TAL TECH

DEPARTMENT OF ENERGY TECHNOLOGY

THERMAL ENGINEERING

Lecturer: ass. prof. Andrei Dedov, PhD
Room: U06 327
Telephone: 6203913
Email: Andrei.Dedov@taltech.ee

Introduction

Course code	**MSJ0001**
Course title	Thermal Engineering
ECTS credits	6.0
Assessment form	examination
Lecturer	Andrei Dedov (English)
Course aims	Teaching/learning goals are to provide: - a general account for thermal phenomena and thermal appliances in the field of mechanical and energy engineering; - deeper theoretical knowledge on thermodynamics and heat transfer processes as well on practical thermal appliances i.e. heat exchangers, heat and power generating units, cooling and freezing units and boiler units, but also on organic fuels for boilers.

OUTCOMES

Learning outcomes in the course	- clear comprehension of thermodynamic terms, a good knowledge of gas and water vapour properties, a clear comprehension of common thermodynamic processes; - clear comprehension on processes and cycles of thermal power generating units, as well coolers and freezers, capability to calculate the efficiency of units; - good knowledge on heat propagation ways and a capability to calculate the heat transfer intensity in technical appliances; - capability to calculate the heat and energy amount transferred or transformed in thermodynamic processes and in heat exchangers; - good knowledge main types of heat exchangers, a capability for basic thermal calculation of heat exchangers; - basic knowledge on properties and characteristics of organic fuels, a basic knowledge of layout, main characteristics and parameters of steam boilers.

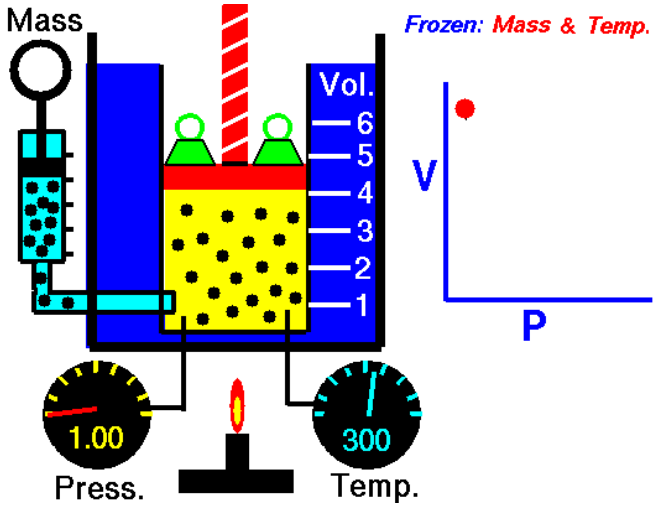
Description

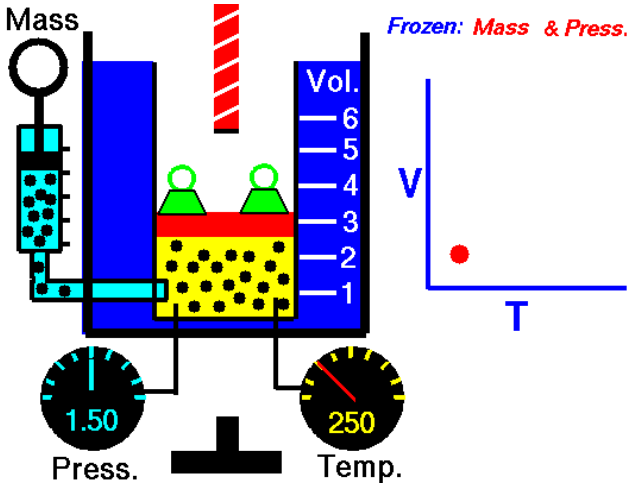
brief description of the course	- Introduction. Main information about subject. Main topics in thermodynamics. Thermodynamic substance and thermodynamic parameters of substance. - Ideal gas, real gas, gas mixtures. Internal energy, enthalpy and entropy. Specific heat capacity of substance. - Work and heat. First law of thermodynamics. Common thermodynamic processes. - Basics about thermodynamic cycles. Thermal efficiency of cycles. Carnot thermodynamic cycle. Second law of thermodynamics. Thermodynamic cycles of heat engines. - Thermodynamic properties of water and steam. Water and steam thermodynamic data tables and diagrams. - Schematic sketch for steam turbine-driven power generation unit, thermodynamic cycle of that unit. Cogeneration of heat and power. Cogeneration total efficiency. - Heat and energy conversion processes. Heat pumps and refrigerators. Schematic sketch of refrigerator. - Basics about fluid (liquid and gas) flow. Throttling. Basics about nozzles,

