

Course Syllabus EEL - 2043

Course Title: Pr. of Electric Machines	Course Code: EEL 2043	Credit Hours:	Pre-Requisites: EEL 2003
Instructor: Dr. Haris M. Khalid		Contact Info: hkhalid@hct.ac.ae , Website: www.harismkhalid.com	
Course Description:	<p>This course focuses on fundamentals of common electrical machines. They are analyzed through industrial applications. Three-phase electrical circuits are analyzed as well as the operation of single-phase and three-phase electrical transformers. The steady state operation of DC machines and stepper motors is analyzed and the performance characteristics of single and three-phase induction motors are discussed. Practical laboratories are utilized to reinforce the concepts.</p>		
Teaching & Learning Methodologies:	<p>In this course, the student is focuses on the construction, operation and testing of three-phase electrical machines, which begins with understanding basic laws governing electrical machines operation. Then, students has to apply the basic law on three-phase machines to enhance his understanding. The following activities have been performed to fulfil the target:</p> <ol style="list-style-type: none"> 1- Analyze three-phase electrical circuits. 2- List the advantages of three – phase systems over single – the same capacity 3- Describe the construction and operation of a simple three-phase AC generator. 4- Calculate voltage and current in star and delta circuits. 5- Determine the currents, voltages and powers in three-phase balanced and unbalanced circuits. Analyse the operation of single and three – phase electrical. 6- Describe the construction of a single – phase and three phase transformer; identify the various types/ interpret the transformer nameplate data. Explain the operational principle of the ideal electrical structure and the main components of thermal power plants. 7- Measure the load characteristics of a single phase transformer (R/ L/ C) 8- Analyze the steady state operation of DC machines and stepper motors. 9- Explain the operational principles of DC motors and generators. 10- Describe the construction and operation of stepper motors. 11- Explain traditional speed control methods for DC motors. 12- Discuss the performance characteristics of single and three phase induction motors. 13- Explain how the pulsating and rotating magnetic fields are produced in distributed windings of the single-phase and three-phase induction motor. 14- Describe the process of torque production in multi-phase machines. 15- Calculate and compare starting torque, full - load torque and maximum torque of the three-phase induction motor. 16- Use a three-phase induction motor circuit model to analyze the torque-speed and current-speed characteristics under various conditions, symmetrically and asymmetrically spacing and for bundled conductors. Measure the torque-speed characteristics of the induction motor at various source frequencies. 17- Describe the physical construction and winding configurations of various single-phase AC motors and determine the associated performance characteristics. 		
Course Resources:	Student: Instructor: P. C. Sen (1996): Principles of Electric Machines and Power Electronics, John Wiley & Sons Inc., ISBN: 9780471022954.		
Course Learning Outcomes		Program Learning Objectives	

CLO 1- Analyze three-phase electrical circuits.

CLO 2- Analyze the operation of single-phase and three-phase electrical transformers.

CLO 3- Analyze the steady state operation of DC machines and stepper motors.

CLO 4- Discuss the performance characteristics of single and three phase induction motors.

Assessment Strategy:

Final Exam: 30 %

Practical Investigations, and Quizzes: 20 %

Midterm I: 25 %

Midterm II: 25 %