

Electrotechnique et Electronique de Puissance

Electrotechnics and Power Electronics- 3rd level

IDENTIFICATION

CODE : GEA-4-S2-EC-ETEP3
ECTS : 3.0

HOURS

Lectures : 15.5 h
Seminars : 15.5 h
Laboratory : 24.0 h
Project : 0.0 h
Teacher-student
contact : 55.0 h
Personal work : 28.0 h
Total : 83.0 h

ASSESSMENT METHOD

personal work
composition 3h
Laboratories

TEACHING AIDS

TEACHING LANGUAGE

French

CONTACT

M. COTTINET Pierre-Jean
pierre-jean.cottinet@insa-lyon.fr
M. PETIT Lionel
lionel.petit@insa-lyon.fr

AIMS

Choice and set-up of a switching power supply [DC/DC or DC/AC]
Analyse and design of basic switching power supplies
Set up and analyse of an actuation system : electrical machine [DC or AC] and its power supply
Static power converters analysis methods, main architectures, power electronics switches and passive components. Dynamic models of induction motors, variable speed operations. Self-controlled synchronous motor.

CONTENT

Course and exercises :
DC-DC power converters, principles, reversibility, passive input and output filters. Insulated switch mode power converters [Forward, Flyback, ...]. Semiconductors protections, soft-switching networks. Single-phase, half bridge, full bridge, push-pull and three-phase voltage source inverters. Dynamic models of induction motors for flux vector control.
Laboratory:
DC-DC switch mode power converters [insulated and non-insulated], voltage source inverters, self-controlled synchronous motor, variable speed operations of induction motors, method of symmetrical co-ordinates (unbalanced three-phase generator), high voltage installation.

BIBLIOGRAPHY

Electronique de puissance - Techniques de l'ingénieur, D 3 150 - 1 à D 3 175 - 9
Alimentations à découpage et convertisseurs à résonance, JP Ferrieux, F Forest, Ed. Masson, 1997
Modélisation des machines électriques en vue de leur commande, JP Louis, Ed. Hermes, 2004
Principles of electric machines and power electronics, Ed. John Wiley et Sons, 1997
Fundamentals of Power Electronics, R.W. Erickson, Ed. Chapman and Hall, New york, 1997

PRE-REQUISITE

modules 3-GEA-ETEP1 et 3-GEA-ETEP2.