NATEF tasks listed in the related learning plan (The tasks must be completed with limited supervision - entry level)

*Your performance will be successful when:*

- learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan
- learner provides acceptable oral and / or written responses to questions and / or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- learner actively participates in the NATEF task requirements listed in the related learning plan
- learner attends required class and lab sessions and shows up on time

## **7. Diagnose engine cooling system to determine needed repair. (NATEF I D)**

### **Learning objectives**

*What you will learn as you master the competency:*

- a. Determine repairs needed on engine's cooling system and its components.

### **Performance Standards**

*You will demonstrate your competence:*

- when learner completes NATEF aligned assignment and job sheets listed in the related learning plan. (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- when learner performs the priority NATEF tasks listed in the related learning plan. (The tasks must be completed with limited supervision - entry level)

*Your performance will be successful when:*

- learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan
- learner provides acceptable oral and / or written responses to questions and / or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- learner actively participates in the NATEF task requirements listed in the related learning plan
- learner attends required class and lab sessions and shows up on time

## **8. Diagnose engine lubrication system to determine needed repair. (NATEF I D)**

### **Learning objectives**

*What you will learn as you master the competency:*

- a. Determine needed repairs on engine's lubrication system and its components.

### **Performance Standards**

*You will demonstrate your competence:*

- when learner completes NATEF aligned assignment and job sheets listed in the related learning plan (The assignment and job sheets must be completed at a satisfactory level to the instructor)
- when learner performs the priority NATEF tasks listed in the related learning plan (The tasks must be completed with limited supervision - entry level)

*Your performance will be successful when:*

- learner is productive, works safely, and in a professional manner while working on NATEF task requirements listed in related learning plan
- learner provides acceptable oral and / or written responses to questions and / or situations asked by the instructor, while working on the NATEF task requirements listed in related learning plan
- learner actively participates in the NATEF task requirements listed in the related learning plan
- learner attends required class and lab sessions and shows up on time

### **Types of Instruction**

Classroom presentation

Lab

Simulated or actual work experience

Computer-based instruction

Group activities/cooperative learning

## **Grading Information**

### **Grading Rationale**

Grading Weights

Lab = 45%

Class (Includes Test and Assignments) = 45%

Final Exam (Post Test is the final) = 10%

Note: The Pre/Post test has a total of 50 questions which are worth "2" points each. Total possible on the AUT 106 Pre/Post test is 100 points. However, the district requires the instructor to record number of questions correct as the raw score with a maximum question = 50.

### Grading Methods

Class score calculation -

Quizzes, assignments and job sheet points shall be added and carry a weight equal to one test score.

All exam shall have equal weight (test scores averaged) and used in class score calculations. Except the final (post-test) which will be worth at least 10% of the overall final grade calculation.

Lab score calculation -

Instructor should evaluate each student's work habits using lab time card. Each student should be evaluated on productivity & progress on task requirements, working in a professional manner, clean-up and safe work habits.

Instructor is also required to evaluate each student's skill level in achieving the NATEF task requirements outlined in the various learning plans.

Instructors are encouraged to reward students for showing up on time and attending each class & lab session.

This can be done by requiring students to make arrangement with the instructor to make-up any lost time prior to missed day. All students need to notify the instructor of sick days through voice mail, etc. on the day of sickness. Instructors should not allow for any work to be turned in late or any test made up without some type of deduction for late assignments / test. Suggested deduction 50% of original score.

### **Grading Scale**

A	90%-100%
B	80%-89%
C	70%-79%
D	60%-69%
F	Below 60%

Pass/Fail      A non-major student may choose to have a grade of P or F rather than a letter grade. A grade of P will require that the student receive a percentage grade of at least 70%. A grade less than this will result in a grade of F.

## **Learning Plan**

### **Safety**

#### **Overview**

In this learning plan the student will develop the knowledge needed to work safely in a shop environment. You will learn safety procedures, the location of safety equipment, and the safety features of various shop equipment. The instruction will cover general shop safety processes, fire safety, battery safety, lifting procedures, and health related hazards.

#### **1. Apply proper safety procedures and processes.**

#### **Learning Activities**

- \_\_\_\_ 1. Complete a worksheet/assignment sheet.
  
- \_\_\_\_ 2. Collect and present to the class for discussion a newspaper article that relates to industrial accidents / safety in the work place.
  
- \_\_\_\_ 3. Listen and observe a lecture covering safety procedures and practices - review a safety and hazards video.
  
- \_\_\_\_ 4. Operate hoist, floor jack (jack stands) and any equipment needed during assigned lab activities.
  
- \_\_\_\_ 5. Identify location of safety equipment, first aid kit, phone, fire blanket, fire extinguishers, exits, light switches, and vents.

