

ÓBUDA UNIVERSITY



**SÁNDOR REJTŐ FACULTY OF LIGHT INDUSTRY AND
ENVIRONMENTAL ENGINEERING**

INSTITUTE OF ENVIRONMENTAL ENGINEERING

**ITEMS REQUIRED FOR FINAL EXAMINATION OF
THE LIGHT INDUSTRY SPECIALISATION OF THE FULL
TIME BSc (C) ENVIRONMENTAL ENGINEERING
PROGRAMME**

**Budapest
2017**

Final Examination

The final examination period is determined by the order of University Rector containing the schedule for the academic year. The defence of the BSc thesis should be done before the final oral examination in front of the examination's board of which has of a chairman and at least two members.

The final examination consists of two steps: 1. defending the thesis and 2. oral examination in the subjects specified by the curriculum. The final examination must be carried out in one day, continuously. During the examination period, student will have 20 minutes as preparation time for each subject. At the same time one student may be allowed to take an examination in front of the board.

The result of the final examination

The result of the final examination is calculated as the average of the grades received from the defence of BSc thesis and the oral part of the final examination in the subjects specified by the curriculum:

$$R = \frac{TH + \sum_{i=1}^n R_i}{1 + n}$$

where:

- R result of the final exam,
- TH result of the thesis,
- R_i result of the i oral exam,
- n number of oral exams (in our case $n = 2$).

On the basis of the result of the final examination, finally, it can be calculated as shown above and the grade of the diploma must be as in the following table:

In Hungarian	In English	Result of Final Exam (R)
kiváló	outstanding	5.00
jeles	excellent	4.51 – 4.99
jó	good	3.51 – 4.50
közepes	satisfactory	2.51 – 3.50
elégséges	pass	2.00 – 2.50

FINAL EXAMINATION ITEMS OF THE LIGHT INDUSTRY SPECIALISATION OF THE FULL TIME ENVIRONMENTAL ENGINEERING PROGRAMME

PART (A): *Nature conservation and landscape protection*

1. What is the definition of landscape? What kind of landscape concept do you know?
2. The border of landscape, landscape-forming factors.
3. Regions of Hungary, introduce the hierarchy system of landscape and the main landscape types in Hungary.
4. According to the geological aspects of the landscape introduce the solid material of the Earth in term of rock and mineral. Mention down the main types (groups) of the rocks.
5. Briefly give an account on the theory of plate tectonics and the main types of plate boundaries. What is a relationship between plate tectonics and volcanic activity? Introduce the main types of volcanism.
6. How can we define the protected area? What kind of protection areas do you know?
7. What is the IUCN? Introduce the IUCN categories of protected areas.
8. International history of protected areas. Describe the main events which helped to form nature protection.
9. International conventions on natural conservation/protection (Ramsar Convention, MAB, UNESCO World Heritage Site, CITES, Bern and Bonn Conventions, CBD=Conference in Rio)
10. Natural conservation in Hungary (classification of natural areas, history of national parks).
11. Define and explain the followings: ecosystem, biomes, food chains and trophic pyramids, biogeochemical cycles, biodiversity, ecological interactions, ecological succession, population ecology or environmental issues.

12. Define and explain the followings: Population Ecology, Global Ecology, Community Ecology, Behavioural Ecology, Population Dynamics in Ecology, Evolutionary Ecology.
13. Explain what you mean by environment, levels of ecology, ecosystems and the primary consumer.
14. What do you mean by landscape structure, biodiversity and how human Impact on the Environment
15. Briefly describe the followings: biogeography, eutrophication in lakes and seas, metapopulation, biodiversity, bioaccumulation, biome.
16. Three types of biodiversity are genetic, species and ecosystem diversity. Explain what each term means, showing the different meaning of each term.
17. The classic model of logistic population growth is characterized by two parameters: the intrinsic rate of growth, r , and the carrying capacity, K . Draw a graph of logistic population growth (abundance vs. time, beginning at a very low initial abundance) and explain how parameters r and K affect the shape of this graph. What types of life history traits affect r and K ?
18. Aquatic communities often have more trophic levels than terrestrial communities. Discuss physiological and energetic reasons that might help explain this difference.
19. What is pollutant? Describe the major sources of pollutants and transport mechanisms. Briefly describe a strategy that has been developed to reduce the impact of pollutants on human health or the environment.
20. What is ecotourism? State two criteria that characterise an activity as ecotourism and describe any likely negative impacts of your nominated ecotourism activity. Should the ecotourism activity you described call 'environmentally sustainable'? Justify your answer in terms of the meaning of environmentally sustainable.

PART (B): Elements of Environmental protection

PART B-I: Water quality protection

1. Describe the hydrological and social water cycle and their key processes! Present the freshwater types and their characteristics!
2. Describe the concept of water quality and its physical, chemical, biological, bacteriological parameters and explain some measurement methods.
3. What is the main goal of the WFD, what are the key elements of the WFD? Explain the ecological water qualification process according to the WFD.
4. Explain the transportation process of pollutants in surface and subsurface waters. What does the self-cleaning process mean?
5. What is the definition of wastewater, describe the types of wastewater and mention their characteristics. Describe the advantages and disadvantages of combined and separated sanitary systems.
6. Draw the typical wastewater treatment process flow diagram and explain the different technological processes.
7. Explain the water disinfection processes.
8. Describe the membrane technologies of water treatment systems.
9. Explain the natural and decentralized sewage treatment processes. Justify their application.
10. Describe the sewage sludge and its components. Explain the technological options and purpose of treatments focusing on reuse. Describe some disposal methods.

