

Course Name Electrical Machine - II
Course Code EE501
Course Credit 4
Contact Hour 3L-1T
Prerequisite Electrical Machine-I, Field Theory

Course Objective

The objectives of this course are

1. To prepare students to perform the analysis of any electromechanical system.
2. To teach principles of Induction Machine, Synchronous Machines and Fractional kW Motors and how they work.
3. To empower students to understand working of electrical equipment used in industry, power system and house-hold applications.
4. To expose the students to the concepts of various types of electrical machines and applications of electrical machines in electric power engineering and electric drives.
5. To analyze power requirements, power capability, efficiency, operating characteristics, control requirements and electrical demands of these machines.

Course Outcome

On completion of the course students will be able to

1. Formulate and then analyze the working of any electrical machine using mathematical model under loaded and unloaded conditions.
2. Understand and explain the principle of operation and performance of Induction Machine, Synchronous Machines and Fractional kW Motors.
3. Analyze the response of Induction Machine, Synchronous Machines and Fractional kW Motors.
4. Troubleshoot the operation of Induction Machine, Synchronous Machines and Fractional kW Motors.
5. Analyze given require specification of electrical machine and select a suitable measuring instrument for a given application.
6. Select the suitable specification of machine for different purpose

CO Mapping with departmental POs

H: High, M: Medium, L: Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	H											
CO 2	H	M	L									
CO 3			M	H								
CO 4			M	H								
CO 5			H									
CO 6			M	H								

Course Content

Module-I: Single Phase Induction Motor

10L

Construction, Double revolving field theory, Cross field theory, Starting methods, Speed-Torque characteristics, Phasor diagram, Condition of Maximum torque, Determination of equivalent circuit parameters, Testing of Single phase motors, Applications. Single phase AC series motor, Compensated and uncompensated motors.

Module-II: Special Electromechanical Devices**9L**

Principle and construction of switched Reluctance motor, Permanent magnet machines, Brushless DC machines, Hysteresis motor, Stepper motor, Tacho generators, Synchros & resolvers. AC servo motors, Principle, construction and operational characteristics of Induction generator & linear Induction motor.

Module-III: Synchronous Machines**20L**

Construction, Types, Excitation systems, Generator & Motor modes, Armature reaction, Theory for salient pole machine, Two Reaction theory, Voltage regulation (EMF, MMF, ZPF). Operating characteristics of Alternators and their rating. Power angle characteristics of Synchronous machines. Parallel operation of Alternators, Synchronous machine connected to infinite bus, effect of change of excitation and speed of prime mover. Starting of Synchronous motor, V-curve. Damper winding, Hunting. Short circuit transients. Applications.

Text Books:

1. Electrical Machinery, P.S. Bhimra, Khanna Publishers.
2. Electrical Machines, Nagrath & Kothary, TMH.
3. Electrical Machines, Theory & Applications, M.N. Bandyopadhyay, PHI

Reference Books:

1. Electric Machinery & Transformer, Bhag S. Guru and H.R. Hiziroglu, 3rd Edition, Oxford University press.
2. Electric Machinery, A. E. Fitzgerald, Charles Kingsley, Jr. & Stephen D. Umans, 6th Edition, Tata McGraw Hill Edition.
3. Theory of Alternating Current Machinery, Alexander S Langsdorf, Tata Mc Graw Hill Edition.
4. The performance and Design of Alternating Current Machines, M.G.Say, CBS publishers & distributors.
5. Problems in Electrical Engineering, Parker smith, 9th Edition, CBS publishers & distributors.