#### **Assessment Activities**

- \_\_\_\_ 1. Participate in safety discussion.
- \_\_\_\_ 2. Complete activities in lesson.
- \_\_\_\_ 3. Complete written safety test.

## Learning Plan

### Engine diagnosis

#### Overview

In this learning plan the student will develop an understanding of how to diagnose the mechanical condition of an engine. Additionally, the learner will practice specific diagnostic procedures that can isolate engine mechanical problems.

## 2. Diagnose mechanical condition on internal combustion engine. (NATEF I A)

#### Learning Activities

- \_\_\_\_1. Verify customer concern / complaint to determined necessary repair. (P1, NATEF IA1)
  
- \_\_\_\_2. Inspect engine assembly for fuel, oil, coolant, and other leaks to determine necessary action. (P2 NATEF IA2)
  
- \_\_\_\_3. Listen / Inspect engine noises and vibrations to determine necessary action. (P3 NATEF IA3)
  
- \_\_\_\_4. Identify the cause of excessive oil consumption, unusual engine exhaust color, odor, and sounds to determine necessary action. (P3 NATEF IA4)
  
- \_\_\_\_5. Perform engine vacuum tests. (P1 NATEF IA5)
  
- \_\_\_\_6. Perform cylinder power balance tests. (P1 NATEF IA6)
  
- \_\_\_\_7. Perform cylinder compression tests. (P1 NATEF IA7)
  
- \_\_\_\_8. Perform cylinder leakage tests. (P1 NATEF IA8)

#### Assessment Activities

- \_\_\_\_1. Access and use repair information / manuals during the diagnostic process.
- \_\_\_\_2. Participate in various classroom discussions related to appropriate reading assignment / engine diagnosis.



- \_\_\_\_\_3. Complete classroom assignments sheet related to engine diagnosis.
- \_\_\_\_\_4. Complete lab activities / Job sheets - JS1-L1-UII & JS2-L1-UII.
- \_\_\_\_\_5. Preview CBI or A/V material related to engine diagnosis.
- \_\_\_\_\_6. Complete written test covering engine theory and diagnostic process.

## Learning Plan

### Short block repair

#### Overview

In this learning plan the student will develop the skills needed to properly rebuild a short block engine assembly. The rebuild process will include disassembly, clean, inspect, repair, or replace components and reassembly.

### 3. Perform repair procedures on engine block components/assembly. (NATEF I C)

#### Learning Activities

- \_\_\_\_1. Remove engine (front-wheel drive and/or rear-wheel drive) to prepare for disassembly. (P3 NATEF IA9)
  
- \_\_\_\_2. Reinstall engine (front-wheel drive and/or rear-wheel drive). (P3 NATEF IA10)
  
- \_\_\_\_3. Inspect and replace pans, covers, gaskets, and seals. (P2 NATEF IC1)
  
- \_\_\_\_4. Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage to determine necessary action. (P2 NATEF IC2)
  
- \_\_\_\_5. Inspect internal and external threads. Restore as needed (includes installing thread inserts). (P1 NATEF IC3)
  
- \_\_\_\_6. Remove cylinder wall ridges. (P3 NATEF IC4)
  
- \_\_\_\_7. Inspect and measure cylinder walls for damage and wear to determine necessary action. (P2 NATEF IC5)
  
- \_\_\_\_8. Deglaze and clean cylinder walls (P1 NATEF IC6)
  
- \_\_\_\_9. Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment to determine necessary action. (P3 NATEF IC7)

- \_\_\_\_ 10. Inspect crankshaft for surface cracks and journal damage. Check oil passage condition. Measure journal wear to determine necessary action. (P3 NATEF IC8)
  
- \_\_\_\_ 11. Inspect and measure main and connecting rod bearings for damage, clearance, and end play to determine necessary action (includes the proper selection of bearings). (P2 NATEF IC9)
  
- \_\_\_\_ 12. Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems. Inspect rod alignment and bearing bore condition. (P3 NATEF IC10)
  
- \_\_\_\_ 13. Inspect, measure, and service pistons and pins to determine necessary action. (P2 NATEF IC 11)
  
- \_\_\_\_ 14. Inspect, measure, and install piston rings. (P2 NATEF IC12)
  
- \_\_\_\_ 15. Inspect, repair, or replace crankshaft vibration damper (harmonic balancer). (P3 NATEF IC13)
  
- \_\_\_\_ 16. Reassemble engine components using correct gaskets and sealants. (P2 NATEF IC14)
  
- \_\_\_\_ 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. (P3 NATEF IC15)
  
- \_\_\_\_ 18. Prime engine lubrication system. (P1 NATEF IC16)

**Assessment Activities**

- \_\_\_\_ 1. Access and use repair information systems / manuals during the repair process.
- \_\_\_\_ 2. Participate in various classroom discussions related to engine overhaul procedures.
- \_\_\_\_ 3. Complete classroom assignment sheets related to the overhaul process - AS1-L1-UII or AS2-L1-UIII, AS1-L1-UV, AS1-L1-UVII, AS2-L1-UVII.
- \_\_\_\_ 4. Complete written description on engine removal procedures.
- \_\_\_\_ 5. Complete written description on engine reinstallation procedures.

