

# Experiments of Engine Engineering

Syllabus Number

1L205

Basic Major Subjects

Elective Requisites 2  
credit

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## 1. Course Description

We will disassemble the gasoline engine for cars, which is mounted on the test cab and is actually operable, while explaining the composition and operation of parts. Each time the disassembled parts are inspected and measured, the state of the engine is checked. After assembly, make adjustments, diagnoses, and experiments to ensure normal operation. In the second half, a full load test of the diesel engine will be performed.

In this class, you will acquire knowledge, skills and attitudes about DP2 to DP5.

## 2. Course Objectives

Students aim to understand, acquire and practice the following:

(1) Basic structure, operating principle, and names of each part of the reciprocating engine.

(2) Knowledge on disassembly / assembly / adjustment and experimental methods, engine power and fuel efficiency

## 3. Grading Policy

The final examination (50%) and the assignment / experiment report (50%) will be used, and the class attitude will be evaluated by the deduction method. The class attitude is to protect the "knowledge of practical training and experimental work" distributed on the first day of class.

During the class, you will give exercises one by one and explain the answers. In addition, we will give feedback on the whole in the last class.

The assignment / experiment report is written on A4 paper vertically using a ballpoint pen, and the contents and assignments are summarized for each training / experiment once for all training / experiments. Please submit by the test date.

## 4. Textbook and Reference

### Textbook

Japan College of Automobile and Maintenance Colleges Japan Automobile College / Maintenance College Association Textbook Series No.7 Automobile Maintenance Tools / Equipment Japan College of Automobile and Maintenance Colleges

Supervised by the Ministry of Land, Infrastructure, Transport and Tourism Auto mechanic training course textbook Third grade gasoline engine Japan Automobile Development Association

Supervised by the Ministry of Land, Infrastructure, Transport and Tourism Auto mechanic training course textbook II Class 2 gasoline car Japan Automobile Development Association

Supervised by the Ministry of Land, Infrastructure, Transport and Tourism Auto mechanic training course textbook-Second grade diesel engine Japan Automobile Development Association

### Reference

Teruo Sai Introduction to internal combustion engine engineering Ohmsha ISBN978-4-274-22082-1

Teaching materials: 1300cc water-cooled 4-cycle inline 4-cylinder gasoline engine, various special tools required for disassembly and assembly, various measuring instruments

## 5. Requirements(Assignments)

As a preparatory lesson, check the meanings of proper nouns and relationships shown in the lesson contents, and collectively (about 1.5 hours) start the lesson. In particular, it is desirable to understand part names and functions to some extent. After the class, please review the contents of the lesson for about 1.5 hours to deepen your understanding.

Then, make a report of the contents of practical training and experiment for every class.

## 6. Note

All training and experiments require attendance. Strictly check for late / absent / early leaving.

Please prepare report papers and notebooks by yourself. Please wear the uniforms, hats, and safety shoes purchased in advance for the training.

It is desirable that the engine structure theory, which is a lecture related to the engine engineering experiment, has been completed.

## 7. Schedule

- [1] Guidance, outline of engine, review of engine engineering, and etc.  
Preparatory training: Read pages 7 to 17 of the textbook Class 2 gasoline engine and understand the range of practical training  
Review: To understand the contents of the practice range again based on the teaching materials
- [2] Test run of the engine and confirmation and diagnosis of the engine condition using a diagnostic device. Separation of fuel / cooling system, removal of electrical equipment, removal of converter housing, torque converter, installation on engine stand  
Preparatory training: Reading the textbook, Class 2 Gasoline Car Engine, pages 65-135, and understanding the range of practical training  
Review: To understand the contents of the practice range again based on the teaching materials
- [3] Removal of accessory parts. Removing the timing chain  
Preparatory training: Read the relevant section on pages 19 to 42 of the textbook second-class gasoline engine and understand the scope of the practical training  
Review: To understand the contents of the practice range again based on the teaching materials

- [4] Removal of cylinder head, camshaft, intake and exhaust valves  
Preparatory training: Read the relevant section on pages 19 to 42 of the textbook second-class gasoline engine and understand the scope of the practical training  
Review: To understand the contents of the practice range again based on the teaching materials
- [5] Removal of piston and main bearing  
Preparatory training: Read the relevant section on pages 19 to 42 of the textbook second-class gasoline engine and understand the scope of the practical training  
Review: To understand the contents of the practice range again based on the teaching materials
- [6] Cleaning of each part, name confirmation, inspection, measurement, pass / fail judgment  
Preliminary training: Reread the textbooks on pages 7 to 42 of the textbook, Class 2 Gasoline Car Engine, and understand the scope of the training.  
Review: To understand the contents of the practice range again based on the teaching materials
- [7] Main bearing, piston assembly  
Preparatory training: Read the relevant section on pages 19 to 42 of the textbook Class 2 gasoline car engine again to understand the scope of the practical training  
Review: To understand the contents of the practice range again based on the teaching materials
- [8] Cylinder head, intake and exhaust valve assembly  
Preparatory training: Read the relevant section on pages 19 to 42 of the textbook Class 2 gasoline car engine again to understand the scope of the practical training  
Review: To understand the contents of the practice range again based on the teaching materials
- [9] Assembling camshaft and timing chain  
Preparatory training: Read the relevant section on pages 19 to 42 of the textbook Class 2 gasoline car engine again to understand the scope of the practical training  
Review: To understand the contents of the practice range again based on the teaching materials
- [10] Auxiliary parts, torque converter, converter housing assembly, installation on test cab  
Preparatory training: Reread textbooks, class 2 gasoline engine, pages 65 to 135 to understand the scope of the training  
Review: To understand the contents of the practice range again based on the teaching materials
- [11] Installation of electric equipment, assembly of fuel / cooling system, adjustment / diagnosis  
Preliminary training: Read the textbook, Class 2 gasoline engine, pages 47 to 55 again to understand the scope of the training.  
Review: To understand the contents of the practice range again based on the teaching materials
- [12] Test run of the completed engine, and engine idle experiment (using a diagnostic device to measure ignition efficiency and engine speed to measure fuel consumption and engine speed fluctuations and set the optimal engine speed)  
Preparatory training: Reading the textbook second-class gasoline car engine pages 153-162, textbook car maintenance tools and equipment P116-132 and understanding the range of practical training  
Review: To understand the contents of the practice range again based on the teaching materials
- [13] Preparation for engine dynamo test (outline explanation of laboratory equipment and safety precautions)  
Preparatory course: Reading the textbook second grade diesel engine page 7 to 14 and textbook car maintenance tools and equipment pages 155 to 193 to understand the scope of the training  
Review: To understand the contents of the practice range again based on the teaching materials
- [14] Full load test of diesel engine (measures the torque, output, and fuel efficiency of the diesel engine by changing the engine speed at every 500 rpm).  
Preliminary training: Read textbooks for automobile maintenance tools and equipment on pages 155 to 193 again to understand the scope of practical training  
Review: To understand the contents of the practice range again based on the teaching materials
- [15] Testing and Summary