Tárgytematika / Course Description

Electrotechnics

GKNB_AUTA018

Tárgyfelelős neve / Teacher's name: Kovács Gergely
Félév / Semester: 2020/21/1
Beszámolási forma / Assesment: Vizsga
Tárgy heti óraszáma / Teaching hours(week): 2/1/0
Tárgy féléves óraszáma / Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

Aim of lectrure is to give the basic concepts of electrical circuits, electromagnetism and electric machines.

TANTÁRGY TARTALMA / DESCRIPTION

Concepts in electric circuits. Current, voltage, potential. Direct current (DC), alternating current (AC). Bulk model of linear circuit elements: resistor, capacitor, inductor, voltage source, current source, open circuit, short circuit. Power and energy. Elements of electric circuit: node, branch. The graph of electric circuit. Introduction to SciLab/Octave and Spice.

Kirchhoff’s laws. Resistors in series and parallel. Voltage divider rule. Current divider rule. Star-delta transformation. Circuit reduction techniques.

Electric circuit analysis. Superposition. Applying Scilab/Octave and Spice. Measurement issues.

Electric circuit analysis. Nodal analysis, mesh analysis. Applying Scilab/Octave and Spice. Measurement issues.

Thévenin’s theorem, Norton’ theorem. Maximum power transfer theorem. Thévenin and Norton generator determination by measurements.

Sinusoidal current and voltage. AC generation. Representation of sinusoid with phasor. Impedance and admittance of resistor, capacitor, inductor. Single phase network analysis techniques.

Power in AC circuits. The power factor. Filters. Bode diagram. The oscilloscope. Applying Scilab/Octave and Spice in circuit simulation.

Three phase networks. Three phase AC generation. Star connected and delta connected circuits. Three phase power. Circuit analysis techniques.

Introduction to electromagnetism. Electric field. Capacitor. Magnetic field. Inductor. Force in electric and magnetic field.

Magnetic circuit. Ampére’s law, Faraday’s law, Lenz’s law. Material parameters: permittivity, permeability, conductivity, hysteresis. Eddy

currents.

Introduction to transformers. Construction. Circuit model of transformer. Efficiency.

Introduction to AC machines. Induction machines. Construction. Rotating magnetic field. Slip. Circuit model of induction machines. Torque characteristics. Power, losses and efficiency. Single phase machine.

Introduction to AC machines. Synchronous machines. Construction. Circuit model of synchronous machines. Torque.

Introduction to DC machines. Construction. Circuit model of DC machines.

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

Vizsga

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Lecture notes at maxwell.sze.hu/~kuczmann

Free eBooks from bookbon.com: Wasif Naeem, Concepts in Electric Circuits Richard Carter, Electromagnetism for Electronic Engineers Craig Scheckle, Three Phase Electrical Circuit Analysis W. J. R. H. Pooler, Electrical Power