- \_\_\_\_\_6. Complete lab activities / Job sheets - JS1-L1-UIII or JS2-L1-UIII, JS1-L1-UV, JS2-L1-UV, JS3-L1-UV, JS4-L1-UV, JS--L1-UV, JS6-L1-UV, JS1-L2-UV, JS1-L1-UVII, JS2-L1-UVII, JS3-L1-UVII or JS4-L1-UVII and JS5-L1-UVII.
- \_\_\_\_\_7. Preview A/V material covering engine overhaul procedures.
- \_\_\_\_\_8. Complete written test covering engine overhaul, engine removal & reinstallation procedures, and preparing engine for starting.

## Learning Plan

### Cylinder head rebuilding

#### Overview

In this learning plan the student will develop the skills needed to properly recondition a cylinder head.

#### 4. Perform repair procedures on cylinder head and valve train components/assembly. (NATEF I B)

#### Learning Activities

- \_\_\_\_ 1. Remove cylinder head(s). Visually inspect cylinder head(s) for cracks. Check gasket surface areas for warpage and leakage. Check passage condition. (P2 NATEF IB1)
  
- \_\_\_\_ 2. Install cylinder heads and gaskets. Tighten according to manufacturer's specifications and procedures. (P2 NATEF IB2)
  
- \_\_\_\_ 3. Inspect and test valve springs for squareness, pressure, and free height comparison and replace as needed. (P3 NATEF IB3)
  
- \_\_\_\_ 4. Inspect valve spring retainers, locks, and valve grooves. (P2 NATEF IB4)
  
- \_\_\_\_ 5. Replace valve stem seals. (P3 NATEF IB5)
  
- \_\_\_\_ 6. Inspect valve guides for wear. Check valve guide height and stem-to-guide clearance and recondition or replace as needed. (P3 NATEF IB6)
  
- \_\_\_\_ 7. Resurface valves. (P2 NATEF IB7)
  
- \_\_\_\_ 8. Resurface valve seats. (P2 NATEF IB8)
  
- \_\_\_\_ 9. Check valve face-to-seat contact and valve seat concentricity (runout). (P3 NATEF IB9)

- \_\_\_\_ 10. Check valve spring assembled height and valve stem height. (P2 NATEF IB10)
  
- \_\_\_\_ 11. Inspect pushrods, rocker arms, rocker arm pivots, and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices). (P2 NATEF IB11)
  
- \_\_\_\_ 12. Inspect hydraulic or mechanical lifters. Replace as needed. (P2 NATEF IB12)
  
- \_\_\_\_ 13. Adjust valves (mechanical or hydraulic lifters). (P1 NATEF IB13)
  
- \_\_\_\_ 14. Inspect camshaft drives (including gear wear and backlash, sprocket, and chain wear). Replace as needed. (P2 NATEF IB14)
  
- \_\_\_\_ 15. Inspect and replace timing belt(s), overhead cam drive sprockets, and tensioners. Check belt tension. Adjust as necessary. (P1 NATEF IB15)
  
- \_\_\_\_ 16. Inspect camshaft for runout, journal wear, and lobe wear. (P3 NATEF IB16)
  
- \_\_\_\_ 17. Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment. Determine necessary action. (P3 NATEF IB17)
  
- \_\_\_\_ 18. Verify camshaft(s) timing according to manufacturer's specifications and procedures. (P1 NATEF IB18)

**Assessment Activities**

- \_\_\_\_ 1. Access and use repair information / manuals during the cylinder head reconditioning process.
- \_\_\_\_ 2. Participate in various classroom discussions related to appropriate reading assignment / cylinder reconditioning.
- \_\_\_\_ 3. Complete classroom assignment sheets related to cylinder head reconditioning and valve train adjustments / service - AS1-L3-UIV, AS2-L3-UIV and AS3-L3-UVI.
- \_\_\_\_ 4. Complete lab activities / Job sheets related to cylinder head reconditioning & valve train repair & service - JS1-L2-UIV, JS2-L2-UIV, JS3-L2-UIV, JS1-L3-UIV, JS2-L3-UIV, JS3-L3-UIV, JS4-L3-UIV, JS5-L3-UIV.
- \_\_\_\_ 5. Preview A/V material covering cylinder head reconditioning.
- \_\_\_\_ 6. Take a field trip to the local automotive machine shop and observe cylinder recondition processes & engine rebore procedures.
- \_\_\_\_ 7. Complete written test covering engine valve train systems & repair and cylinder head

reconditioning.

