

Semiconductor Engineering

Syllabus Number

1H203

Basic Major Subjects

Elective Requisites 2
credit

FUKUDA Naoki

1. Course Description

The following contents will be learned.

- (1) Structure and electrical characteristics of semiconductor devices, diodes, and transistors.
- (2) Rectifying circuits using semiconductor, analog to digital conversion, and digital to analog conversion.
- (3) Logic element and logic circuits.
- (4) Examples related to automobiles.

In this lesson, knowledge, techniques, and attitudes regarding DP 2 will be acquired.

Lessons are primarily lecture-style, but pair work will be carried out as appropriate according to the context of the each lesson.

2. Course Objectives

Students can apply the basic structure of semiconductor devices, the functions, and usage of devices to concrete examples in automobiles and the like.

3. Grading Policy

Your grade in the class will be decided on the evaluate with 100% of the result of the final exam. An explanation will be given after the end of the final exam.

4. Textbook and Reference

Textbook

YUTA Haruo, HORIBATA Takatoshi Electronic Device Engineering Morikita Publishing Co., Ltd.

FURUKAWA Seijiro, OGITA Yohichiro, ASANO Tanemasa Basic Digital Circuits Morikita Publishing Co., Ltd.

5. Requirements(Assignments)

- (1) As preparations for next lesson, please check the meaning of the proper noun and the contents of the relationship shown in the contents of the lesson, and come to the class. (90 minutes)
- (2) As a review, please solve exercises applied to the items instructed during the lesson, so that you can cope with works in pair as appropriate in the next lesson. (90 minutes)

6. Note

Lesson are planned on the premise that the contents of the Principle of Electricity are understood.

7. Schedule

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| [1] | Type and structure of semiconductors. |
| [2] | Electrical characteristics of semiconductors. |
| [3] | Function of PN junction diode. |
| [4] | Structure of PN junction diode. |
| [5] | Depletion layer of PN junction diode. |
| [6] | Role of semiconductor element in rectifier circuits. |
| [7] | Cases of using semiconductor elements in rectifier circuits and exercises in pairs. |
| [8] | Transistor function. |
| [9] | Structure and operation of the transistor. |
| [10] | Structure of bipolar transistor, field effect transistor, and MOS-FET. |
| [11] | Types of logic element. |
| [12] | Truth table of logic element and exercises in pairs. |
| [13] | Logic circuits, counters, and exercises in pairs. |
| [14] | A / D conversion and D / A conversion. |
| [15] | Summary. |