

Heat Transfer

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IDENTIFICATION

CODE : GEA-5-TT
ECTS : 2.0

HOURS

Lectures : 10.0 h
Seminars : 10.0 h
Laboratory : 8.0 h
Project : 0.0 h
Teacher-student
contact : 28.0 h
Personal work : 15.0 h
Total : 43.0 h

ASSESSMENT METHOD

Practical Laboratory mark (25%)
Written exam : 2h (75%)

TEACHING AIDS

Text books courses, lecture, practical
lab (in French)

TEACHING LANGUAGE

French

CONTACT

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AIMS

On a given case, know which modes of heat transfer need to be taken into account [conduction, convection, radiation],
Know the dedicated equations of each heat transfer mode and how to use them,
Know how to choose the best method to resolve a problem of heat transfer: equivalent electrical circuit, analytical resolution, finite difference method.
Give the future engineer all the needed knowledges to understand and control heat transfers in various electrical engineering processes, devices or components

CONTENT

Course: Temperature measurements (dedicated sensors and conditioners)Heat transfers: conduction of heat, convective heat flow, radiating heat flowModelling of heat transfers with equivalent electrical circuitsFinite-difference methods
Lecture: Application to various problems of electrical engineering heat transfers
Practical lab:Radiating heat flow - Infra-red emissivity-Greenhouse effect-Stefan-Boltzmann LawHeat transfer in VLSI component by Finite Element Method ModellingTemperature measurements with PT 100 temperature sensor

BIBLIOGRAPHY

- 1 - Georges Asch et collaborateurs, Les capteurs en instrumentation industrielle, 5ème édition, Dunod (1999)
- 2 - F.P Incropera, D.P. De Witt, Fundamentals of heat and mass transferts, 3rd ed. J. Wiley-Sons (1990)
- 3 - M. Orfeuil, Electrothermie industrielle, Dunod (1981)
- 4 - Anna-Maria Bianchi, Yves Fautrelle, Jacqueline Etay, Transferts Thermiques, Presses Polytechniques et Universitaires Romandes, 2004

PRE-REQUISITE

Differential and integral calculus, matrices, electricity fundamentals