Description

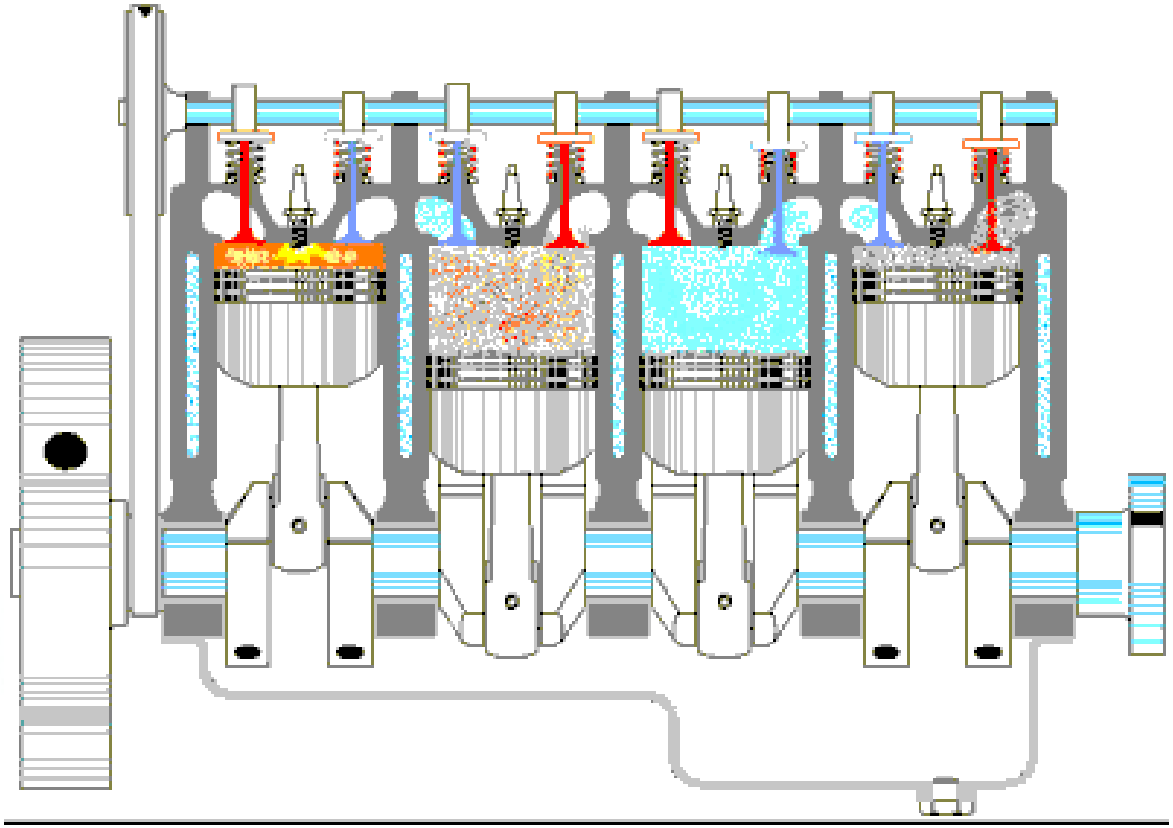
brief description of the course	- Main ways for heat propagation: heat transfer by thermal conduction, heat transfer by convection and thermal radiation. Heat transmission in heat exchanges, types of heat exchanges, and basics for simulation of heat transmission in heat exchanges. - Fuel types, main character

