YLIOPISTOTENTTI - UNIVERSITY EXAM

Opiskelijan nimi / Student name:	Opiskelijanumero / Student number:

Opettaja täyttää / Lecturer fills in:

Opintojakson koodi and nimi / The code and the name of the course:

Koodi / Code: 721345S

Tentin nimi / Exam name: Environmental Economics

Tiedekunta / Faculty: Oulun yliopiston kauppakorkeakoulu / Oulu Business School

Tentin pvm / Date of exam: 25.9.2017	**Tentin kesto tunteina / Exam in hours: 3**
Tentin nro / No. of the exam: 2. uusinta / 2. retake (esim. Tentti, 1. uusinta, 2. uusinta / e.g. Exam, 1. retake, 2. retake)	**Opintopistemäärä / Credit units: 6**
Tentaattori(t) / Examiner(s): Artti Juutinen	**Sisäinen postios. / Internal address:**

Sallitut apuvälineet / The devices allowed in the exam:

☒ Nelilaskin /
Standard calculator

☒ Funktiolaskin /
Scientific calculator

☐ Ohjelmoitava laskin /
Programmable calculator

☐ Muu materiaali, tarkennettu alla / Other material, specified below:

Tenttiin vastaaminen / Please answer the questions:
☒ Suomeksi / in Finnish   ☒ Englanniksi / in English

Suomenkielisessä tutkinto-ohjelmassa olevalla opiskelijalla on oikeus käyttää arvioitavassa opintosuorituksessa suomen kieltä, vaikka opintojakson opetuskieli olisi englanti. Tämä ei koske vieraan kielen opintoja. (Kts. Koulutuksen johtosääntö 18 §)

In a Finnish degree programme a student has a right to use Finnish language for their study attainment, even though the language of instruction is English, (excluding language studies) even when the language of instruction is other than Finnish. (See the Education Regulations 18 §)

Kysymyspaperi on palautettava / Paper with exam questions must be returned:
☐ Kyllä / Yes   ☒ Ei / No

1. Answer the questions below.

   a) What functions the natural environment provides to the economy? What possibilities of substitutions there are between human-made and environmental functions? Give examples. (2p)

   b) What is the materials balance principle? (2p)

   c) What is the environmental Kuznets curve (EKC) hypothesis? (Hint: use graphs) (2p)

2. Consider the following questions relating to pollution control.

   a) What do we mean by flow pollutant and stock pollutant? Explain briefly and give an example of both. (1p)

   b) Suppose now that we want to determine the efficient level of flow pollutant. Draw the typical shapes of pollution benefit and damage functions (both total and marginal). Explain the intuition behind these functions. (2p)

   c) Identify the efficient level of flow pollutant with a graph and explain it. Also show on your graph the quantity of flow pollutant that would be achieved without pollution control. Note: Full credit requires graph plus explanation. (3p)

3. Answer the following questions concerning use of non-renewable resources

   a) Derive Hotelling rule by using a two period model and interpret the result. (3p)

   b) Derive the optimal extraction path of the mine's output for the two periods by using the following information. (3p)

   Suppose that the mining company owns a fixed stock of ore. The size of stock is 15 tons. The company operates only two periods. Denote ore extraction at period t by x_t. The market price of ore (per ton extracted) is 10 euros. Accordingly, the total revenues are $R_t = 10x_t$. The total costs of extraction are $C_t = \frac{1}{2}x_t^2$. The rate of interest at which rents are discounted is 10 percent.

4. Answer the following questions concerning fishery
   a. By using graphs describe, explain and interpret the open access steady-state and static profit-maximising private-property equilibriums. (3p)
   b. By using graphs describe, how taxes can be used to solve the open access problem. (3p)