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# Electrical machinery and electrical drives

## Finalità

The course provides the basic knowledge required for the usage of the most common electrical machine and electric drives.

## Programma

Electric machines classification. The main components of the electric machines.

Joule losses and iron losses: the efficiency of the electrical machines.

Transformer: ideal transformer and real transformer: no load operations and rated load operations.

Voltage drop, power, losses and efficiency of electrical transformer. Three phases transformers.

Induction machines: mechanical and electrical behaviour. Induction motor start-up and velocity regulation.

Direct Current machines: electrical and mechanical behaviour, start-up and velocity regulation.

Permanet Magnet Synchronous Machines (PMSM): a.c. and d.c. PMSM, electrical and mechanical behaviour.

Permanet magnet step motor, reluctance step motor and hybrid step motor.

Electric Drives classification. The main components of electric drives: speed and position transducers, current transducers.

Analog and digital PID regulators, PLC.

Electric drives based on permanent dc motors: torque control and velocity control.

DC motor supply: soft switching chopper.

Electric drives based on PMSM: torque control and velocity control.

Electric drives based on induction motors: torque and speed control.

Incremental electrical drives: basic stepping motor control circuits.

## Attività d'esercitazione

Laboratory activity on electrical machines characterization.

## Modalità d'esame

The exam is based on an oral discussion

## Propedeuticità

Applicazioni Industriali Elettriche

Elettronica

## Testi consigliati

E.Bassi, A.Bossi "Macchine e Azionamenti Elettrici" UTET, Milano ISBN: 88-7933-184-1

Lecture notes