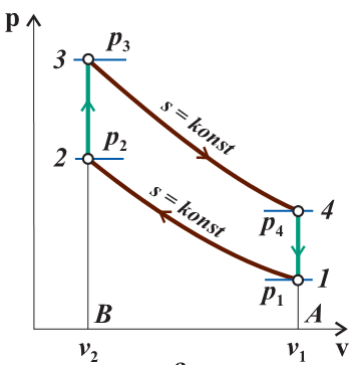
Description

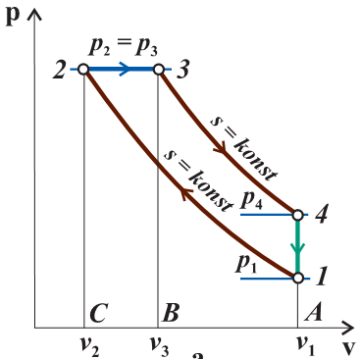


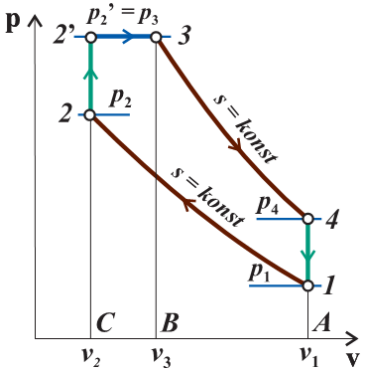


Description

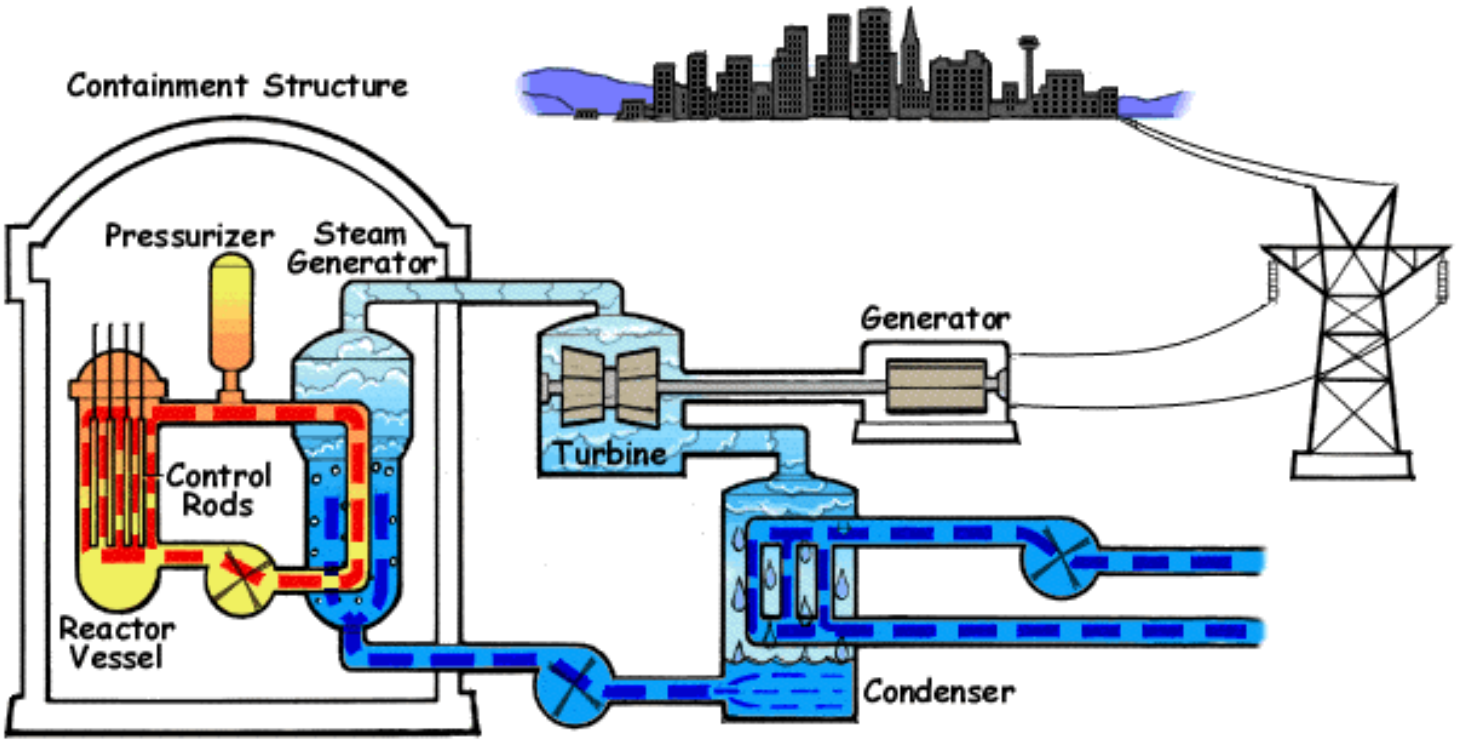




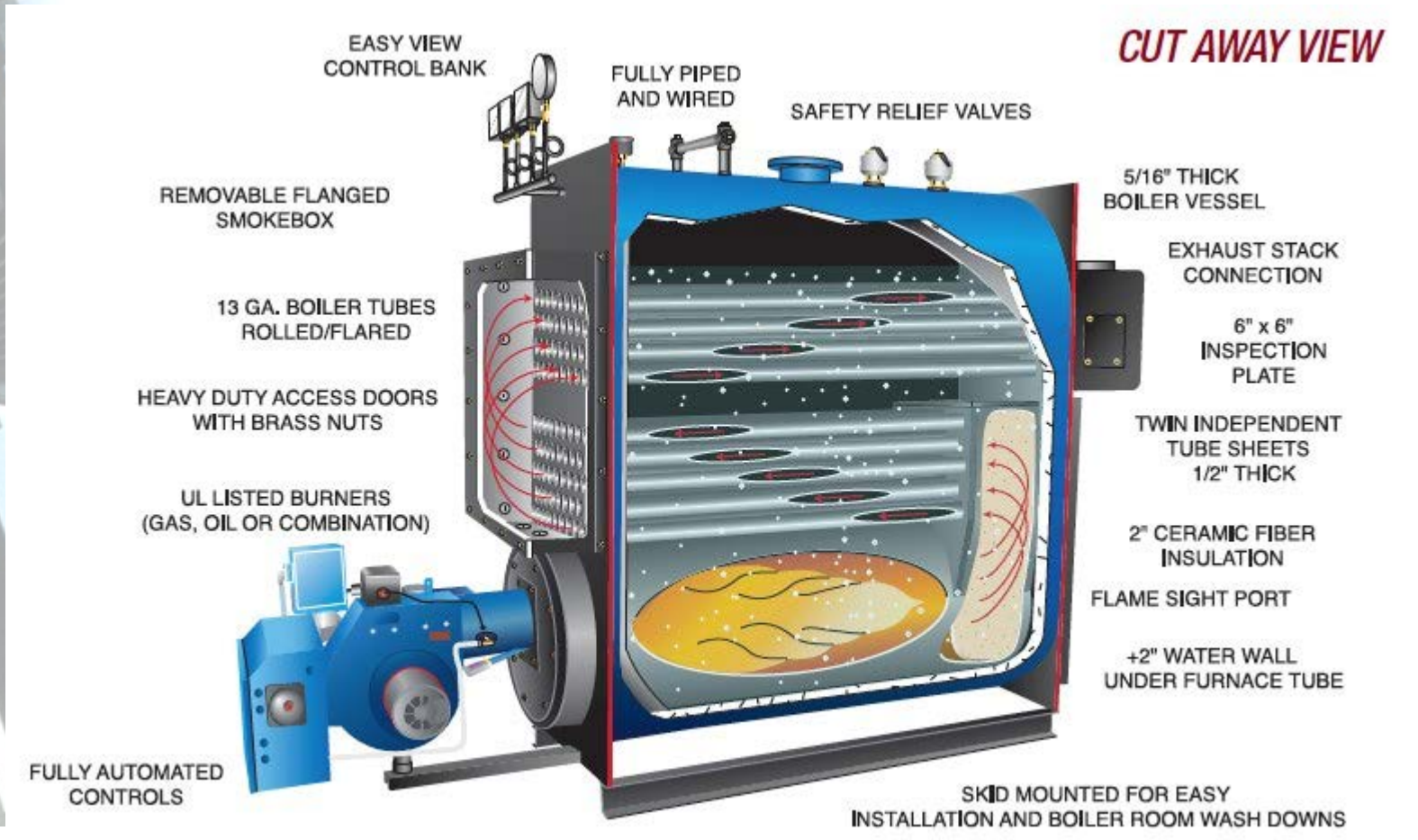




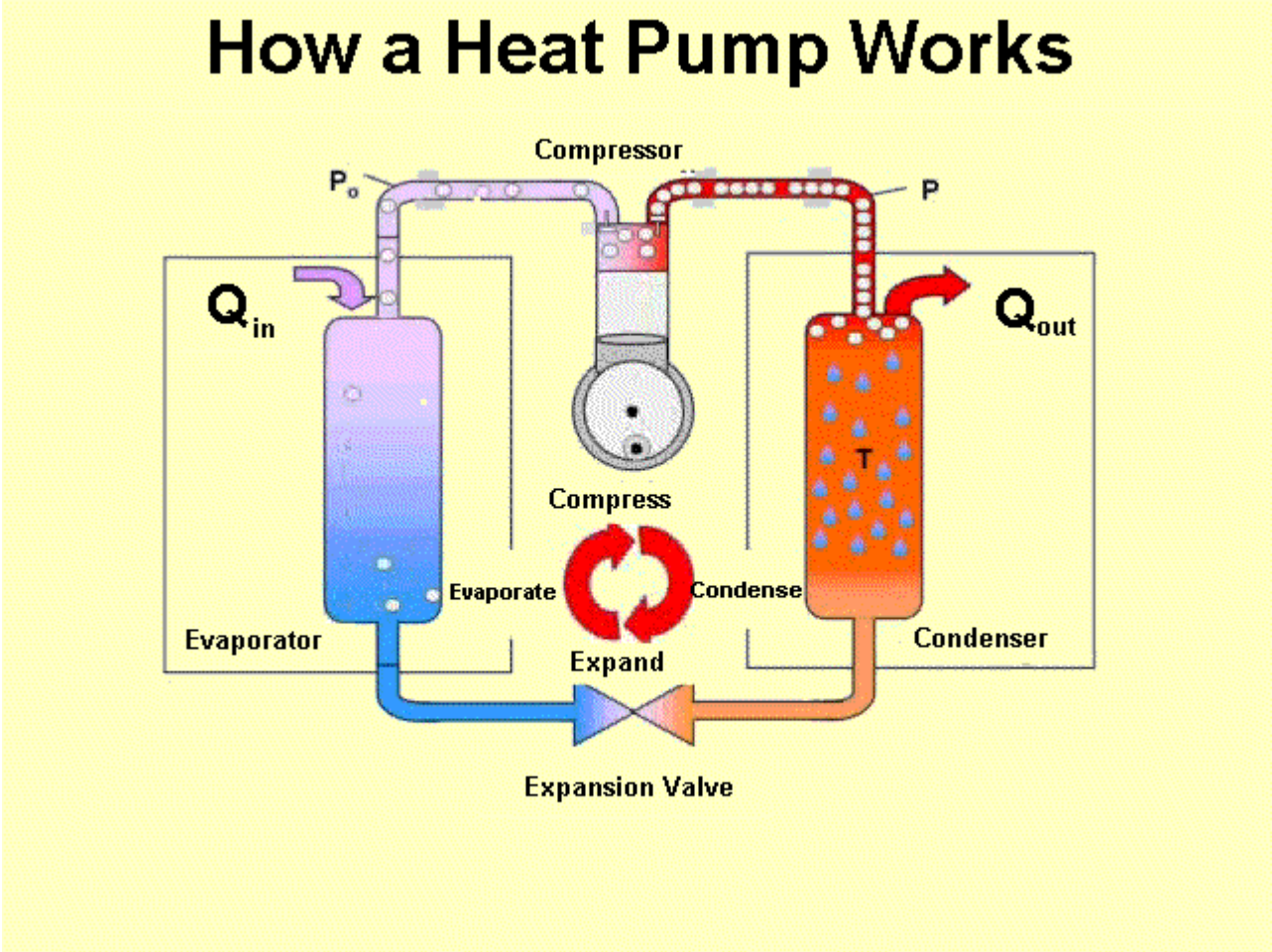
Description



Description



Description



Description

evaluation criteria	
A student shall demonstrate his/her acquired competencies by answering five questions in written form. The questions shall be given on topics considered during lectures. The duration