

Date:	Examination No.:	Version:2022-2023	Start: 4-9-2023
Module Name - Code	Special Electrical Machines-theoretical and practical -21310		
Module Language:	English		
Responsible:	Assistant Lecturer: Wafeeq shaia hanna and Banaz Safeen Ibrahim		
Lecture (s):			
College:	College of Engineering – Salahaddin University		
Duration:	15 week – 7 semester		
Course outcomes:	<p>1 - theory : The course deals with the fundamental principles of Special Electrical machines. This course is a mandatory requirements for the BSc in Electrical Engineering. It helps the students to analyze and understand Special Electrical machines both in theory and practical . The course aims To analysis Special Electrical machines Types and the control circuits, sequential circuits both synchronous and a synchronous machine , synchronous motor, Torque slip characteristic for different Special Electrical machines , evaluate the effect of changing the Rotor type and its construction ,for example from permanent magnet to Reluctance type or using Wound-armature on the pre design of the machine and its characteristic .Each type of these machines study must classified into basic subtitles , like; equivalent circuit, construction details, torque speed explanations, methods of speed control , and all the necessary derivation of the governing equations . Other rules and methods of analysis are how can we derive or modify the stator or rotor (i.e type of Poles , salient or cylinder, permanent or non- permanent) to build such model to reach the desired speed and output performance .</p> <p>2 Practical laboratory Working on Special Electrical machines both in theory and practical is to provide the practical exposure to the student regarding construction and operation of Synchronous motors and Special motors. Students are allowed to conduct various experiments on the machines for the validation of performance characteristics of those machines. From these lab courses student will gain the skill to select correct machine for a specific application.</p>		
Course Content:	<p>1 - theory To study the: equivalent circuit , torque speed characteristic , speed control, induced voltage equation, output machine performance, for all the following special machines :</p> <p>1- The universal Motor. 2- Compensated Type universal Motor. 3- Reluctance Motor. 4- Switched reluctance motor. 5- stepper- motor. 6-Variable reluctance stepper motor, Hybrid synchronous stepper. 7- brush less DC motor. 8- Two - phase control motor. 9- the Drag Cup Servo machine. 10- Hysteresis motor. 11- Tachometers. 12- Synchronous system. 13- Synchronous Error Detector. 14- Repulsion Motor. Permanent magnet machine. 15-Schrage Motor. 16:Linear Induction Motor, Saturable Reactor</p> <p style="text-align: center;">2-Practically lab working Synchronous machine</p> <p>1. To determine the direct axis reactance X_d and quadrature axis reactance X_q of a Salient pole synchronous machine by Slip Test. 2. Sub transient direct axis and quadrature axis synchronous reactance of synchronous machine. 3. Measurement of: 1-Negative Sequence Reactance (X_2) 2- Zero Sequence Reactance (X_0)</p> <p>4. Determination of quadrature axis synchronous reactance of salient pole synchronous machine by maximum lagging current method. 5. Determination of X_q by reluctance motor method.</p> <p style="text-align: center;">Special Machine: AC Commutator Machines</p> <p>1. Load test of repulsion motor 2. Universal Motor</p>		
Literature:	<p>*Electrical machinery Dr .S.K Sen 2006. *Electrical machinery fundamentals Third Edition, Stephen J Chapman. *Electrical machines, drives, and power systems, Theodore Wildi, sixth edition. *Electrical machinery sixth edition A.E Fitzgerald, Charles Kingsley, jr, Stephen D. Umans. * Alternating current machines .fifth edition.MG say. *Power system (Analysis and Design) j. Duncanglover, Mulukutla S. Sarma third .Edition. *Electric Machinery, fourth Edition SI metric Edition, Fitzgerald/Kingsley/ Umans.</p>		
Type of Teaching:	<p style="text-align: center;">2 h in lectures 2 hrs laboratory working. 1 h Tutorial</p>		
Pre-requisites:			
Frequency:	Yearly in fall semester		
Requirements for credit points:	<p style="text-align: center;">For the award of credit points it is necessary to pass the Mid - Term Exam 50% (Practical and Theoretical contains : 35% Theoretical : 15% Practical</p> <p>Student's attendance is required in Lab.</p>		
Credit point:	6		

Grade Distribution:	the grade is generated Form the Examination results as the following : Theoretical 75% Practical 25% distributed us (35% Mid - Term Exam +quiz + class activity + 40% final Exam) Practical effort 25%(15%Mid - Term Exam +Reports + students attendance in the lab existence + discussion+ 10% final Practical Exam)
Work load:	1 Credit = 30 h workload ,6 Credit * 30 = 180 h (The workload is 180 h per Semester