

MENT106 Fundamentals of Electrical and Electronics Engineering

ECTS Value: 5 ECTS
Self-Study Hours: 20

Contact Hours: 25
Assessment Hours: 80

Overall Objectives and Outcomes

This module encompasses the theory and identification of components in electrical and electronics engineering through basic circuits. Participants will be introduced to the electrical and electronics principles underpinning circuit theory, units and simple DC circuits. They shall then progress to developing a holistic understanding of discrete electronic components such as diodes, and transistors, integrated together to form integrated circuits such as logic gates, the 555 timer and voltage regulators.

By the end of this module, the learner will be able to:

Competences:

- a. Critically assess and develop pedagogical exercises to demonstrate the theoretical frameworks in within DC electric circuits including concepts of charge, current, voltage and power and the use of fundamental laws of electrical circuit analysis.
- b. Develop and evaluate pedagogical exercises to develop basic circuits from discrete components such as transistors, operational amplifiers, 555 timer, logic gates, voltage regulators
- c. Develop and evaluate pedagogical exercises to identify electrical and electronic components from their schematic, pictorial and real-life representation in discrete or in circuits including specifications, classification and labelling including sub-circuits the various electrical sources for electronic circuits such as batteries, power supplies and solar cells and their combined configuration.
- d. Research and develop pedagogical exercise/s to determine the use and function of ancillary components most common switches such as single pole/throw and double pole/throw switches and the ideal IC package types which are available for particular project.

Knowledge:

- a. Understand the concept, design and application of passive components resistance, capacitance and inductance within electrical and electronics circuit with various configurations including typical values and calculations.
- b. Understand the concept, design and application of active components in electronics circuits such as semiconductor devices, amplifiers and logic gates and their datasheets.
- c. Understand the concept, design and application of active components in circuits such as actuators, motors and relays and their characteristics and specifications.
- d. Outline the use and function of ancillary components most common switches such as single pole/throw and double pole/throw switches and the ideal IC package types which are available for particular project.

Skills:

- a. Design and determine various simple DC electrical and electronics circuits, such as potential divider, bridge network, timing circuits, gain/attenuation block, backed up by theoretical framework.
- b. Interpret datasheet and specifications of components for specific functionalities.

Assessment Methods

This module will be assessed through: Design and Practice Assignment.

Suggested Readings

Core Reading List:

1. Bird J., (2017). Electrical and Electronics Principles & Technology. Routledge.
2. Franco Sergio, (1994). Electric Circuit Fundamentals. Oxford University Press.
3. Hughes Edward, (2008). Hughes Electrical and Electronic Technology, Tenth Edition. Pearson PH.
4. Tooley Mike, (2006). Electronic Circuits: Fundamentals and Applications, Third Edition. Routledge

Supplementary Reading List:

1. Boylestad Robert, Nashelsky Louis, (2013). Electronic Devices and Circuit Theory. Pearson Education.
2. Coombs, Jr. Clyde F., (2007). Printed Circuit Handbook Sixth Edition. McGraw Hill Professional.
3. Floyd Thomas L., (2017). Electronic Devices. Pearson.
4. Harowitz Paul, Hill Winfield, (2015). The Art of Electronics. Cambridge University Press.
5. Hughes Edward, (2008). Hughes Electrical and Electronic Technology, Tenth Edition. Pearson PH.
6. M Kaplan Daniel, G White Christopher, (2003). Hands on Electronics: A one semester course for class instruction or self-study. Cambridge University Press.

Websites:

1. Batteryuniversity.com
2. www.pveducation.org
3. <http://www.edisontechcenter.org>