Syllabus

Code/Name	EEE 309 / Electromechanical Energy Conversion i
Type	Required
Credit/ECTS	6/6
Hour per Week	6(4+2)
Level/Year	Undergraduate/3
Semester	Fall
Classroom	A103
Content	Electromagnetic circuits. Electromechanical energy conversion. Single-phase and three-phase transformers. DC motors and generators: principles of operation, speed control. Rotating magnetic fields and three-phase windings..
Prerequisites	None
Textbooks	***Primary*** S.J. Chapman, Electric Machinery Fundamentals, 5th ed., 2011, McGraw Hill ***Supplementary*** A.E. Fitzgerald, et.al.,6th ed., 2013, Electric Machinery, McGraw Hill.
Objectives	• To learn the principles of electromechanical energy conversion • To use these principles to teach how electrical machines work and operation principles • To learn control methods of transformers, dc and machines
Course Outcomes	In this course you will be able to: CO1 Understand the basic concepts of electromechanical energy conversion and use these concepts in solving problems CO2 Understand the operation principles of single and three phase transformers and analyze their performance CO3 Understand the rotating field concept CO4 Understand the operation principles of direct current machines, and to conduct performance analysis of these machines by with the help of equivalent circuits

Weekly Schedule of Topics

W	Topic
1	Definition of electromechanical energy conversion. Review of basic laws and concepts that are necessary in the analysis of magnetic circuits
2	Calculation of self and mutual inductance. Hysteresis phenomenon. Losses in electromagnetic circuits. Permanent magnets.
3	Operation principles and applications of single phase transformers.
4	Ideal and non-ideal transformers. Calculation of equivalent circuit parameters
5	Efficiency and regulation.
6	Three phase transformers
7	Definition and calculation of energy balance for motor and generator operations. Force and torque calculation.
8	Singly and multiply excited systems. Force and torque in permanent magnet systems
9	DC machine fundamentals. Induced voltage and torque equations. Equivalent circuit.
10-11	Separately excited, shunt, series and dc machines

12-13 Compund Machines. Speed and voltage regulation and efficiency

14 Permanent magnet dc machines

Contribution to Program Outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	5	5	1	4	0	2	2	3	1	0	0
CO2	5	5	1	4	0	2	2	3	1	0	0
CO3	5	5	3	4	0	1	1	3	1	0	0
CO4	5	5	3	4	0	1	1	3	1	0	0

* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

Requirements	Basic knowledge of Electromagnetic Field Theory
Course Policy	• Be in the class on time. • English should always be used to communicate with one another. • At least 70% attendance is required, otherwise a grade of **DZ** will be assigned.
Cheating & Plagiarism	• Copying or letting someone copy your work on exams, assignments, or reports is cheating. • Cutting and pasting text, figures and tables from web sources or any other electronic source is plagiarism. • The consequence of academic dishonesty is to receive a grade of **FF** for the course.
Evaluation	Midterm 40% Final Exam 60% Total 100%

Instructor

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Room	209	Office Hours	W 11.30-12.30	F 13.30-14.30

Prepared by Akın Uslu on june 10th, 2024.