of the exam will be 90 minutes. Final grade will be the result of written exam Exam(70%) + Labs&Ex(30%) **Assessment prerequisites:** Laboratory works previously handed in and defended	
Study literature	- Y.A. Cengel, Thermodynamics, An Engineering Approach, 2004 - M. J. Moran, Fundamentals Engineering Thermodynamics, 2011 - Y.A. Cengel, Heat and Mass Transfer, 2015 - A. Ots, Soojustehnika.Aluskursus, Tallinn, 2011 - http://www.tud.ttu.ee/im/Andrei.Dedov/MSJ0001_ThermalEngineering/
Full-time studies	4.0
lectures	2.0
practices	1.0
exercises	1.0

Timetable

time	lesson	lecturer	room	duration
Tuesday				
08:00-09:30	Thermal Engineering (MSJ0001) lecture groups: EARB51, LARB51	Professor Alar Konist, Associate Professor Andrei Dedov, Senior Research Scientist Dmitri Nešumajev	U06-220	1-16
11:30-13:00	Thermal Engineering (MSJ0001) practice+exercise groups: EARB51	Associate Professor Andrei Dedov, Lead Engineer Sven Kamenev	U06-220	1-16
16:00-17:30	Thermal Engineering (MSJ0001) practice+exercise groups: EARB51	Associate Professor Andrei Dedov, Lead Engineer Sven Kamenev	U06-201	1-16
Wednesday				
12:00-13:30	Thermal Engineering (MSJ0001) lecture groups: MVEB51, MVEB52	Associate Professor Andrei Dedov	U06-220	1-16
Thursday				
08:00-09:30	Thermal Engineering (MSJ0001) practice+exercise groups: MVEB52	Associate Professor Andrei Dedov	U06-201	1-16
10:00-11:30	Thermal Engineering (MSJ0001) practice+exercise groups: MVEB51	Associate Professor Andrei Dedov	U06-201	1-16
14:00-15:30	Thermal Engineering (MSJ0001) practice+exercise groups: LARB51	Lead Engineer Sven Kamenev, Associate Professor Andrei Dedov	U05-104	1-16

12:00 ?