## Learning Plan

### Servicing the cooling system

#### Overview

In this learning plan the student will develop the skills need to properly diagnose and perform needed repairs to an engine's cooling system.

#### 5. Perform engine cooling system service. (NATEF I D)

#### Learning Activities

- \_\_\_\_1. Test coolant. Drain and recover coolant. Flush and refill cooling system with recommended coolant. Bleed air as required. (P2 NATEF ID7)
  
- \_\_\_\_2. Inspect, test, remove, and replace water pump. (P2 NATEF ID8)
  
- \_\_\_\_3. Remove and replace radiator. (P2 NATEF ID9)

#### Assessment Activities

- \_\_\_\_1. Access and use repair information / manuals during cooling systems diagnostic process.
- \_\_\_\_2. Participate in various classroom discussions related to cooling system diagnosis, PM service, and repair.
- \_\_\_\_3. Complete classroom assignment sheets related to the diagnosis of an engine's cooling system - AS1-L2-UVIII, AS2-L2-UVIII, AS3-L2-UVIII, AS4-L2\_UVIII, and AS5-L2-UVIII.
- \_\_\_\_4. Complete lab activities / Job sheets related to the engine's cooling system - JS1-L2-UVIII, JS2-L2-UVII, JS3-L2-UVIII, and JS4-L2-UVIII.
- \_\_\_\_5. Preview film strip and or Computer-based instruction featuring cooling system components, operation, repair, & service.
- \_\_\_\_6. Complete written test over the engine's cooling system.



## **Learning Plan**

### **Engine lubrication service and repair**

#### ***Overview***

In this learning plan the student will develop the skills needed to properly perform PM service, ID problems and repair the engine's lubricating system.

#### **6. Perform engine lubrication/preventative maintenance service. (NATEF I D)**

#### ***Learning Activities***

- \_\_\_\_\_1. Perform oil and filter change (includes manufacturer's recommended scheduled service related items-list per mileage). (P1 NATEF ID13)

#### ***Assessment Activities***

- \_\_\_\_\_1. Complete performance assessment activates listed in learning plan #\* 8 - Lubrication system repair.
- \_\_\_\_\_2. Complete the written test listed in learning plan #8.

## **Learning Plan**

### **Cooling system diagnosis and repair**

#### **Overview**

In this learning plan the student will develop the skills needed to properly service and repair and engine's cooling system.

#### **7. Diagnose engine cooling system to determine needed repair. (NATEF I D)**

#### **Learning Activities**

- \_\_\_\_1. Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature) to determine necessary action. (P1 NATEF ID3)
  
- \_\_\_\_2. Inspect, replace, and adjust drive belts, tensioners, and pulleys. (P1 NATEF ID4)
  
- \_\_\_\_3. Inspect and replace engine cooling and heater system hoses. (P2 NATEF ID5)
  
- \_\_\_\_4. Inspect, test, and replace thermostat and housing. (P2 NATEF ID6)
  
- \_\_\_\_5. Inspect, and test fans (electrical or mechanical), fan clutch, fan shroud, and air dams. (P2 NATEF ID10)

#### **Assessment Activities**

- \_\_\_\_1. Complete the performance assessment activities listed in learning plan # 5.
- \_\_\_\_2. Complete the test listed in learning plan #5.

## Learning Plan

### Engine lubrication system diagnosis

#### Overview

In the learning plan the student will develop the skills needed to properly diagnose an engine's lubrication system and repair as needed.

#### 8. Diagnose engine lubrication system to determine needed repair. (NATEF I D)

#### Learning Activities

- \_\_\_\_ 1. Perform oil pressure tests to determine necessary action. (P1 NATEF ID1)
  
- \_\_\_\_ 2. Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive to perform necessary action. (P3 NATEF ID2)
  
- \_\_\_\_ 3. Inspect auxiliary oil coolers. Replace as needed. (P3 NATEF ID11)
  
- \_\_\_\_ 4. Inspect, test, and replace oil temperature and pressure switches and sensors. (P2 NATEF ID12)

#### Assessment Activities

- \_\_\_\_ 1. Access and use repair information / manuals while diagnosing the engine's lubrication system.
- \_\_\_\_ 2. Participate in various classroom discussions related to diagnosis, PM service, and repair of an engine's lubricating system.
- \_\_\_\_ 3. Complete classroom assignment sheets related to the engine's lubrication system - AS1-L1-UVI, AS2-L1-UVI, AS3-L1-UVI, AS3-L1-UVI, AS4-L1-UVI.
- \_\_\_\_ 4. Complete lab activities / Job sheets related to the engine's lubrication system - JS1-L1-UVI, JS3-L1-UVI and / or JS4-L1-UVI.
- \_\_\_\_ 5. Preview A/V material covering engine oiling system / oil types.
- \_\_\_\_ 6. Complete written test covering engine lubrication system and service of this system.