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Department of Electrical Engineering	
Electrical Machines (63391)	
Total Credits	**3**
major compulsory	
Prerequisites	P1 : Electrical Circuits (67212) OR Electrical Circuits (69231) OR Electrical and Electronic Circuits (63291) OR Electrical Circuits (65260) OR Electrical Cirucits (63292)

Course Contents

Introduction to electric machines, transformers, fundamentals of electric machines, DC generators, DC motors , AC electric machines, synchronous machines, induction motors.

	Intended Learning Outcomes (ILO's)	Student Outcomes (SO's)	Contribution
1	Learning the techniques and calculation methods of ideal transformer , the practical transformer with its equivalent circuits ,the per-unit system ,the voltage regulation and efficiency of transformer .	A	25 %
2	Learning the design techniques and characteristics of the DC generator types and the DC motor types with their related calculations.	C	45 %
3	Understanding the principles and characteristics of AC machines and the synchronous generator .	E	13 %
4	Understanding the construction ,function and characteristics of the three phase induction motor	E	17 %

Textbook and/ or Refrences

Stephen J. Chapman , Electric Machinery Fundamentals. 4th Edition, McGraw Hill 2005

Assessment Criteria	Percent (%)
First Exam	20 %
Second Exam	20 %
Quizzes	10 %
Final Exam	50 %

Course Plan

Week	Topic
1	Introduction: Note on units, magnetic circuits, magnetization curves.
2	Transformers : Type of transformers, the ideal transformer, theory and operation of ideal transformer.
3	Transformers : The practical transformer , the equivalent circuit of practical transformer, the open circuit test and short circuit test.
4	The transformer voltage regulation , efficiency, and the per-unit system calculations .
5	Fundamentals of electric machines: induced voltage on a conductor moving in a magnetic field (generator action), production of induced force on a wire (motor action), rotating loop between curved pole phases.
6	The induced torque in the rotating loop in a magnetic field, the generated DC voltage of a rotating loop, winding types of electric machines, voltage regulation.
7	DC Generators: separately exited generators, armature reaction, the shunt DC generator, the efficiency of the DC generator. First Exam
8	The series DC generator, the cumulatively compound DC generator.

9	DC Motors : Separately exited motors, the shunt DC motor , speed control of DC motors , series DC motors.
10	AC Electric machines: Difference between DC and AC machines ,rotating magnetic field, relationship between frequency, speed of magnetic field , speed of rotor and poles., the induced voltage in AC machines.
11	Synchronous generator construction , the speed of rotation of a synchronous generator, the internal generated voltage of a synchronous generator, the equivalent circuit of a synchronous generator.
12	The phasor diagram of a synchronous generator , power and torque in synchronous generator. Examples on synchronous generator . Second Exam
13	Induction Motors : Induction motor construction, basic induction motor concepts, , the equivalent circuit of induction motor, power and torque in induction motor.
14	Induction motor torque speed characteristics, examples on induction motors. Quiz
15	General examples on selected subjects of the course and review of specific topics
16	Examples on some topics and FINAL EXAM