

Ene-39.4006 New Energy Production Processes
Examination Tuesday 14.12.2010 time: 13.00-17.00

1. Explain the basic principles of $H_2(g)$ /air fuel cell operation. Draw a schematic diagram of the fuel cell. What are the fuel cell polarization losses and how does a typical polarization curve of the fuel cell look like? What is the thermodynamic efficiency of the fuel cell? Describe different types of fuel cells AFC, PEM and SOFC, and write the basic anode and cathode reactions for each of them. Which one these fuel cells is suitable also for $CO(g)$?
2. Describe the state of the art of the wave energy technology. What is the meaning and importance of the numbers: 40 kW/m (in Portugal) and 60..70kW/m (in England)? Classify the existing wave energy technologies and describe different types of wave energy devices. What kind of problems for pilot systems are reported by Wave Energy Center in Portugal?
3. Explain applications where microturbines are attractive. What does mean ORC cycle and what is the idea behind that? What are the basic concepts of dye-sensitized solar cell?
4. Give examples how to improve energy efficiency by changing technology. As an example consider the use of compressed air in workshops. Describe how the use of coal can be replaced by different biomass solutions.