PART B-II: Air quality protection

1. Describe the global problems of the Earth (greenhouse effect, the ozone layer is getting thinner, acid rains)
2. The spread of pollutants in the atmosphere (atmospheric motions, self-cleaning of the atmosphere)
3. Describe the characteristics of dusts (definition, categorization by size, by type of act when flying, by origin)
4. Fractionation of dust particles
5. Describe the following dust collecting method: settling and baffle chambers
6. Describe the following dust collecting method: Centrifugal collectors (including the forces that effect the dust particles)
7. Describe the following dust collecting method: electrostatic precipitators (ESP)
8. Describe the following dust collecting method: filtration (including the efficiency)
9. Describe the following dust collecting method: wet scrubbers (spray scrubbers and packed scrubbers)
10. Describe the following dust collecting method: wet scrubbers (dynamic scrubbers, plate scrubbers and venturi scrubbers)

PART B-III: Protection of environmental matrices (Soil protection)

1. What is the Soil? Describe the layers, functions and phases of the soil.
2. Describe the concept of soil degradation! What are the causes of soil degradation? What are the most important soil degradation processes?
3. Describe the erosion phenomena and the methods of defence against them.
4. Describe the phenomenon of salinization and its defence.
5. Describe the most commonly occurring organic soil contamination and prevention. The fate of organic pollutants in the soil e.g. pesticides and their mobility, water solubility, bioaccumulation.
6. Describe the most often occurring inorganic soil contamination and prevention.
7. Describe the distribution of groundwater contamination and its incorporation into the soil, the process of spreading and the methods of its prevention.
8. Describe the concept of bioremediation and its applications.
9. Describe the methods of modern landfill (deposition)
10. Describe the concept of in situ, in-site, ex-site exemptions and compare the advantages and disadvantages of soil contamination.
11. Describe soil colloids and their role in the soil.

PART B-IV: Waste management

1. Describe the possible classification and characteristics of waste.
2. Describe the purpose and the main principles of waste management and the Waste Management Plan.
3. Classify the different waste collecting technologies and describe them.
4. Describe the possible ways of waste transportation and waste deposit.
5. List and describe the physical procedures of waste pre-treatment.
6. List and describe the chemical processes of waste pre-treatment.
7. Describe the technological steps of waste incineration.
8. Describe the technological steps of pyrolysis.
9. Describe the aerobic and anaerobic waste management.
10. Describe the hazardous waste disposal technologies.

PART B-V: Noise, vibration and radiation protection

1. Classify sounds according to their frequency, energy, waveform and time change? What is the mathematical relationship between the sound intensity and the rms (root mean square) value of the sound pressure? How can we determine effective sound pressure from the maximum sound pressure value?
2. Define the sound intensity and pitch. Describe the known levels of acoustics. What is the mathematical relationship between the sound power, sound pressure, sound intensity and loudness level? What does the loudness level depend on? Explain the Fletcher-Munson curves.
3. Describe the factors which effect the outdoor sound propagation. Explain the sound barrier wall. Define the Fresnel number.
4. Describe the energy conditions of a closed sound field. What do we mean during reverberation time (T60), how can it be calculated?
5. What metrics do we use to determine the level of environmental noise and what are the noise limits for evaluating it?
6. What do we mean under a strategic noise map, how is it done, and what is its function? Describe the most important noise protection solutions (at source, at transmission path, and at receiver).
7. How can we categorize the mechanical source of vibration? How the equivalent vibration acceleration (and acceleration level) be determined and measured? What are the most important methods of vibration protection? Describe the modes of vibration reduction.
8. Group the main types of particle radiation. Describe the natural and artificial components of radioactive exposure. Describe the natural radioactivity. Describe the operational principle of Nuclear Power Plant in Paks. What to do in case of nuclear accidents in nuclear power plants (remedial and defence modes)?
9. Categorize the main types of electromagnetic radiation. Give the physical quantities of ionizing and non-ionizing radiations. Define "SAR" and "ALARA". Describe the most important methods of protection for radiation protection.
10. What do we mean by light pollution and electrosmog? What is the impact on the living environment? How to reduce their effect? Avoid using mobile phones (with regard to their radiation).

PART B-VI: Renewable Energy

1. Describe the biomass according to their classification and characteristics.
2. Describe the use of biomass for energy purposes.
3. Describe the operation of wind turbines.
4. Mention and explain the types of alternative fuels.
5. Describe the operation and types of hydro power plants.
6. Describe the thermal utilization of geothermal energy.
7. Describe the method of how electricity is produced from geothermal energy.
8. Describe the heat pump power supply.
9. Describe the thermal utilization of solar energy.
10. Describe the solar cells and their application.
11. Describe the energy sources and the energy chain.