INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON

DPT GENIE MECANIQUE
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Fluid and Thermal Mechanics

Energy conversions

IDENTIFICATION

CODE : GM-4-S2-EC-MECEN
ECTS : 3.0

HOURS

Lectures :	24.0 h
Seminars :	20.0 h
Laboratory :	0.0 h
Project :	0.0 h
Teacher-student contact :	44.0 h
Personal work :	45.0 h
Total :	89.0 h

ASSESSMENT METHOD

Final Exam (2h)

TEACHING AIDS

TEACHING LANGUAGE

French

CONTACT

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AIMS

-Describe and analyze thermodynamically the operating principles of energy conversion systems in sectors such as transport, industry or energy production.
-Identify the diffrent components of a turbomachine and explain the role of each element.
-Modeling and analyzing, from the point of view of fluid mechanics, the performance of a turbomachine.

CONTENT

- Theory of machines, exergy, thermodynamics in finite time
- Thermal machines and steam power plants, Vapour power cycles, gas power cycles
- Thermodynamics of compressors
- Refrigerating plants and heat pumps
- Air treatment (air conditioning), humid air
- Reciprocating internal combustion engines with external heat input, energy balances
- Machinery classification: Centrifugal, axial machines. Hydraulic turbines, wind turbines, gas turbines, compressors, turbocharger, turbojet and pumps.
- Turbomachinery Components
- Insertion of the machines in the associated circuits, serial / parallel coupling
- Description of Turbomachinery operation, Energy transfer and velocity diagram in turbomachines.
- Mechanisms of loss and quantify the different yields: isentropic, polytropic
- Preliminary design for turbomachines elements
- Cavitation phenomenon in Hydraulic machines.
- Dimensional analysis and similarity in turbomachines

BIBLIOGRAPHY

- Turbomachinery : basic theory and applications - Logan , Earl - 1993
- Internal Combustion Engine Fundamentals, Heywood, 1988

PRE-REQUISITE

Thermodynamics, Fluid mechanics